

2019 Ohio School Design Manual

Volume 2:

21st Century Learning Environment Guidelines

OFCC

OHIO FACILITIES CONSTRUCTION COMMISSION

The ***Ohio Facilities Construction Commission*** *(**OFCC**)* is pleased to announce the ***2019*** Ohio School Design Manual (OSDM) update.

Each year the Commission revises the OSDM with support and valuable input from the design and construction community, school districts, state agencies and other interested parties. The result is a dynamic document that reinforces our commitment to high quality school facilities while maintaining flexibility and local control.

This "VOLUME 1 - EDUCATIONAL FACILITY PLANNING GUIDE" is a stand-alone guide for school districts to use as a guide for facility planning. This stand-alone guide outlines the process from inception up to the design phase of a facility project. ***After the planning process, outlined within this 2019 OSDM "Volume 1: Educational Facility Planning Guide", the 2019 OSDM "Volume 2: 21st Century Learning Environment Guidelines" would be implemented during the design process.***

The OSDM is a cornerstone of the Commission's efforts to promote the 21st Century learning environment, providing guidelines that serve the diverse needs of local school communities and their students. For our Design Professionals, the OSDM provides a wide selection of high quality materials and systems to serve the districts over the entire lifecycle of the building. This approach ensures that both the district and the taxpayers of Ohio achieve the maximum benefit from their investment.

Ohio continues to build on past design achievements that meet the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) for Schools. The LEED system is the national benchmark for high performance green buildings.

The OFCC acknowledges the difficult design and construction tasks that ultimately result in the buildings so critical to our Ohio communities and the new educational goals set by Governor DeWine. There is a necessary balance measured between the complexity and cost of 21st century structures and the sustainability and maintenance requirements to be borne by local taxpayers for decades to come.

We look forward to working with you to design and build exciting educational environments for Ohio school students.

Sincerely,



Ohio Facilities Construction Commission
David M. Williamson
Executive Director

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OHIO SCHOOL DESIGN MANUAL
Ohio Facilities Construction Commission

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The Ohio Facilities Construction Commission (OFCC) is an independent agency of the State within the Ohio Facilities Construction Commission (OFCC) and is charged with overseeing the design and construction of school facilities in the state of Ohio. A school facilities project is a very exciting event for a school district, but it can also be complex and overwhelming.

The OFCC Design Manual (OSDM) has been developed to provide consistent, clear information for school districts and design professionals as a new generation of schools is being created for Ohio. The guidelines are the culmination of standards, accepted procedures, statutory requirements, and the experience of experts and authorities throughout the United States. The guidelines provided in the OSDM establish a uniform level of quality and sustainability for all public school buildings. The OSDM applies to new school facilities and new additions to existing buildings. Renovation to existing facilities should adhere to the OSDM guidelines when possible.

Since the OSDM communicates a vast amount of information on so many planning, design, and construction issues, the length and quantity of the OSDM can be intimidating. However, understanding how the OSDM is organized and which information will be needed during the various phases of the process will enable each participant to be better prepared for the exciting opportunity of creating school facilities.

This year's update includes a separate volume entitled, "VOLUME 1 - EDUCATIONAL FACILITY PLANNING GUIDE" which is a stand-alone guide for school districts to use as a guide for facility planning. This stand-alone guide outlines the process from inception up to the design phase of a facility project. The separate volume provides school districts the planning tools required for a facility project without the length and quantity of the entire OSDM.

An important consideration in developing a state-wide program that must provide equity among districts is the balance between broadly applicable standards and program delivery. A fundamental tenet of educational facility planning is that school facilities must be responsive to a school district's educational program. The OSDM allows districts to develop building programs that respond to their current, unique needs as well as preparing for their educational future. There are also many different ways in which districts are delivering educational programs and helping students accomplish learning objectives at each grade level and school. By designing classrooms and other instructional spaces to be flexible and adaptable, districts are better prepared to accommodate future educational program developments.

The EDUCATIONAL FACILITY PLANNING GUIDE begins the exciting process of developing learning facilities that respond to the needs of learners. This separate volume incorporates the development and outcome of the district's vision into the design process which will reinforce the transformation to learner centered facilities.

Additionally, sustainable, energy efficient features will be incorporated into school facilities designs. These features will have a positive impact on student academic achievement. By promoting the design and construction of green schools, we can make a significant impact on student heath, test scores, teacher retention, school operating costs and the environment.

In response to the desire for sustainable designs and the Governor's Executive Order 2007-02S, Coordinating Ohio Energy Policy and State Energy Utilization, the OFCC adopted Resolution 07-124, Approving Incorporation of Energy Efficiency and Sustainable Design Features into the Commission's Programs. As a measure of success, the Commission

adopted the U.S. Green Building Council's (USGBC) LEED for Schools (Leadership in Energy and Environmental Design) Silver Certification as its benchmark with preferred investment in attaining LEED points in the energy and atmosphere category.

The OSDM is required by state law to provide the parameters for building assistance programs in which the school district and the State of Ohio share the building costs. Throughout the planning, design, and construction phases of every project there are four factors that must be considered and held in balance: quality, cost, optimizing energy performance, and time (schedule). The OSDM was created to provide parameters for balancing these four essential elements fairly for all the projects in each district throughout the state.

The Career-Technical School sections are intended to be used in conjunction with the OSDM to address all aspects of programming, design, and construction of Career-Technical and Comprehensive High Schools that are not explicitly covered by other sections of the OSDM. They provide guidelines for the size and quantity of instructional and support spaces as well as material/system components necessary for the construction of Career-Technical School facilities and the Career-Technical components of Comprehensive High Schools.

Equality among school districts related to size of career-technical spaces, finishes, systems and costs is the primary purpose of the Career-Technical sections. It is the intent of the OFCC Vocational Facilities Assistance Program (VFAP) to improve existing Career-Technical program spaces, especially in relation to curriculum and instructional delivery methods, building codes, OSHA requirements, and fire safety. The space guidelines set forth in these sections are intended to meet these requirements as well as to accommodate the best practices for the delivery of Career-Technical programming.

There is no intent within the context of the OSDM to restrict, encourage, or otherwise influence the requirements of the public bidding laws of the State of Ohio relative to entities bidding on labor, material, products, or services. Names of proprietary organizations are not stated within the manual, and the intent is to encourage open, competitive bidding for the work.

The OSDM is the exclusive property of the OFCC of the State of Ohio, and the OFCC reserves the right to add, delete, modify, or otherwise change the content of this manual at any time. Specific information contained within the manual will be periodically modified to reflect current conditions.

ROLES OF PARTICIPANTS IN DESIGN AND CONSTRUCTION

The Project Team is responsible for creating and implementing a district facility plan. The planning, contracting, and project management strategies involved in this process have been developed, refined, and have proven to be successful in millions of dollars worth of school projects. Each team member will need to access and become familiar with various portions of the Design Manual to better understand his/her role and fulfill his/her responsibilities.

Participants in ***Implementing*** the Master Facility Plan

Role: School District Representative (District)
Responsibilities: The School District Representative is responsible for making decisions during the design and construction of the school project.

Role: Ohio Facilities Construction Commission (OFCC), Planner (OFCC-P), Project Manager (OFCC-PM)

Responsibilities: An OFCC Planner and Project Manager is the primary interface for the school district, the CP, and the DP. The OFCC-P and OFCC-PM accommodates the unique needs of the school district within the framework of OFCC policies and procedures.

Role: Educational Planner (EP)

Responsibilities: The Educational Planner provides guidance, expertise, and experience in the development of an educational framework, which meets the educational vision of the district.

Role: The Design Professional (DP)

Responsibilities: The DP is involved in developing the Program of Requirements (POR) for the project. The DP, along with his or her consultants, is responsible for the documents that are developed during design and that are ultimately used for the construction of the project.

Role: The Construction Professional (CP)

Responsibilities: The CP is responsible for scheduling, estimating, and providing overall coordination for projects

Role: Commissioning Maintenance Agent (CMA)

Responsibilities: The Commissioning Maintenance Agent (CMA) is hired by the school district to provide a single point responsibility to ensure efficiency of operation and performance of the building's major systems.

Every team member must understand and fulfill his or her responsibilities for the planning, design, and construction process to be successful. Fortunately, the team works together to be sure that everyone's voice is heard and decisions are made and implemented in a timely manner. Partnering sessions are held throughout the process to help all the stakeholders work together in an environment of mutual trust with open channels of communication.

SUMMARY OF THE CONTRACTING, DESIGN, BIDDING AND CONSTRUCTION PROCESS

CONTRACTING

Agreements and contracts are established between the state and the school district for the project.

DESIGN

The Project Team works together to develop a POR, the detailed square footage requirements for each space in the building. Once the POR is approved the design phases begin:

Schematic Design Phase (SD): Spaces are drawn to the correct scale indicating relative sizes as stated in the POR. Spaces are shown in the correct relationship to each other. Energy simulation modeling to occur.

Design Development Phase (SD): The drawings indicate greater levels of detail. In addition to classroom and building size, the building systems, materials, and furnishings are shown in the documents. Commissioning process begins.

Construction Documents Phase (CD): The documents show the detailed information that will ultimately be used by the contractors to bid and construct the building.

BIDDING

The project is bid, bidders are evaluated, and contracts are executed.

CONSTRUCTION

The Project Team and the Contractor work together to construct the building. Throughout the construction phase the Project Team holds regular meetings to review the progress of construction. The Project Team uses proven methods to assist in monitoring the budget, schedule, project quality, and change orders during construction. Furniture and equipment are procured. Commissioning is implemented.

OCCUPANCY

Furniture and equipment are delivered and put in place. Students, faculty, and staff move into the building.

POST-OCCUPANCY

The warranty phase begins and a Maintenance Plan is implemented. The project and financial closeout steps occur.

The following table illustrates the contracting, design, construction, occupancy, and post occupancy process; the participants in each step, and the estimated timeline for each phase.

PARTICIPANT LEGEND
ACTIVE PARTICIPANT
ADVISORY / REVIEW
MINIMAL / NO PARTICIPATION

PHASE	Approximate Duration	PHASE Brief Description	School District (SD)	OFCC Planner	Regional Program Consultant (RPC)	Assessment Consultant (AC)	Enrollment Projection Consultant (EPC)	Pre-Bond Design Professional (PBDP)	Educational Planner (EP)	OFCC Project Manager (OFCC-PM)	Design Professional (DP)	Construction Professional (CP)	Commissioning Maintenance Agent (CMA)
PRE-PLANNING	PRIOR TO PROJECT BEGINNING	**ESTABLISH PARTNERSHIPS WITH COMMUNITY STAKEHOLDERS** The school district should undertake a process to establish partnerships with community stakeholders, establish and refine its educational vision, and review school facilities in connection with that educational program and vision.	■										
		ESTABLISH / REFINE EDUCATIONAL VISION Stakeholders should work together to develop an educational vision. Questions that may be answered include: What are the most appropriate program areas and delivery systems for the district? What does educational research suggest? What is the most appropriate grade configuration or school size? What areas are working? What needs to be changed?	■										
		CONNECT EDUCATIONAL PROGRAM AND VISION WITH FACILITIES Connections must address the relationship of every site's school improvement planning process, the facility that is being considered, and community involvement in taking ownership of the process. Questions that address connecting the educational program with facilities include: What are the future educational programs and/or systems that will impact facilities? What priorities should be addressed regarding the educational program and facilities? Once the district has developed an educational vision, it is now time to assess the physical condition of the district's classroom facilities and the ability of those facilities to support the district's educational vision. The district may apply for the Facilities Assessment Program (FAP) only at any time to determine the condition of their classroom facilities.	■										

EXECUTIVE SUMMARY
OVERVIEW OF THE DESIGN AND CONSTRUCTION PROCESS

PARTICIPANT LEGEND
ACTIVE PARTICIPANT
ADVISORY / REVIEW
MINIMAL / NO PARTICIPATION

PHASE	Approximate Duration	PHASE Brief Description	School District (SD)	OFCC Planner (OFCC-P)	Regional Program Consultant (RPC)	Assessment Consultant (AC)	Enrollment Projection Consultant (EPC)	Pre-Bond Design Professional (PBDP)	Educational Planner (EP)	OFCC Project Manager (OFCC-PM)	Design Professional (DP)	Construction Professional (CP)	Commissioning Maintenance Agent (CMA)
PRE-PLANNING	PRIOR TO PROJECT BEGINNING	**PROGRAMS and APPLICATION PROCESS** **Facility Assessment Program (FAP)** Permits school districts to receive a district-wide assessment and master facility plan for existing classroom facilities. This information empowers the district to make informed decisions regarding its facilities. **Non-funded Program, Expedited Local Partnership Program (ELPP) or Vocational Facilities Assistance Program (VFAP) ELPP)** ELPP permits school districts that are estimated to be over two years away from eligibility for state assistance under the Classroom Facilities Assistance Program (CFAP) to receive a district-wide assessment and master facilities plan from the OFCC. The OFCC will assess the classroom facilities needs of participating districts, and, in collaboration with the district, develop a district-wide master facilities plan. Program participants may spend local resources on a discrete part of their overall master facilities plan (either new construction or major renovation) and later receive credit for qualifying expenditures from the school district's share of the overall project budget when the district becomes eligible for state assistance under CFAP or VFAP. **Funded Program Exceptional Needs Program (ENP)** ENP is a building replacement program that provides school districts with the ability to protect the health and safety of their students with a new facility. The program has a single building orientation, so it will not necessarily fund a district's entire facilties needs.											

PARTICIPANT LEGEND
ACTIVE PARTICIPANT
ADVISORY / REVIEW
MINIMAL / NO PARTICIPATION

PHASE	Approximate Duration	PHASE Brief Description	School District (SD)	OFCC Planner	Regional Program Consultant (RPC)	Assessment Consultant (AC)	Enrollment Projection Consultant (EPC)	Pre-Bond Design Professional (PBDP)	Educational Planner (EP)	OFCC Project Manager (OFCC-[illegible])	Design Professional (DP)	Construction Professional (CP)	Commissioning Maintenance Agent (CMA)
PRE-PLANNING	1 MONTH	**NOTIFICATION OF ELIGIBILITY FOR FUNDED PROGRAM (CFAP,VFAP or ENP)** CFAP provides funding for the entire or a segment of the facility needs of a school district. Each school district is ranked on the School District Ranking List supplied to the OFCC by the Ohio Department of Education (ODE). Vocational Facility Assistance Program (VFAP) provides funding for vocational, career technical, and comprehensive high schools similar to the CFAP program.											
PLANNING	PRIOR TO PROJECT BEGINNING	**DISTRICT SELECTS PRE-BOND DESIGN PROFESSIONAL** The district is responsible for interviewing and selecting the Pre-Bond Design Professional (PBDP) for pre-bond services. The PBDP is responsible for review of the assessment and master plan options. The PBDP assists in site selection, segmenting and estimating locally funded initiatives. The PBDP provides support at meetings. OFCC does not co-fund pre-bond services.											

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PLANNING	1- 2 MONTHS	**OFCC CONDUCTS FACILITY ASSESSMENT** The development of a uniform and comprehensive assessment of a district's facilities is central to CFAP, VFAP, ENP, ELPP and VFAP ELPP. The process has evolved since 1997 and is accomplished through an Assessment Consultant (AC) working with a sophisticated internet-based assessment tool. The school district will be requested to provide floor plans and other information and to make Facilities Managers available to assist the consultants in the evaluation of the facilities. The facility assessment report contains a variety of data about each of the district's buildings, such as: site acreage, current grade configuration, capacity, number of floors, number of teaching stations, total building square footage, and the dates of construction for the original building and additions. However, it is important for all parties to understand that the use of the facility assessment report is for the purpose of developing an estimated project cost and scope based on best available data. Conditions which are hidden or otherwise unknown may have an impact on the final project cost. The AC reviews 23 building components and applies a funding level to each of these components in order to bring the existing condition or system(s) to the minimum level described within the OSDM standards. The assessment report will either indicate no work required, supplementing a system or component, or complete replacement of a system or component based upon age, condition, size, or non-existence. Additionally, the facility assessment report contains the Council of Educational Planners International (CEFPI) facility appraisal review, report and summary. The purpose of the CEFPI appraisal form is to subjectively report on conditions of the facility. Refer to section 0101 for additional information.											

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PLANNING	1 -2 MONTHS	**DEVELOP ENROLLMENT STUDY FOR A TYPICAL PRE-K-12 SCHOOL, ELPP, FAP, ENP, or CFAP** An important component of the OFCC planning protocol is the development of student enrollment projections. Upon entering a program, OFCC assigns an Educational Projection Consultant (EPC) to develop the enrollment projections. The objective is to determine the number of students for which the buildings should be designed. The enrollment history of the school district is obtained through an online district questionnaire. School district demographics such as live birth statistics, population information, housing starts, and survival rates are all combined to project the district's enrollment 10 years into the future. Refer to section 0102 for additional information. **DEVELOP ENROLLMENT STUDY FOR A CAREER-TECHNICAL SCHOOL** An important component of the OFCC planning protocol is the development of student enrollment projections. Upon entering the VFAP ELPP or VFAP, the OFCC assigns an Educational Projection Consultant (EPC) to develop the enrollment projections. The objective is to determine the number of students for which the buildings should be designed. The enrollment history of the school district is obtained through an online district questionnaire. Additional enrollment information is obtained from the Ohio Department of Education (ODE) on associate districts. Refer to section 0102 for additional information.											

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PLANNING, APPROVAL, AND FUNDING	**3 - 8 MONTHS**	**DEVELOP MASTER FACILITIES PLAN SPECIFYING SCOPE AND COST FOR K-12 SCHOOLS AND/OR CAREER-TECHNICAL SCHOOLS** **K-12 SCHOOLS** After the Assessment and Enrollment Projection reports are completed, the Master Facilities Plan is developed to define the scope of work and budget for each of the school district's classroom facilities. The number of students projected for each school is entered into the grade level-appropriate spreadsheet in the Ohio School Design Manual (OSDM) to determine the total gross square footage for that school in the Master Facilities Plan. Square foot allowance charts can be found in Chapter 2, Section 2000 of the OSDM. When Career-Technical programs are provided at the facility, the projected enrollment in the Career-Technical program is used along with the types of programs to develop a space allocation for those high schools housing Career-Technical programs. **CAREER-TECHNICAL SCHOOLS** After the assessment and enrollment reports are completed, the Master Facilities Plan is developed to define the scope of work and budget for each of the district's classroom facilities. The number of career-technical students for each school is entered into the core space spreadsheet in Chapter 2 of the OSDM (Career-Technical section) to determine the total gross core square footage for that school in the Master Facilities Plan. The program area is determined by developing a program of requirements. Square foot maximum charts can be found for both core and program areas in Chapter 2, Section 2700 of the OSDM (Career- Technical section). The core square footage for each school is then multiplied by the allowable cost per square foot for that school level and school size (data found in Section 1200 of the OSDM). All buildings in the school district are aggregated to determine the overall budget for the Master Facilities Plan.												

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PLANNING, APPROVAL, AND FUNDING	1 MONTH	**STATE AND LOCAL SHARE FUNDING** Once the Master Facilities Plan is developed a program specific calculation worksheet will be used to determine the state and local share. For values that change over time, e.g. net bonded indebtedness and assessed valuation, consult with OFCC and bond counsel for the correct figures to use.	■	■						▒			
	1 MONTH	**STATE AND DISTRICT PROJECT AGREEMENT** This standardized Agreement serves as the basis of the relationship between the school district and the OFCC until the Project Completion Certificate is signed. It has been coordinated with three other documents; the Architect's Agreement with the school district, the CP's agreement, and the General Conditions or the Contracts for Construction. Refer to section 0126 for additional information.	■	■						▒			
END OF PLANNING PROCESS AND BEGINNING OF DESIGN AND CONSTRUCTION PROCESS **Refer to section 1020 in Volume 2 for additional information within the Design and Construction Process**													
CONTRACTING	2 - 4 MONTHS	**CONTRACT FOR DESIGN PROFESSIONAL** The selection of the Design Professional (DP) to provide services for the Design/Bid/Build process is made jointly through a publicly-advertised qualifications-based selection process. The typical process involves publicly requesting Statements of Qualifications, review and short-listing of the submitting firms, and final interviews to rank as many as three candidate firms. Only after selecting the top firm do the owners enter into fee negotiations. OFCC must approve the DP's contract.	■	▒						■	■		
		CP SELECTION AND CONTRACT The selection of the Construction Professional (CP) is made by the *owner team*. The selection process again is a qualifications-based, open process involving advertisement, short-listing, interviews and final ranking and final selection. The fees are negotiated by the *owner team*.	■	▒						■		■	

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PRE-DESIGN	1 MONTH	**SELECT COMMISSIONING MAINTENANCE AGENT (CMA)** The CMA employed directly by the school district, acts independently of the Designers to assure that the Building Systems will function within the parameters established as the basis for their design and the owner's design intent. At the beginning of the design process, the agent establishes a Commissioning Plan to be followed throughout design and construction efforts and post occupancy. The Commissioning Plan establishes operational objectives, monitors installation procedures, and incorporates functional testing protocols. The CMA is an independent third party with no other ties to the project. The CMA cannot be tasked with conducting any subsequent corrective actions beyond that of the CMA role.	■	▒						■		■
PRE-DESIGN	2 - 6 MONTHS	**PRE-DESIGN (PD)** The Pre-Design Phase (PD) of the project includes the development of the Program of Requirements (POR) defined above, LEED Registration, LEED point checklist and initial energy modeling. The PD information is reviewed and approved by the Project Team before starting the Schematic Design (SD).	■	▒	▒			■		■		
PRE-DESIGN	1 - 2 MONTHS	**ECO CHARRETTE** Sustainable, energy efficient features will be incorporated into school facility designs. These features will have a positive impact on student academic achievement. By promoting the design and construction of "green" schools, we can make a significant impact on student health, test scores, teacher retention, school operating costs, and the environment. Emphasis is given to energy efficiency in the design of new and renovated facilities. An integrated design approach is encouraged, and energy modeling early in the design process is required. This modeling should include the design choices and optimize the building's energy efficiency. (See Chapter 7, pages 7010-1 and 7010-2).	■					▒		▒	■	

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DESIGN	**ALL DESIGN PHASES 10 - 15 MONTHS**	**Develop Program of Requirements (POR)** The Development of the POR (identification of space needs) should begin with a thorough understanding of current and future student instructional needs. The school district Administration is encouraged to consider contracting with an Educational Planner (EP), whose primary function will be to assist the district and its stakeholders in developing/reviewing its educational mission, goals, and vision and then communicating that vision to the design team. This process should include administration, staff, OFCC representatives, students and interested community members. Following the planning process with the EP, information such as the grades to be housed, the number of students per grade and the square footage per student are entered into the OSDM active excel spreadsheets yielding the Total Gross Building Square Footage. Using the Bracketing Chapter of the OSDM, prototypical space allocations for specific grade groupings are reviewed and a district specific written building space plan is developed. Various schemes are developed and tested against the allowable square footage until the school district's Educational Delivery Plan is manifested in a space plan. The POR is a written listing of the spaces along with their respective square footages. Two-dimensional graphic building plans should not be developed until the written POR has been completed and approved by the Project Team. If the school district elects to proceed with components not listed as acceptable in the OSDM, the school district may proceed with district funds in addition to the prescribed district millage requirement or apply for a variance. Deviations should be discussed with the OFCC staff during the early planning phases of the project. Upon recommendation of the Variance Committee, the Executive Director may approve the variance, where there is agreement that the variation will result in good value for the district while maintaining the budget.											

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DESIGN	ALL DESIGN PHASES 10 - 15 MONTHS	**SCHEMATIC DESIGN (SD)** During the SD Phase, the required spaces developed during the POR process are organized in functional groupings and oriented around building circulation and service systems. Along with the SD, the DP will submit the POR, LEED point checklist, energy modeling, technology system schematic and description, and energy consumption information. The SD information is reviewed and approved by the Project Team before starting the Design Development (DD) Phase.	ACTIVE					ADVISORY		ADVISORY	ACTIVE	ADVISORY	ADVISORY
		DESIGN DEVELOPMENT (DD) During the DD Phase the design is further refined to incorporate the actual materials and systems that will be used in construction. Detailed calculations for material stresses, heat loss/gain, and electrical loads are made and the final configuration of materials is established. Preliminary Specifications for all components are prepared and are used along with the drawings in the preparation of the construction estimate of cost by the CP. The DD documents including the POR, LEED point checklist, energy modeling, technology system documents, and drawings, are reviewed and approved by the Project Team before starting the Construction Documents (CD) Phase.	ACTIVE							ADVISORY	ACTIVE	ADVISORY	ADVISORY

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DESIGN	**ALL DESIGN PHASES 10 - 15 MONTHS**	**CONSTRUCTION DOCUMENTS (CD)** At the conclusion of the DD Phase, all decisions regarding the make-up of the new building should be resolved and documented. Adjustments should have been made in the design to bring the cost estimate into alignment with the project budget. The objective of the CD Phase is to prepare documentation that will accurately and precisely convey the design to the prime contractors who will construct it. In essence, the DD drawings and specifications are refined and combined with Instructions to Bidders and General Conditions of the Contract for Construction and other documents necessary to define the activities of all parties during the actual construction. Additionally, the LEED point checklist, energy modeling, technology drawings, and USGBC Design Review Comments are included as part of the CD documents. These documents are used as the basis of the final estimate of construction cost necessary for a recommendation to the school district and OFCC prior to entering the Bidding Phase (BP). These documents are submitted for agency approval necessary for the issuance of a building permit.											
BIDDING	**ALL BIDDING PHASES 1 - 3 MONTHS**	**BIDDING PHASE (BP)** The structure of the BP is defined by statute. The process begins with the public advertisement for bidders. This advertisement describes work divided into trade packages. It indicates where the documents can be obtained and states the date, time, and place of the public bid opening. It establishes a time and place for a pre-bid conference during which the contractors can ask questions related to the project. Sealed prime contract bids are received at the bid time and publicly opened, read aloud and tabulated.											

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BIDDING	1 MONTH	**EVALUATE BIDDERS** After the bid opening meeting, the apparent low bidders are evaluated to determine whether they are responsible according to criteria set forth in law. The bid packages are carefully examined by district counsel and the CP for compliance with the bidding requirements.	ADVISORY							ADVISORY	ADVISORY	ACTIVE	
BIDDING	ALL BIDDING PHASES 1 - 3 MONTHS	**ENTER INTO CONTRACTS** Within 60 days of the receipt of bids, the CP and low bid contractors work together to prepare construction contracts for the work on form documents provided by OFCC. The contracts are approved by resolution of the school disytrict and the OFCC.	ACTIVE							ACTIVE	ADVISORY	ACTIVE	
		TRADE CONTRACTOR PARTNERING Similar in format to the previous day-long executive partnering session, the trade contract partnering session introduces the prime contractors to the team. Objectives and concerns are discussed, communication channels are established and dispute resolution procedures are agreed upon.	ACTIVE							ACTIVE	ADVISORY	ACTIVE	ADVISORY
CONSTRUCTION	18 - 24 MONTHS	**CONSTRUCT BUILDING** This phase takes more time than any of the others. Sometimes it takes as much as 18 or 24 months for a single K-12 or high school. Often it begins with a sitework package which commences prior to all the documents being complete for the building itself. This work can include the preparation of the entire site and the construction of the building pad. Normally the construction of a school is done as if the building were divided up into four or six different building projects allowing the contractors to move sequentially through the entire project.	ACTIVE							ACTIVE	ADVISORY	ACTIVE	

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CONSTRUCTION	1 - 3 MONTHS	**PROCURE FURNITURE AND EQUIPMENT** While the furniture plan for a facility can and should be created at the same time that the SD, DD, and CD Phases are being completed, the actual bidding and ordering of the furniture is typically postponed until 6 to 9 months before the anticipated move in date. Specifications and materials change frequently in the furniture industry and items bid as much as a year ago, may no longer be available.	■							■	▒	■	
	1 - 2 MONTHS	**DEVELOP MAINTENANCE PLAN** The school district maintenance plan is normally prepared by a Commissioning Maintenance Agent (CMA). Aided by a comprehensive web tool, the CMA creates an exhaustive list of every asset requiring maintenance in the building. The asset manufacturer's recommendations for ongoing maintenance and useful service life are analyzed, and a report is generated outlining the cost impact of maintaining the building. The revenue for maintenance is also analyzed, and a business plan is developed and presented to the school district for its use.	■							▒	▒	■	■
	1 MONTH	**CLOSEOUT PARTNERING** The closeout partnering meeting brings all stakeholders together in a session to focus on the smooth completion of all participants' obligations under their contracts. A professional facilitator guides all parties step by step through the requirements.	■							▒	▒	■	▒
	1 - 2 MONTHS	**PUNCH LIST** Having been notified by the contractors that their work is complete and compliant with the project documents, the DP and CP inspect the work and prepare a "punch list" of missing or deficient items. The items on this list must be completed, repaired or replaced by the contractors. When the corrections are accomplished and all items are accounted for on the punch list, the DP Team and the CP are notified to make a final inspection.	▒							▒	■	■	▒

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OCCUPANCY	1 MONTH	**MOVE INTO BUILDING** Time must be allocated in the schedule to deliver and set up loose furnishings and move equipment, supplies, and materials into the building.	■										
OCCUPANCY	–	**FINAL COMMISSIONING** While the CMA should be an active team member from the beginning, the work involved with system documentation and performance testing can only start as the systems come on line. Commissioning begins as systems are started and deemed functionally operational.											■
POST-OCCUPANCY	11 MONTHS	**WARRANTY PERIOD** Normally the project specifications call for the contractor to provide a labor guarantee for a period of one year commencing when the school district begins to use the building. Equipment and product warranties are usually longer in duration and are set forth in the specifications. During the applicable period, the contractor is obligated to repair or replace any systems or materials that are not functioning as intended. An eleven month inspection of the building is conducted by the DP team, CMA, and CP, and deficiencies are listed. The contractor is obligated to correct those deficiencies much as he or she is obligated to do in the punch listing process.									■	■	■
POST-OCCUPANCY	1 - 2 MONTHS	**PROJECT CLOSEOUT** The project closeout focuses more on the relationships between the school district and the contractors than on the school district and the OFCC. The closeout process is necessary to monitor and verify the submission of operation manuals, owner training, attic material stock, certificates contract completion and other documentation. The DP shall provide record documents to the school district prior to final completion. The requirements for record drawings and other provisions of the closeout process are set forth in the contracts and in OFCC policy and procedure memoranda.	■								■	■	

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POST-OCCUPANCY	1 - 2 MONTHS	**FINANCIAL CLOSEOUT** The financial closeout primarily focuses on reconciling and concluding the fiscal relationship between the school district and the OFCC. This process includes a comprehensive recap of the original project budget, any budget increases that were approved, the State share, the local share, and the interest earned on both the State and the district shares. All expenditures are recapped, including those for contracts, change orders, miscellaneous district expenses, and soft costs. Once the financial reconciliation is agreed to, a certificate of project completion is executed. Principal dollars remaining in the project construction fund are distributed to the State and school district in proportion of the original State and school district shares. Remaining interest earned on State and school district funds is returned to the State and deposited in the school district maintenance fund.	■							■	■	■	

CHAPTER 1: INTRODUCTION

OHIO SCHOOL DESIGN MANUAL (OSDM) ORGANIZATION

Volume Two of the Ohio School Design Manual (OSDM) is organized into ten chapters that explain the design, and construction process; identify the square footage provisions for each school level; detail the features and amenities of each space; and provide systems, materials, and specification information. This section of the Executive Summary contains an overview of key points included in each chapter.

The OSDM is made up of two volumes. The first volume (Volume 1) titled EDUCATIONAL FACILITY PLANNING GUIDE is the guide for school districts to use from inception of a facility project up to the start of the design stage. The second volume (Volume 2) contains the information needed from the beginning of the design stage through the commissioning stages and 11-month walk-through.

The chapters included in the OSDM are:

VOLUME 1
EDUCATIONAL FACILITY PLANNING GUIDE

VOLUME 2
Chapter 1: Introductory Information
Chapter 2: OSDM Bracketing
Chapter 3: School Site
Chapter 4: Elementary School
Chapter 5: Middle School
Chapter 6: High School
Chapter 6: High School (Career-Technical)
Chapter 7: Sustainable Design
Chapter 8: Systems and Materials
Chapter 8: Systems and Materials (Career-Technical)
Chapter 9: Specifications
Chapter 9: Specifications (Career-Technical)
Chapter 10: Miscellaneous
Chapter 10: Miscellaneous (Career-Technical)

VOLUME 1
Contains the planning process and guidelines for school districts to use from inception of a facility project up to the start of the design stage.

VOLUME 2
Chapter 1: Introduction

Chapter 1 contains introductory information that provides a general overview of the design and construction process and the Design's responsiveness to educational planning.

Key Points

Developing a clearly articulated educational program is the essential first step to any successful school building project. Partnerships should be developed between school personnel and the community to establish and refine the educational vision and begin the connection between the educational vision and a building program.

Enrollment Projections and Facility Assessments provide essential data for decision-making.

Chapter 2: OSDM Bracketing

Chapter 2 assists the school district in establishing the square footage for a new facility. Bracketing first identifies the overall square feet for a facility and then identifies spaces that may be included. The size of a school facility is based on student capacity, grade configuration, and square foot per student.

K-12 Key Points

The formula for determining the overall square footage of a school facility is:

grade grouping # of students **X** student square feet **=** total overall square feet funded

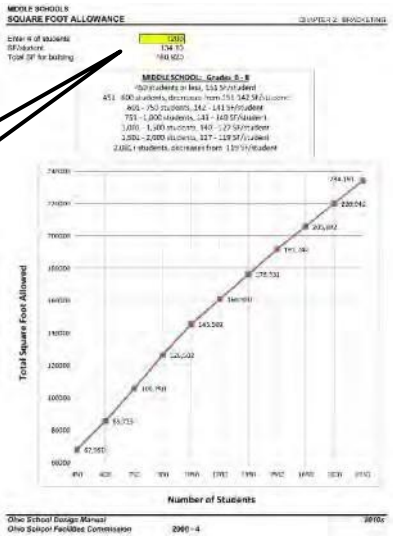
Additional Key Points in Chapter 2:

The minimum school size at any grade configuration is 350 students (per 3318.03 ORC).
The ranges of gross fundable square footage per student per school level are:
- Elementary (K-5) – from 115.6 – 125 square feet on a sliding scale
- Middle (6-8) – from 141 – 151 square feet on a sliding scale
- High (9-12) – from 156 – 180 square feet on a sliding scale
- The sliding scale allows for the fact that larger buildings that must be provided for larger student populations are more space efficient and require fewer square feet per student.

Additional graphs indicate total funded gross square footage for K-12, K-8, and 6-12 school buildings.
There are certain parameters for which spaces must be included and how large those spaces must be. Aside from those parameters, the planning team must work together to determine which spaces are needed. The parameters for developing the Program of Requirements (POR) include:
- "Academic Space" refers to space in: Core Academic, Special Education, Art, Music, Family and Consumer Science, Technology Education, and Business Education. All other space is considered to be "Non-Academic." Space can be moved from Non-Academic areas to Academic areas, but not *vice versa*.
- The total square footage for all Academic areas must equal or exceed the total listed in the OSDM for that school level and enrollment.
- For grades PK-5: the size of a classroom may be reduced 10% from the size listed in the OSDM.
- The total square footage developed may vary no more than one-tenth (0.001) of one percent above or below the total square footage in the Master Plan.
- For all grade levels: Academic spaces may be reduced up to 10% to accommodate extended learning areas.

See charts in Chapter 2 for additional information
- Section 2100 for elementary schools (grades K-5)
- Section 2200 for middle schools (grades 6-8)
- Section 2300 for high schools (grades 9-12)
- Section 2400 for grade K-12 combination schools
- Section 2500 for grade K-8 combination schools
- Section 2600 for grade 6-12 combination schools

To determine the gross square footage for a school building, enter the number of students.



OSDM Tolerance

During the development of the original OSDM, published in 1997, extensive research was conducted into existing local, state, and national classroom size standards. It was determined that a 900 SF classroom was the appropriate size to accommodate current and future student needs, project based delivery, children with disabilities, and multiple program delivery methods for twenty-five (25) students.

As part of the implementation of the OSDM, it was found that a certain amount of tolerance was needed to allow flexibility when designing the spaces contained within the school and the overall total size of the school building. Extensive research was conducted regarding sizing instructional spaces to adequately accommodate student learning, children with disabilities, movement, flexibility, adaptability, and future program delivery methods. It was determined that allowing a tolerance of 10% so districts may reduce the overall classroom size to no less than 810 SF would provide extra space for the development of creative learning spaces, student commons and other instruction areas such as art and music. This reduction allows classrooms to remain adequately sized to meet student educational needs. Following is a brief summary of the primary points of the tolerance policy. The full tolerance policy follows this summary.

> All grade level academic spaces may be reduced up to ten percent (10%) below the square footage of spaces specified in the OSDM.

Measurement and Area Calculations for Building Spaces

Classrooms and other instructional spaces are sized to be flexible and adaptable to curricula of the future. Core areas, circulation, and building services are appropriately sized to support a range of design solutions. The following spaces shall be measured as indicated below when evaluating design solutions for compliance with the OSDM:

Corridors: Stairs, ramps, and elevators shall be included in the Program of Requirements (POR) as Corridor area.

Stairs: Stair area shall be calculated as one hundred percent (100%) on the ground floor and fifty-percent (50%) on elevated floors. Area shall be calculated based on the total area inside the stair enclosure walls.

Elevators: Elevators shall be calculated as one hundred percent (100%) on the ground floor and zero percent (0%) on elevated floors.

Overhangs: Overhangs located at building entrances and exits do not count as area. Interior balconies are generally counted as circulation space.

Total Net Square Footage of a Room: Calculated as the measurement of the interior area excluding the wall thickness.

Total Gross Square Footage of a Room: Calculated as the measurement of the exterior area including the wall thickness.

Mechanical Equipment Space: Includes “traditional” mechanical equipment rooms and an elevated “walkable” space for mechanical equipment and its servicing. “Vaults” associated with geothermal systems are counted as mechanical room square footage.

Square Footage Flexibility for the Total Building

For 3-stories and greater construction, the developed area may be increased for vertical circulation up to the square footage provided in the bracketing tool. The project budget is not increased due to offsetting reductions in site development costs with 3-story and greater construction.

On a building-by-building basis, the total gross square footage developed for a building may vary from the square footage specified in the Master Facilities Plan or the square footage adjusted for vertical circulation by:

Plus 1/10th of one percent (0.001) or
Minus ½ of one percent (0.005)

Square Footage Flexibility for Non-Academic Spaces

Non-Academic Spaces are defined as those areas that do not comprise the academic core of the building and include specific areas such as: administration spaces, media center, physical education areas, food service, custodial spaces and building services. The Commission may apply discretion to approve reasonable flexibility for the square footage of non-academic spaces specified in the OSDM. Increasing the square footage of non-academic spaces is not an acceptable justification for a reduction to the square footage of academic space, however the Commission does support expanding academic spaces through the reallocation of non-academic space to the academic core. Corridor area should be appropriately sized to accommodate the design solution for the project.

See Section 1120 High Performance Learning Environments for exemption to minimum square footage

Square Footage Flexibility for Academic Spaces

Academic Spaces are defined as all bracketed program areas except the non-academic spaces within a building. The OSDM provides a range of flexibility for the square footage of such spaces.

Please note that only one of the options shown below for each grade level may be used.

For all grade levels, academic spaces may be increased above the square footage of spaces specified in the OSDM. Required non-academic spaces must still satisfy their intended uses. The total gross square footage of the building shall not be increased.

For all grade levels, academic spaces may be reduced up to ten percent (10%) below the square footage of spaces specified in the OSDM.

The total gross square footage of the academic core shall equal or exceed the total gross square footage of the academic core space specified in the OSDM.

Variance Requests for OSDM Systems, Materials and Square Footages

The design professional is required to pursue an OSDM Variance Request from the Commission for deviations from the standards, material and system specifications, and area square footages provided in the OSDM. The design professional may provide data to support the use of alternative products through the Design Variance Request process. Variances may be requested via the Construction Professional website at http://www.cmw.OFCC.state.oh.us using the online OSDM Variance Request tool. The Commission has established an OSDM Variance Request Committee that is tasked to review these requests, to conduct proper research on each request, and to make appropriate recommendations.

Creative Learning Areas

Allowing the 10% reduction in the size of the classrooms can provide exciting opportunities for flexibility in educational programming. Over the past few years, educational program delivery has changed to accommodate differences in students' learning habits, an increasing information base, project based assignments, and technology. When this reduction is used, it can result in the development of creative learning areas where students can receive instruction, conduct small group activities, practice drama, and engage in other learning activities.

Creative learning areas are intended to provide students, staff, and teachers with an area adjacent to the classroom where a multitude of activities can take place. This space does not have walls and is intended to "extend" the classroom or other area for instructional and support purposes. A few of the activities that can occur are:

Small group work/study areas using soft or hard seating (3-7 students per group)
Rehearsal area for student skits or plays
One-on-one tutoring by peers or community volunteers
Individual projects requiring more space than what is allotted in a traditional classroom (ex: creating a poster display board, doing a large painting or drawing, etc.)
Reading by a teacher or volunteer to a large group of children (8-15 students, soft seating or soft floor space)
Individual study or quiet time to read, reflect, or do homework
Space to showcase student art and projects
Service learning activities (volunteerism)
Physical activities not incorporated in gym or outside areas (ex: gross motor skills, tumbling on mats, cheerleading practice)
Accessibility for after-school student clubs (key club, school newspaper, student officers, etc.)
English as a Second Language (ESL) tutoring
Lecture/presentation space that combines students from two or more classes
Lounging space for students with soft furniture to allow for wireless Internet access, reading, conversation, and other forms of informal social interaction
Make-up tests (proficiency and school subject exams)
Showing of films, class parties, fun activities

When designing creative learning areas, it is important to note some of the characteristics that define what a creative learning space is and is not. The characteristics below are not meant to limit the design team in its creative endeavors, but are meant to provide a guideline for discussions between the District and the design team.

A Creative Learning Area IS:
A flexible learning and support space
Adjacent to classrooms
Classrooms on most sides
May be part of the means of egress/corridor
Has a visual connection to each of the adjacent classrooms

A Creative Learning Area IS NOT:
- Enclosed with walls and/or doors
- A room
- A "teaching station"
- A room with desks, chairs, a teacher's desk, or fixed furniture

EXECUTIVE SUMMARY

OSDM ORGANIZATION

Career-Technical Bracketing

Chapter 2, of the OSDM assists the school district in establishing gross square footage for a new Career-Technical facility. The size of a Career-Technical school facility is based on student capacity, approved program square feet and core square foot area per student.

Number of Students	Maximum Square Feet Per Student		
	Core Area	Program Area	Total
400 or less	113	169	282
600	101	162	263
800	97	146	243
1,000 or more	95	136	231

Number of students **/** 50 students per program **=** # of Type 1 – 4 programs funded
Number of students **/** 30 students per program **=** # of Type 5 – 7 programs funded
Core Area (# of students x square feet) + Program Area (# of programs x program square feet) = Total Overall Square Feet Funded

There are certain parameters for which spaces must be included and how large those spaces must be. Aside from those parameters, the planning team must work together to determine which of the spaces are needed. The parameters for developing the Program of Requirements (POR) include:

A ratio of 25 students per classroom is used to determine building capacity.

A ratio of 50 students per program is used to determine the number of funded Type 1 - 4 programs and 30 students per program in Type 5 - 7 programs.

"Academic Space" refers to space in: Core Academic, Special Education and Program Types 1 - 7. All other space is considered to be "Non-Academic." Space can be moved from Non-Academic areas to Academic areas, but not *vice versa*.

The total square footage for all Academic areas must equal or exceed the total listed.

The total square footage developed may vary no more than one-tenth (0.001) of one percent above or below the total square footage in the Master Plan. See charts in Chapter 2, Section 2700, for additional information.

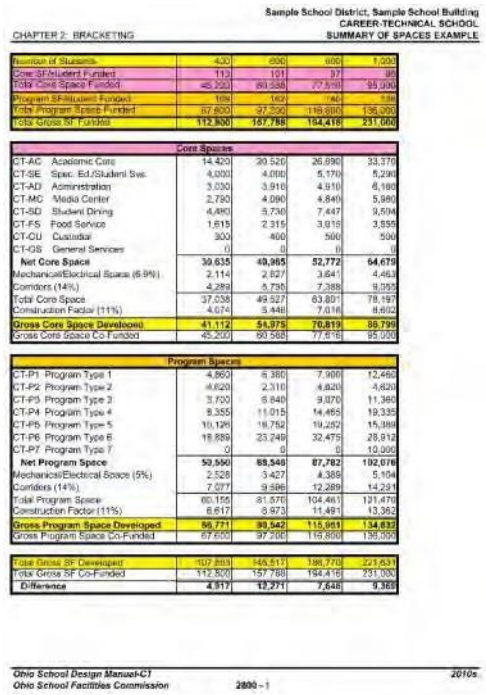
The Bracketing spreadsheet is an interactive tool that aids in the development of the Program of Requirements.

The spreadsheet is organized by Program Area, i.e. Core Academic, Special Needs, etc., as well as Program Types 1-7.

The table at the top of the page shows examples of Core Spaces.

The second table shows examples of Program Spaces.

The table labeled WORKSHEET is linked to the detailed pages for each program area.



Sample School District, Sample School Building
CAREER-TECHNICAL SCHOOL
CHAPTER 2: BRACKETING — SUMMARY OF SPACES EXAMPLE

Number of Students	400	600	800	1,000
Core SF/Student Funded	113	101	97	95
Total Core Space Funded	45,200	60,568	77,616	95,000
Program SF/Student Funded	169	162	146	136
Total Program Space Funded	67,600	97,200	116,800	136,000
Total Gross SF Funded	112,800	157,768	194,416	231,000

Core Spaces				
CT-AC Academic Core	14,420	20,520	26,890	33,370
CT-SE Spec. Ed./Student Svs.	4,000	4,000	5,170	5,290
CT-AD Administration	3,030	3,910	4,910	6,180
CT-MC Media Center	2,790	4,090	4,840	5,980
CT-SD Student Dining	4,490	5,730	7,447	9,594
CT-FS Food Service	1,615	2,315	3,015	3,855
CT-CU Custodial	300	400	500	500
CT-GS General Services	0	0	0	0
Net Core Space	**30,635**	**40,965**	**52,772**	**64,679**
Mechanical/Electrical Space (6.9%)	2,114	2,827	3,641	4,463
Corridors (14%)	4,289	5,735	7,388	9,055
Total Core Space	37,038	49,527	63,801	78,197
Construction Factor (11%)	4,074	5,448	7,018	8,602
Gross Core Space Developed	**41,112**	**54,975**	**70,819**	**86,799**
Gross Core Space Co-Funded	45,200	60,568	77,616	95,000

Program Spaces				
CT-P1 Program Type 1	4,860	6,380	7,900	12,460
CT-P2 Program Type 2	4,620	2,310	4,620	4,620
CT-P3 Program Type 3	3,700	5,840	9,070	11,360
CT-P4 Program Type 4	9,355	11,015	14,465	19,335
CT-P5 Program Type 5	10,126	16,752	19,282	15,388
CT-P6 Program Type 6	18,889	23,249	32,475	28,912
CT-P7 Program Type 7	0	0	0	10,000
Net Program Space	**59,550**	**65,546**	**87,782**	**102,076**
Mechanical/Electrical Space (5%)	2,528	3,427	4,386	5,104
Corridors (14%)	7,077	9,596	12,289	14,291
Total Program Space	69,155	81,570	104,461	121,470
Construction Factor (11%)	8,617	8,973	11,491	13,362
Gross Program Space Developed	**66,771**	**89,542**	**115,951**	**134,833**
Gross Program Space Co-Funded	67,600	97,200	116,800	136,000

Total Gross SF Developed	107,883	145,517	186,770	221,631
Total Gross SF Co-Funded	112,800	157,768	194,416	231,000
Difference	4,917	12,271	7,646	9,369

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Chapter 3: School Site

Chapter 3 contains information about site size, site circulation, and site amenities. Design requirements are also outlined for a multitude of factors that must be considered, including: various types of circulation and site access, drainage, play fields and playgrounds, fencing, lighting, mechanical/electrical yard, landscaping, site furnishings, and exterior security provisions.

Key Points

Site size guidelines accommodate a variety of sizes for schools located in rural and suburban districts. Recommended site sizes are:
Elementary School: 10 acres plus 1 acre per 100 students
Middle School: 20 acres plus 1 acre per 100 students
High School or Career-Technical School: 35 acres plus 1 acre per 100 students
Combination Schools:
K-12 School: 40 acres plus 1 acre per 100 students K-8 School: 20 acres plus 1 acre per 100 students 6-12 School: 35 acres plus 1 acre per 100 students

It is recognized that not all urban sites will be able to accommodate a new or replacement facility, even with the smallest site sizes recommended in the OSDM. The OSDM provides a list of possible site size reductions that may be considered. Strategies include decreasing the building footprint, decreasing the amount of parking, decreasing the size of the mechanical yard, providing curbside bus and parent drop-off, reducing the amount of greenspace, and reducing the size or decreasing the number of outdoor play spaces. These strategies are not intended to be all-inclusive and implementing these reductions should involve all interested parties. Chapter 3 identifies a process to determine the area required for an urban school's site needs.

Deviations from the site size may be required due to extenuating circumstances. In such case, the OFCC will require the Design Professional to evaluate and recommend that the school district's educational program needs can be accomplished within a facility on the applicable site.

Site selection applies to new construction. A review of the site selection criteria is required for additions to existing facilities to determine if the existing site can accommodate the site design requirements. The site selection is to be done by the school district with the assistance of a design professional.

Factors to be used for judging the merits of a site are:

- Adjacent Property
- Aesthetic Considerations
- Codes and Zoning
- Easements/Right-of-way
- Environmental Restrictions
- Safe Routes To Schools
- Safety
- Site Preparation
- Site Size
- Site Utilities
- Soil Characteristics
- Testing
- Topography
- Vehicle Access
- Walkability

Site design requirements detail design considerations and provide diagrams for important site elements, including:

a. Vehicular circulation
b. Pedestrian circulation
c. Emergency vehicle access
d. Bicycle circulation
e. Storm drainage
f. Sanitary sewerage
g. Directional signage
h. Physical education
i. Playgrounds
j. Fencing
k. Lighting/Light Pollution
l. Mechanical/electrical yard
m. Landscaping
n. Site furnishings
o. Exterior security provisions

Parent drop-off and bus drop-off areas are to be separate.

Particular emphasis is placed on safety issues, such as separation of vehicular and pedestrian traffic.

In addition to stating design requirements, this chapter indicates items that the school district and the design professional should "plan for" in future improvements. Items indicated to be "planned for" are not funded by the OFCC.

Chapter 4: Elementary School

Chapter 4 begins with an overall building diagram detailing the way in which various areas of an elementary school could be arranged. There are also program area diagrams throughout this chapter that demonstrate how specific spaces might relate to each other within a program area. Space plates are included for each type of space in the program area.

Key Points

The information in this diagram is referred to as a *space plate*. There is a space plate for each room in each program area in each school level.

Each room has a unique code that appears in the bracketing and on the space plate. In this case:
E=Elementary
AC=Academic Core
1=Space Plate #1

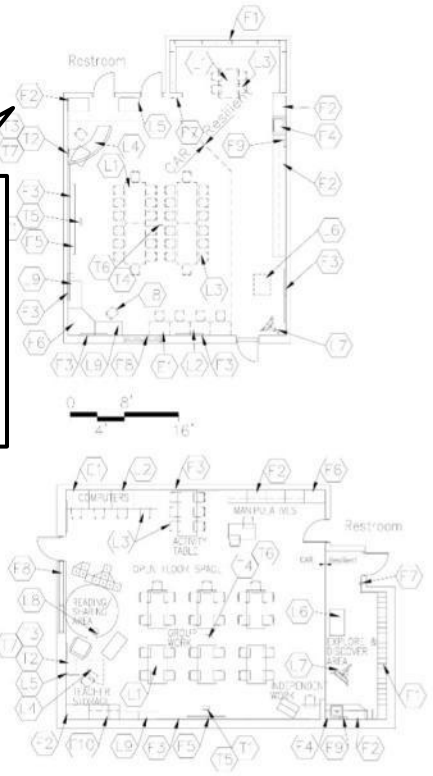
A diagram of the space shows how some of the features and loose furnishings may be organized. The space is not required to be designed in the configuration shown.

Program activities indicate the type of activities that may occur in the space. These activities will vary from district to district depending on the educational program.

Relationships of a particular room to other spaces and activities have been identified to assist the A/E in the design of the facility.

Environmental considerations are items that may affect the educational program. They are the basis of some requirements of Finishes, Features, Plumbing, HVAC, Electrical, and Communications.

Size must be maintained except for tolerance previously noted.



CHAPTER 4: ELEMENTARY SCHOOL

PRE-K/KINDERGARTEN CLASSROOM
E-AC-1

PROGRAM ACTIVITIES:
- Kindergarten instruction through active exploration
- Children practice with tangible articles and are encouraged to develop learning skills, creativity, and imagination.
- Activities include, but are not limited to: group discussions, demonstrations, music activities, listening skills, gross motor skills, art and science projects, and small group activities.

SPATIAL RELATIONSHIPS:
- Near other pre-k/kindergarten classrooms
- Near teacher prep area/workroom
- Direct access to outdoor playground or access through adjacent corridor
- Near vehicle drop-off/pick-up drive
- Adjacent to pre-k/kindergarten restroom

ENVIRONMENTAL CONSIDERATIONS:
- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solu
- Environmental sound control –
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Resilient and stain-resistant floor covering
- Ergonomically appropriate furniture and equipment heights

CAPACITY:	25 students
SIZE:	1,200 SF
ANCILLARY SPACES:	Pre-K/Kindergarten Restroom E-AC-2

NOTES:
1. Loose furnishings shown represent one of many possible configurations based on educational program.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this classroom or could be placed in a teacher prep area/workroom.
3. Second exit from space to meet code need not open to exterior.

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Key Points, continued

This is the subsequent page of information for each space.

Each room has a unique code that appears in the bracketing and on the space plate. In this case:
E=Elementary
AC=Academic Core
1=Space Plate #1

Features identified on the space plates are required for the space. Features include: Fixed Items, Fire Suppression, Plumbing, HVAC, Electrical, Communications, and Electronic Safety & Security Systems.

PRE-K/KINDERGARTEN CLASSROOM
E-AC-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Combination carpet, carpet tile, with resilient options	096816 096500
Optional: All linoleum, ET, sheet vinyl, or rubber	096516 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
- L1 Student desks/tables
- L2 Computer workstation furniture (fixed or mobile)
- L3 Student chairs
- L4 Teacher workstation/computer support and chair (fixed or mobile)
- L5 File cabinet
- L6 Sand/water table
- L7 Children's painting easel
- L8 Teacher reading chair or stool
- L9 8'-10' of low bookcases (fixed or mobile)
- Loose carpet/rug (optional)
- Wastebasket

Electronic Safety and Security:
- Life safety devices per code 283111

Miscellaneous:
- Pencil sharpener (optional)

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES:	Ref.#
Fixed Items:	
F1 Open casework - student coats and personal items, (cubbies) (optional wall cabinets above)	123550
F2 18'–24' combination tall wardrobe, base and wall cabinets	123550
F3 28'-36' combination marker board, tack board, & tackable surface	123550
F4 3' sink base cabinet	123550
F5 Projection screen (optional)	115213
F6 Technology support casework (could be mobile)	123550
F7 Pencil sharpener support (optional)	062000
F8 Window with integral blinds	085113
F9 Towel dispenser (optional)	102813
F10 36"- 42" high storage cabinet	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink with drinking fountain	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting	265100
Means of egress lighting per code	265100
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 ***Wireless access point cable above ceiling***	271513
Central sound system	275123
Clock	275313
Sound reinforcement system	275127
T5 ***Ultra-short throw interactive*** projector	274119
T6 Wireless access point (WAP) as determined by design – refer to Note 4	***272133***
T7 Classroom technology center videoport	***271543, 274116, 274119, 275127***

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Where appropriate, some casework may be mobile to add flexibility and become part of loose furnishings.
4. ***Baseline includes WAP cable per classroom. WAP device quantity/placement per 272133 requirements.***

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The loose furnishings shown on the space plates are often found in spaces of the room type. The list is not inclusive of all furniture that might be included. Loose furnishings are funded as part of the project cost.

Chapter 5: Middle School

Chapter 5 begins with an overall building diagram showing how the various areas of a middle school could be arranged. There are also program area diagrams throughout this chapter that demonstrate how specific spaces might relate to each other within a program area. Space plates are included for each type of space in the program area.

Key Points

The following space plate is for a middle school art room.

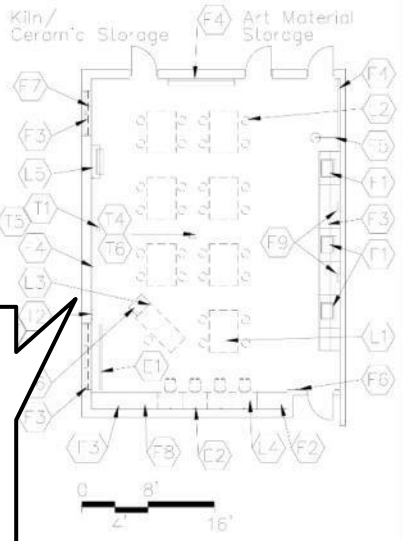
CHAPTER 5: MIDDLE SCHOOL

ART ROOM
M-VA-1

PROGRAM ACTIVITIES:
- Art students will work on a variety of two- and three-dimensional art projects. Projects will include drawing and painting, computer graphics, sculpture and model making, collage, fiber arts, and ceramics.

SPATIAL RELATIONSHIPS:
- Near academic core classrooms
- Direct access to outdoors or activities through corridor

ENVIRONMENTAL CONSIDERATIONS:
- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Stain-resistant floor covering



CAPACITY: 28 students
SIZE: 1,200 SF
ANCILLARY SPACES: Kiln/Ceramic Storage M-VA-2
Art Material Storage M-VA-3

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

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Each room has a unique code that appears in the bracketing and on the space plate. In this case:
M=Middle
VA=Visual Arts
1=Space Plate #1

Program activities indicate the type of activities that may occur in the space. These activities will vary from district to district depending on the educational program.

Relationships of a particular room to other spaces and activities have been identified to assist the A/E in the design of the facility.

Environmental considerations are items that may affect the educational program. They are the basis of some requirements of Finishes, Features, Plumbing, HVAC, Electrical, and Communications.

A diagram of the space shows how some of the features and loose furnishings may be organized. The space is not required to be designed in the configuration shown.

Chapter 5: Middle School, continued

Key Points, continued

This is the subsequent page of information for each space.

Features identified on the space plates are required for the space. Features include: Fixed Items, Fire Suppression, Plumbing, HVAC, Electrical, Communications, and Electronic Safety & Security Systems.

Each room has a unique code that appears in the bracketing and on the space plate. In this case:
M=Middle
VA=Visual Arts
1=Space Plate #1

ART ROOM
M-VA-1

CHAPTER 5: MIDDLE SCHOOL

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, sheet vinyl, rubber,	096500
sealed concrete,	033000
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

The loose furnishings shown on the space plates are often found in spaces of the room type. The list is not inclusive of all furniture that might be included. Loose furnishings are funded as part of the project cost.

LOOSE FURNISHINGS:
- L1 Student work tables
- L2 Student chairs or stools
- L3 Teacher desk and chair/stool and teacher computer support
- L4 Computer workstation furniture
- L5 Desk height file cabinet
- Wastebasket

EQUIPMENT:
- E1 Drying rack

Electronic Safety and Security:
- Life safety devices per code 283111

Miscellaneous:
- Pencil sharpener (optional)

E2 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 3'-5'sink base cabinets, or several wash fountains	123550
F2 Tall wardrobe with file drawers	123550
F3 26'-34' combination tall cabinets, base and wall cabinets	123550
F4 26'-34' combination marker board, tack board & tackable wall surface	101100
F5 Emergency eyewash (recommended)	224000
F6 Pencil sharpener support(optional)	062000
F7 Windows with integral blinds	085113
F8 Technology support casework	123550
F9 Towel dispenser (optional)	102813
F10 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sinks with solids interceptor	224000
Emergency eyewash connections	224500
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Manually controlled general exhaust	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Track lighting	265100
Means of egress lighting per code	265100
Emergency lighting per code	265100
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 ***Wireless access point cable above ceiling***	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 ***Ultra-short throw interactive*** projector	274119
T6 Wireless access point (WAP) as determined by design – refer to Note 4	***272133***
T7 Classroom technology center videoport	***271543, 274116, 274119, 275127***

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity/placement per 272133 requirements.***

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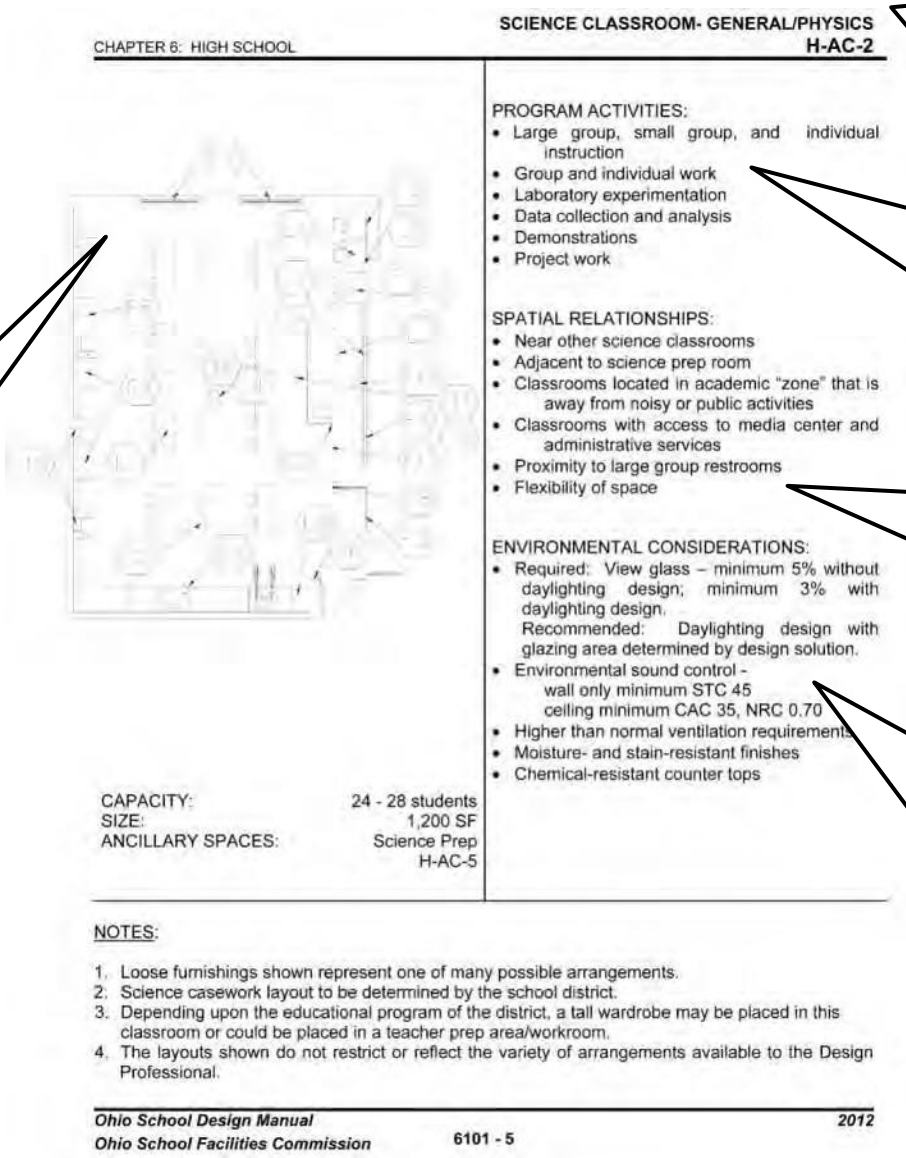
Chapter 6: High School

Chapter 6 begins with an overall building diagram showing how the various areas of a high school could be arranged. There are also program area diagrams throughout this chapter that demonstrate how specific spaces might relate to each other within a program area. Space plates are included for each type of space in the program area.

Key Points

The following space plate is for a high school general science/physics classroom.



CHAPTER 6: HIGH SCHOOL

SCIENCE CLASSROOM- GENERAL/PHYSICS
H-AC-2

PROGRAM ACTIVITIES:
- Large group, small group, and individual instruction
- Group and individual work
- Laboratory experimentation
- Data collection and analysis
- Demonstrations
- Project work

SPATIAL RELATIONSHIPS:
- Near other science classrooms
- Adjacent to science prep room
- Classrooms located in academic "zone" that is away from noisy or public activities
- Classrooms with access to media center and administrative services
- Proximity to large group restrooms
- Flexibility of space

ENVIRONMENTAL CONSIDERATIONS:
- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Higher than normal ventilation requirements
- Moisture- and stain-resistant finishes
- Chemical-resistant counter tops

CAPACITY:	24 - 28 students
SIZE:	1,200 SF
ANCILLARY SPACES:	Science Prep H-AC-5

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Science casework layout to be determined by the school district.
3. Depending upon the educational program of the district, a tall wardrobe may be placed in this classroom or could be placed in a teacher prep area/workroom.
4. The layouts shown do not restrict or reflect the variety of arrangements available to the Design Professional.

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Each room has a unique code that appears in the bracketing and on the space plate. In this case:
H=High
AC=Academic Core
2=Space Plate #2

Program activities indicate the type of activities that may occur in the space. These activities will vary from district to district depending on the educational program.

Relationships of a particular room to other spaces and activities have been identified to assist the A/E in the design of the facility.

Environmental considerations are items that may affect the educational program. They are the basis of some requirements of Finishes, Features, Plumbing, HVAC, Electrical, and Communications.

Diagrams of the space show how some of the features and loose furnishings may be organized. The space is not required to be designed in the configuration shown.

Chapter 6: High School, continued

Key Points, continued

This is the subsequent page of information for each space.

Features identified on the space plates are required for the space. Features include: Fixed Items, Fire Suppression, Plumbing, HVAC, Electrical, Communications, and Electronic Safety & Security Systems.

Each room has a unique code that appears in the bracketing and on the space plate. In this case:
H=High
AC=Academic Core
2=Space Plate #2

SCIENCE CLASSROOM - GENERAL/PHYSICS
H-AC-2

CHAPTER 6: HIGH SCHOOL

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096500
rubber, ET, sheet vinyl,	096516
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
- L1 Student work tables
- L2 Student stools/chairs
- L3 Teacher chair or stool
- L4 Computer workstation furniture
- L5 File cabinet
- Wastebasket

L4 could be fixed casework.

The loose furnishings shown on the space plates are often found in spaces of the room type. The list is not inclusive of all furniture that might be included. Loose furnishings are funded as part of the project cost.

Electronic Safety and Security:
- Life safety devices per code 283111

Miscellaneous:
- Pencil sharpener (optional)

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123553
F2 Demonstration table/teacher desk	123553
F3 20'-32' combination marker board, tack board and tackable wall surface	101100
F4 Technology support casework	123553
F5 40'-60' of lab casework with sinks	123553
F6 Pencil sharpener support (optional)	062000
F7 Windows with integral blinds	085113
F8 Emergency shower/eyewash	224000
F9 18'-24' of wall cabinets	123553
F10 Towel dispensers (optional)	102813
F11 2 eye hooks for demonstrations (optional)	055000
F12 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	224000/221116/221119
Emergency shower/eyewash connections	224000
Gas connections (optional)	226313
Master shutoff for gas	226313
Compressed air connections (optional)	221500
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Manual exhaust	Div. 23
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
Duplex receptacles at perimeter workstations and teaching wall	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting	265100
Means of egress lighting per code	265100
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port at demonstration table	271513
T4 ***Wireless access point cable above ceiling***	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 ***Ultra-short throw interactive*** projector	274119
T6 Wireless access point (WAP) as determined by design – refer to Note 4	***272133***
T7 Classroom technology center videoport	***271543, 274116, 274119, 275127***

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Master gas shutoff valve shall be clearly labeled, easily accessible, and immediately operable by staff.
4. ***Baseline includes WAP cable per classroom. WAP device quantity/placement per 272133 requirements.***

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Chapter 6: Career-Technical School

This Chapter begins with general information about the design and construction of Career-Technical schools. Two subject code/program tables are include with references to the space plates that follow. There are also program area diagrams throughout this chapter that demonstrate how specific spaces might relate to each other within a program area. Space plates are included for each type of space in the various program areas.

Key Points

The information in this diagram is referred to as a *space plate*.

There is a space plate for each room in each program area and each program type.

Each room has a unique code that appears in the bracketing and on the space plate. In this case:
CT=Career Tech
AC=Academic Core
1=Space Plate #1

A diagram of the space shows how some of the features and loose furnishings may be organized. The space is not required to be designed in the configuration

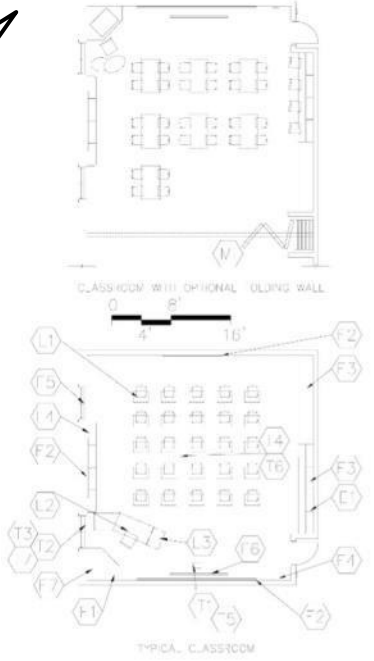
Program activities indicate the type of activities that may occur in the space. These activities will vary from district to district depending on the educational program.

Relationships of a particular room to other spaces and activities have been identified to assist the A/E in the design of the facility.

Environmental considerations are items that may affect the educational program. They are the basis of some requirements of Finishes, Features, Plumbing, HVAC, Electrical, and Communications.

CHAPTER 6: CAREER-TECHNICAL SCHOOL

ACADEMIC CLASSROOM
CT-AC-1



PROGRAM ACTIVITIES:
- Large group, small group, and individual instruction
- Group and individual work
- Demonstrations
- Accommodates any of the core academic disciplines

SPATIAL RELATIONSHIPS:
- Near other academic core classrooms
- Proximity to large group restrooms
- Near teacher prep area/workroom
- Classrooms should be located in academic "zone" that is away from noisy or public activities
- Classrooms with access to media center and administrative services
- Flexibility of space

ENVIRONMENTAL CONSIDERATIONS:
- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: 25 students
SIZE: 900 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be placed in this classroom or could be placed in a teacher prep area/workroom.

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Chapter 6: Career-Technical School

Key Points, continued

This plate contains detailed information about the Career-Technical Academic Classroom.

Each room has a unique code that appears in the bracketing and on the space plate. In this case:
CT=Career Tech
AC=Academic Core
1=Space Plate #1

Features identified on the space plates are required for the space. Features include: Fixed Items, Fire Suppression, Plumbing, HVAC, Electrical, Communications, and Electronic Safety & Security Systems.

ACADEMIC CLASSROOM
CT-AC-1

CHAPTER 6: CAREER-TECHNICAL SCHOOL

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile	096816
Optional: ET, sheet vinyl, linoleum, or rubber	096516 096500 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
- L1 Student desks and chairs
- L2 Teacher desk or workstation/computer support and chair
- L3 File cabinet
- L4 9' of low bookcases (fixed or mobile)
- Wastebasket

Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
M1 Operable partitions between classrooms are optional	102226
Duplex receptacle with dedicated circuit for wireless devices	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123550
F2 20'-32' combination marker board, tack board and tackable wall surface	101100
F3 18'-24' combination base and wall cabinets	123550
F4 Pencil sharpener support (optional)	062000
F5 Windows with integral blinds	085113
F6 Projection screen (optional)	115213
F7 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing: N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting: Illumination level: See Table 8600-5	265100
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 ***Wireless access point cable above ceiling***	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 ***Ultra-short throw interactive*** projector	274119
T6 Wireless access point (WAP) as determined by design – refer to Note 4	***272133***
T7 Classroom technology center videoport	***271543, 274116, 274119, 275127***

The loose furnishings shown on the space plates are often found in spaces of the room type. The list is not inclusive of all furniture that might be included. Loose furnishings are funded as part of the project cost.

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Where appropriate, some casework may be mobile to add flexibility and become part of the loose furnishings.
4. ***Baseline includes WAP cable per classroom. WAP device quantity/placement per 272133 requirements.***

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Chapter 6: Career-Technical School

Following is a Program Space Plate for an Electronics lab in a Career-Technical School.

R*1* / 1503 ELECTRONICS
***R0* / 17.0370 AUTOMATION & ROBOTICS**

CHAPTER 6: CAREER-TECHNICAL SCHOOL **CT-P1-1**

PROGRAM DESCRIPTION:

Electronics: Classroom, laboratory, and practical learning experiences that includes both theory and practice. Students learn construction, maintenance, and repair of digital, analog, and microprocessor circuits in applications such as communications equipment, consumer equipment, and industrial equipment.

Automation & Robotics: Utilizing business and Industry, math, English, science and technology standards, introduces concepts in Automation and Robotics technologies: Computer Numerical Control (CNC), Data Acquisition and Analysis, Electrical/Electronic controls, Fluid Power, Robotics and Programmable Logic Controllers (PLC).

Program Type: 1

Size Requirements: 1,800 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Carpet	096816
Optional: ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(12) Two-person work tables w/storage below
(24) Computer workstation furniture & chairs
(1) Teacher station & chair
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 24' of marker board, tack board, or tackable wall surface	101100
F2 Reserved	
F3 60' of base and wall cabinets	123550
F4 Reserved	
F5 Pencil sharpener support (optional)	062000
F6 Windows with integral blinds	085113
F7 Projection screen, 6'x8'	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting, parabolic lenses: Illumination level: See Table 8600-5	265100
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port	271543
1 voice port and phone	271513/273123
1 data port near teacher workstation	271513
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Ultra-short throw interactive projector	274119
Wireless access point (WAP) as determined by design – refer to Note 4	***272133***
Classroom technology center videoport	***271543, 274116, 274119, 275127***
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
Duplex receptacle with dedicated circuit for wireless devices	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity/placement per 272133 requirements.***

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Ohio School Facilities Commission **6311 - 9**

Chapter 7: *Sustainable Design*
High performance buildings are in the forefront of today's construction. This product is the result of sustainable design and is judged by the United States Green Building Council's LEED rating system. Initially, this chapter indicates suggestions and good practices in daylighting considerations with emphasis on energy conservation.

Chapter 8: Systems and Materials
Chapter 8 provides an overview and options of the various materials and systems that have been used to establish a design standard and level of quality for the systems and materials to be incorporated into new buildings. Systems and materials are described in the following categories
Exterior walls
- masonry cavity wall
- veneer and metal framing
- metal panel on concrete masonry wall
- Plant pre-cast concrete insulated sandwich wall
- Metal panel on metal framing
- Exterior wall/roof closure

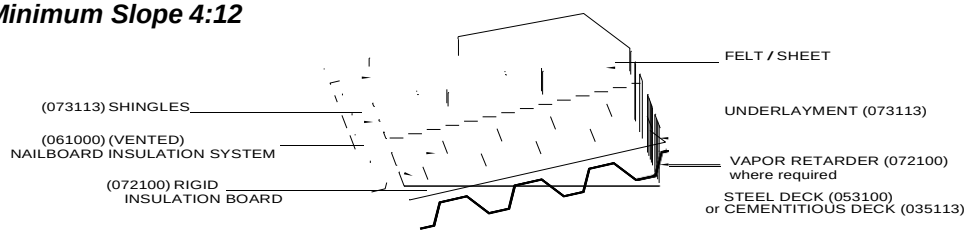
Roofs
- shingle roof & shingle roof system
- metal roof with rigid insulation & metal roof with rigid insulation system
- built-up roof
- membrane roof
- recommended roof ridge
- exterior wall system
- recommended wall-low roof

Interior walls
Structural
Plumbing
HVAC
- central plant VAV system with hot water reheat terminals
- central plant VAV system with fan powered reheat terminals
- water-source heat pump system

Technology
Electrical

EXAMPLE: Shingle Roof
Application - Steep Roofing***, Minimum Slope 4:12***
Components

- Roof Membrane
  - Shingles
  - Underlayment
- Roof insulation
  - (Vented) nailboard insulation
  - Rigid insulation
- Vapor Retarder
  - Where required. Refer to Chapter 9.
- Structural Support
  - Steel deck or cementitious deck
- Air Barrier System Required
  - Self-adhering sheet or Closed-cell polyurethane insulation



Performance
1. Features

- Impact Resistant, Moisture Resistant, Thermal Resistant

EXECUTIVE SUMMARY

OSDM ORGANIZATION

Chapter 9: Specifications

Chapter 9 identifies specifications, which are an element of construction documents, and defines the qualitative requirements for products, materials, and workmanship. This chapter is a guide for the Design Professional who will prepare detailed specifications for the project. The OFCC requires that the specifications for a project promote competition among manufacturers of materials, equipment, and furnishings incorporated into the project. At least three manufacturers should be listed for all materials and systems.

This chapter includes both performance (a statement of required results with criteria for verifying compliance, but without unnecessary limitations on the methods for achieving the required results) and reference (requirements set by authority, custom, or general consensus and are established as accepted criteria) standards.

The sections are organized into CSI's (Construction Specifications Institute) format:

9101 General Requirements
9102 Existing Conditions
9103 Concrete
9104 Masonry
9105 Metals
9106 Wood, Plastics, and Composites
9107 Thermal and Moisture Protection
9108 Openings
9109 Finishes
9110 Specialties
9111 Equipment
9112 Furnishings
9113 Special Construction
9114 Conveying Equipment
9121 Fire Suppression
9122 Plumbing
9123 Heating, Ventilating, and Air Conditioning
9126 Electrical
9127 Communications
9128 Electronic Safety and Security
9131 Earthwork
9132 Exterior Improvements
9133 Utilities

Excerpt from Section 096816 Carpet Specification

FINISHES CHAPTER 9: SPECIFICATIONS

SECTION 096816
SHEET CARPETING

GENERAL GUIDELINES

1.1 SECTION INCLUDES
A. Qualitative requirements for carpet materials and accessories for a direct-glue down or pre-applied adhesive installation of one of the following:.
1. Tufted Broadloom
2. Variable Cushion Tufted Textile (VCTT)

1.2 QUALITY ASSURANCE
A. Chemical Emission/Indoor Air Quality: All carpet specified must be in compliance with the Carpet and Rug Institute (CRI) "Green Label Plus" Indoor Air Quality Carpet Testing Program. The program label and registration number serve as evidence of compliance.

1.3 PROJECT CONDITIONS
A. Concrete subfloors must meet the following requirements before carpet may be installed:
1. pH range of 5 to 9.
2. Moisture-emission rate of 3 lb/1000 sq.ft. per 24 hours or less.

1.4 WARRANTY
A. Tufted Broadloom: 10 years (minimum).
B. Variable Cushion Tufted Textile: 15 years (minimum)

1.5 CARPET
A. Carpet, Tufted Broadloom: Shall meet or exceed the following CRI guidelines:

SCHOOL CARPET MINIMUM AVERAGE SPECIFICATIONS

Carpet Property/Characteristic	Minimum Specifications	Test Method
Type Yard	Solution or Yarn Dyed	--
Color	Multi-Colored Products (select colors complimentary to soil type/color in region)	--
Surface/Style	Level Loop, Multi-Level Loop, Textured Loop, or Cut & Loop	--
Static	3.5 kv (max – not to exceed)	AATCC-134 Step Method
Indoor Air Quality (IAQ)	CRI IAQ Certification "Green Label Plus"	CRI Test Program ASTM D-5116
In glue-down installation, include CRI IAQ Testing Program label for installation adhesives. Carpet over cushion, include CRI IAQ Testing Program label for carpet cushion.		
Flammability – Radiant Panel Test	Class I	ASTM E-648
NBS Smoke	<450 Flaming Mode	ASTM E-662
Tuft Bind (dry)	8 lbs, all products (16-20 lbs suggested for unitary backing)	ASTM D-1335
Delamination	Secondary backed products, 3.5 lbs	ASTM D-3936
Dimensional Stability	Removable modular products, 0.2% or less	ISO 2551
Colorfastness: light	4 or better (60 AFU 3 cycles)	AATCC 16-E
Colorfastness: ozone	4 or better after 2 cycles	AATCC 129
Colorfastness: crocking	4 or better (wet & dry)	AATCC 165
Colorfastness: water	4 or better, AATCC Transference Scale (only yarn dyed carpet) (grade change in color and staining)	AATCC 107
Soil Resistant Treatment	Minimum average of 350 ppm fluorine on pile fiber of 3 separate tests	CRI TM-102

B. Carpet, Variable Cushion Tufted Textile (VCTT): Shall meet or exceed the following guidelines:

Ohio School Design Manual 096816 – Sheet Carpeting *2012*
Ohio School Facilities Commission **9109 - 28**

Chapter 10: Miscellaneous

Chapter 10 provides an overview explaining the importance of color in schools, including general recommendations regarding the use of color for various items and finishes; suggests loose furnishings and equipment for various spaces at each school level; and provides quality guidelines and furniture selection considerations. Additionally, this section contains information on the selection of Food Service Equipment.

For Elementary Schools Chapter 10 suggests warm base, background colors such as light salmon, beiges, soft yellows or peaches on the walls to produce a calming environment. Deeply saturated bright hues on architectural elements should be avoided, since the colors will create too much stimulation. Similar approaches are suggested for the upper grades. School colors can be integrated into the building color scheme in the athletic areas and possibly in the locker specifications. Color is also a very helpful tool in way finding, and this may be accomplished by identifying grade level or team areas with different colors.

Loose furnishings and equipment in the project are those items that are not attached to the building such as furniture, special subject equipment, appliances, trash receptacles, cleaning equipment, etc. The type of loose furnishings and equipment for a school should be selected to support the educational curriculum and the function of the spaces, but also provide flexibility for change and development in the future. The exact items and styles may vary from school to school.

OHIO CONSTRUCTION REFORM

On June 30, 2011, Governor Kasich signed House Bill 153, which included the first changes in the state's method of performing public construction in over 134 years. These changes collectively known as Ohio Construction Reform (OCR) will substantially alter how public improvement projects are completed and will allow for alternative construction delivery methods.

OCR retains the current multiple-prime design-bid-build project delivery method, but gives public owners a number of other project delivery options that could be:

Faster
Have less risk
More flexible
Lower cost

Now that OCR is in effect, state agencies, colleges/universities, counties, townships, municipal corporations, school districts, or other political subdivisions may use these various project delivery methods. Projects by the Ohio Turnpike or ODOT's road construction were not affected and will be completed using previous project delivery methods.

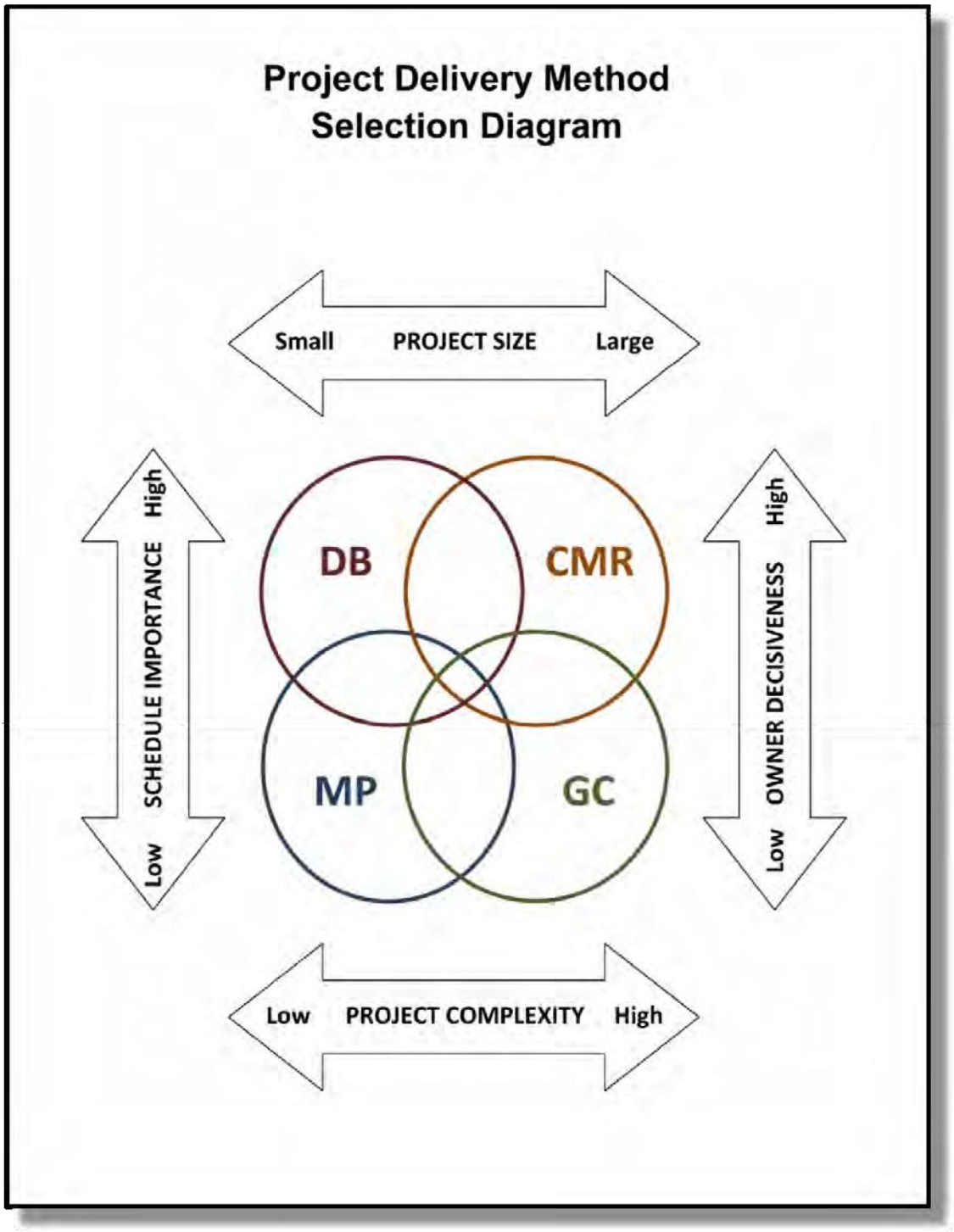
Alternative Project Delivery Methods:

Retains multi-prime design-bid-build project delivery
Removes limitations on single-prime design-bid-build project delivery – General Contracting
Allows design-build (D-B) project delivery – a single entity assumes risk for final design and construction of facility including cost overruns
Retains construction manager (CM) as agent delivery – the CM acts as owner's agent
Allows construction manager at risk delivery (CMR) – the CM holds subcontracts and assumes risk for cost overruns
Allows for open-book Guaranteed Maximum Price, design-assist, and subcontractor prequalification within design-build and CM at risk delivery methods.

See next page for a Project Delivery Method Comparison Guide.

Project Delivery Method Comparison Guide

	Description	Advantages	Disadvantages
MULTIPLE PRIME	Traditional approach in which the owner hires an A/E to fully document the project criteria and design prior to bidding. Multiple packages are separately bid and awarded to the lowest responsive and responsible prime contractors. The owner holds all prime contracts and is responsible for coordination during construction.	• Familiar delivery method • Fully defined project scope • Both designer and contractor accountable to owner • Creates most prime bidding opportunities (lowest bonding) • Lowest initial price • Good for simple projects that are not schedule-driven and not subject to change	• Linear process means longer schedule • Limited control over contractor and subcontractor selection • No design or cost input from contractor • Lack of flexibility for change • Can be adversarial in nature • Not good for complex projects that are schedule-driven
CM as AGENT	An owner's agent is hired through a qualifications based selection process during the design phase. The owner's criteria and full design is documented by a separate A/E. The CMA provides estimates during design, assists with bidding and coordinates prime contractors during construction. The owner bids and holds all contracts for construction.	• Fully defined project scope • Supplements owner's staff • Independent professional services & expertise for owner • Creates most prime bidding opportunities (lowest bonding)	• Adds level of bureaucracy • Limited control over contractor and subcontractor selection • Owner still holds contracts for construction • Not suited for small projects • Drawbacks common to the design-bid-build process
GENERAL CONTRACTING	A linear design-bid-build process in which the owner selects an A/E to fully document the project criteria and design prior to bidding. The lowest responsive and responsible GC (single prime) is awarded the contract. The owner holds a single contract with the GC.	• Familiar delivery method • Fully defined project scope • Both designer and contractor accountable to owner • Simple procurement method • Single contractor to manage • Good for simple to moderately complex projects that are not schedule-driven.	• Sequential process means longer schedule • Limited control over contractor and subcontractor selection • No design or cost input from contractor • Can be adversarial in nature • Not good for complex projects that are schedule-driven • Bonding requirements
CM at RISK	A contractor is hired through a best value selection process during the design phase. The owner's criteria and full design is documented by a separate A/E. The CMR provides a guaranteed maximum price prior to bidding. The CMR bids to prequalified subcontractors and holds all subcontracts for construction.	• Contractor input on design • Selection of contractor based qualifications and price • Open-book GMP • Faster project delivery than traditional design-bid-build • Provides flexibility to handle changes during design phase • Good for large or complex schedule-driven projects • More control selecting subs	• Relationship changes during design to construction phase • Increased contingency for assumption of risk • Difficult to determine if best price has been achieved • Bonding requirements • Disputes if GMP scope not clear
DESIGN-BUILD	A single entity is hired through a best value selection process to deliver a complete project. The owner's criteria and design intent is documented by a separate criteria architect. The design is completed by the DB entity and a guaranteed maximum price is provided prior to bidding. The DB entity bids to prequalified subcontractors and holds all subcontracts for construction.	• Single point of responsibility for design and construction • Contractor selection based on qualifications and price • Fastest project delivery Open-book GMP • No changes orders for design errors and omissions • Good for new construction that is time sensitive and not subject to change • Good for less complex projects • More control selecting sub's	• Owner has less control over selecting designer • Owner has less input in details • Over emphasis on price may compromise quality • Difficult to determine if best price has been achieved • Owner required to make quick decisions • Changes difficult & expensive • Bonding requirements • Disputes if criteria not clear


Project Delivery Method
Selection Diagram
Small
PROJECT SIZE
Large
High
SCHEDULE IMPORTANCE
Low
DB
CMR
MP
GC
High
OWNER DECISIVENESS
Low
Low
PROJECT COMPLEXITY
High

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OBJECTIVE

New K-12 and Career Technical Buildings and Additions

The objective of this section is to establish a baseline "cost per square foot per student" for new school buildings to be constructed under the funding mechanism administered by the Ohio Facilities Construction Commission. It is the intent of the "Design Manual" and the corresponding costs to establish a standard level of quality to be used by all Ohio schools. Under the classroom facilities assistance program and other applicable programs, the costs are to be used for new buildings as well as additions to existing buildings. The costs do not apply to renovation of existing structures.

Renovations

A separate document entitled “Assessment Cost Guidelines” addresses the costs of renovations, and is included herein. Since the approach for the renovations costing differs somewhat from the approach on the new school buildings and additions, all assumptions regarding the assessment cost guidelines are included within the Assessment Cost Guidelines document.

CONSIDERATIONS

There are dozens of variables that affect the cost of construction. They vary in degree, in the ability to be quantified, and the potential effect they may have on a project. An opinion of probable cost is just that–an opinion based on the best information known at the time of bidding. This report considers many variables that may affect construction and utilizes a baseline for purposes of establishing an initial starting point. Regional factors are then applied based on the area where the building is to be constructed within the state.

In addition to the considerations for K-12 facilities, the development of all inclusive construction square foot numbers for the Career-Technical school is a challenging exercise. These challenges include:

Limited historical data on projects is available nationally.
Each program space cost is different and there are over 80 programs.
Some spaces are a-typical, and include features such as high bays and thickened slabs.
Few Career-Technical schools in Ohio have done any building recently, again limiting the availability of historical data.

Regardless of the challenges, much time and effort was put into developing realistic costs through various methods. The processes followed are outlined in detail herein.

NEW K-12 AND CAREER TECHNICAL APPROACH

Modification Factors: Because the information is intended to be used to establish budgets throughout Ohio, it is important to establish cost modification factors for various State regions relative to ***the baseline region of Central Ohio.*** The regions established correspond with the 9 regions identified in the 1990 Ohio Public School Facility Study. These modification factors were applied to both the K-12 and the Career Technical sections of the Design Manual.

Variables:

An opinion of probable cost developed by an estimating professional is "an opinion of cost." There are a number of factors and variables that can significantly affect these costs. Unfortunately, many of these issues are out of the control of the estimator, Ohio Facilities Construction Commission, Design Professional, and school district.

In an effort to establish a baseline cost for Central Ohio, the following factors were identified:

- Projects are to be bid approximately 15 to 18 months after bond issue passage.
- Projects are to be bid in the ***market conditions based on 100.00% Regional Factor***.
- Moderate bidding activity will be present during bidding.
- Projects may or may not include prevailing wage, as indicated by federal or Ohio law.
- All materials from the standards will be "middle of the road" as indicated in the Design Manual.
- Foundations will be standard spread footings.
- In most instances, buildings are priced as single story. However, allowances have been included in the two large high school projects for elevators. It is understood that some buildings in various locations may require additional stories. An analysis has shown reduced site needs and costs counterbalance any potential increased costs for multiple stories.
- The site size will be adequate for staging and material storage in most cases. Certain sites may be smaller and require specific security and laydown requirements. In these instances, it appears that reduced sitework costs will counterbalance the specific costs for these items.
- If the option is selected to use a construction manager with multi-prime bidding, the number of packages may vary by construction manager and could also be affected by market conditions, labor and material availability, project location, etc.
- Typical subsoil conditions.
- Excludes impact on contractor pricing due to private sector activity.

In addition to these factors and the variations that can occur, other variables can significantly affect the costs and should be considered when analyzing these costs.

Availability of qualified contractors and tradesmen.
Availability of materials. Lead times on materials in the current marketplace are significant, and can lead to higher costs.
Anticipated weather conditions during construction.
Final site selected and usability of the site.
Project deadlines. A more aggressive schedule in a tight labor and material marketplace can lead to higher costs.
Construction activity in the private sector market place.
Efficiency of design. Redesign, engineering and structural details can significantly affect costs.
Fluctuation in material prices and wages.
The capacity of the Design firm selected.
Exact locale (labor rates, major material costs).
Market activity at project location and throughout the State (how busy is the market at any given moment.)
Final selected materials for each project.
Bidder competitiveness.
Method of construction procurement.
Final scope of work.
Time of year / schedule of proposed construction.
Mechanical and electrical systems to be utilized.
Material price fluctuations: including steel, lumber, copper, brick, casework, HVAC materials, etc.
Workers compensation and other insurance and tax rate modifications.
Union strength / marketplace versus the non-prevailing wage rates.

The application of these variables to a particular cost/SF will be difficult. However, it is strongly urged that this be done to increase the accuracy of the project cost estimate.

Career Technical Approach

Component Estimate

Because the Career-Technical sections contain over 80 different programs, with significant differences among programs, including the construction materials and types required for the programs, the following approach was taken on developing budgets for these buildings.

Specific Program Areas

Each program instructional space was evaluated separately and estimated as its own single entity. ***Support spaces*** also followed the same procedure, ***based on the cost of the corresponding lab***.

By doing this, a standard list of components was identified that are common to all programs. For instance, each space has concrete masonry unit walls, ceilings, etc.

After the standard list of components for each program and associated space was estimated for cost, the items specific to an individual program were then budgeted. For instance, this could include items such as the "kennel" which is specific only to the Animal Science and Management program. Other examples of considerations applicable to specific programs included ceiling heights, additional HVAC or electrical requirements, etc.

Furnishings were estimated for each specific program, and are included in the basic building cost.

In addition, technology infrastructure was estimated for each specific program and is included in the basic building cost.

A construction contingency is included that is a percentage of site costs, basic building construction costs, furnishings and technology.

Non-construction costs are included as a percentage of the total of site, construction, furnishings, technology infrastructure and contingency.

The final program area opinion of probable costs indicated includes site, building, non-construction costs and all contingencies.

Core Areas

.1 It was determined that the academic area costs will be the same as OSDM high school costs.

General Comments specific to both Program Areas and Core Areas

Non-construction costs are calculated the same for both areas.

The narrative and components of the Career-Technical sections were thoroughly reviewed and taken into consideration when establishing the costs for each system. The system costs were established using past project data and history. Where design guidelines were not yet completely identified, "middle of the road" costs were incorporated.

Although no typical floor plans were available to use in quantifying the systems, proven design ***best practices*** were incorporated. Some examples include: ratio of exterior wall space to floor area, ratio of interior wall space to floor area and ratio of glazing to exterior wall area. These ratios do vary from one design to the next, but they generally fall into a fairly tight range. These ratios generally prove to be reliable when they are coupled with the programming and design approach of the Guidelines Developer.

A general specifications outline for items included and assumptions made per particular category of construction was also developed.

Other Considerations for both K-12 and Career Technical

Non-Construction Costs

Non-Construction costs are included as part of the overall, all inclusive, square foot costs. Items included in non-construction costs are as follows:

Land Survey

Soil Borings/Phase 1 Environmental Report

Agency Approval Fees

Construction Testing

Printing - Bid Documents

Advertising For Bids

Builder's Risk Insurance

Design Professional Compensation

Construction Management Compensation

Commissioning and Maintenance Plan Advisor

Non-construction Contingency ***including but not limited to:***

Partnering/Mediation Services

Square Foot Cost Inclusions

Square foot costs presented on the matrix are all inclusive of all costs required to design and construct the building and include both construction and non-construction costs. The components of the “non- construction costs” are described above. The “construction costs” are described as follows and include the following major components:

Site Development Costs

Building Costs

Furnishings (including playgrounds for elementary)

Technology – see description below

Construction Contingency

Site Development Costs

Site development costs are included in the square foot costs. A reasonable amount of cut and fill is assumed and overall site costs are based on the site described in the Design Manual. Many factors affect site work including cut/fill of soil, topography, location of adjacent utilities, tap-in fees, etc. Site costs do not include the cost to purchase land.

The baseline square foot site development costs take into account standard tap fees and/or on-site water or wastewater treatment plants. However, since every site is unique, the overall allowed site costs should be used wisely by the professionals and the District, and care should be taken to select the most effective and efficient site that can be developed within the allowable cost.

Technology

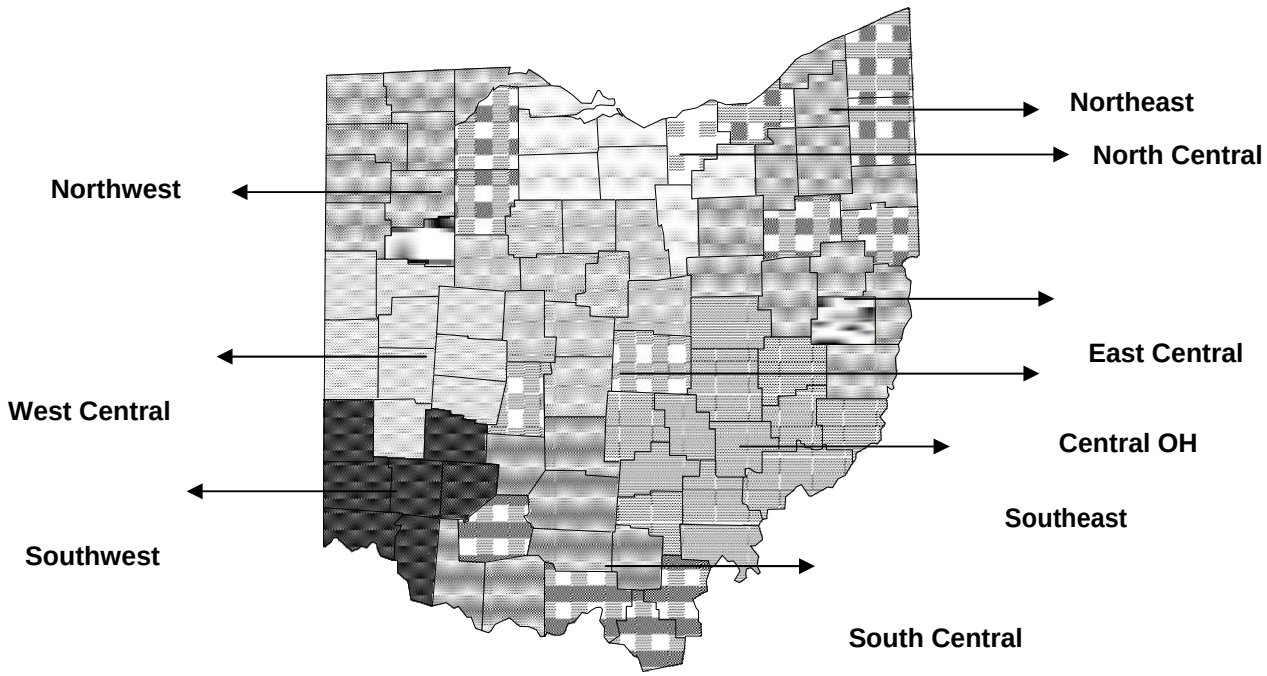
.1 Technology costs include cable tray in academic areas, and voice, video, and data outlets. Also included is a fully digital telephone system with telephones in the classrooms and offices, and an integrated voice mail system. Additionally, there will be a video distribution system with projectors in the classrooms and access to cable systems and some additional media resources. There will also be ***a*** wireless computer network system with data locations throughout and electronics, patch panels, and patch cables as required.

Security

.1 Within the total project cost budget, an allowance based on gross building area shall be set aside for exterior and interior building security systems and protection and utilized most effectively for the project conditions. Refer to Chapter 8, Section 8600.

RESULTS

The opinion of probable cost summary matrix for K-12 facilities and Career-Technical facilities and a diagram of the state showing the regions are included in this section.



1-Southwest	***2-West Central***	***3-Northwest***	***4-North Central***	***5-South Central***
Butler	Auglaize	Allen	Ashland	Adams
Clermont	Champaign	Defiance	Huron	Fayette
Clinton	Clark	Fulton	Medina	Highland
Greene	Darke	Hancock	Sandusky	Lawrence
Hamilton	Logan	Henry	Erie	Pike
Preble	Mercer	Lucas	Lorain	Scioto
Warren	Miami	Paulding	Ottawa	Brown
	Montgomery	Putnam	Seneca	Gallia
	Shelby	Van Wert	Wayne	Jackson
		Williams		Pickaway
		Wood		Ross

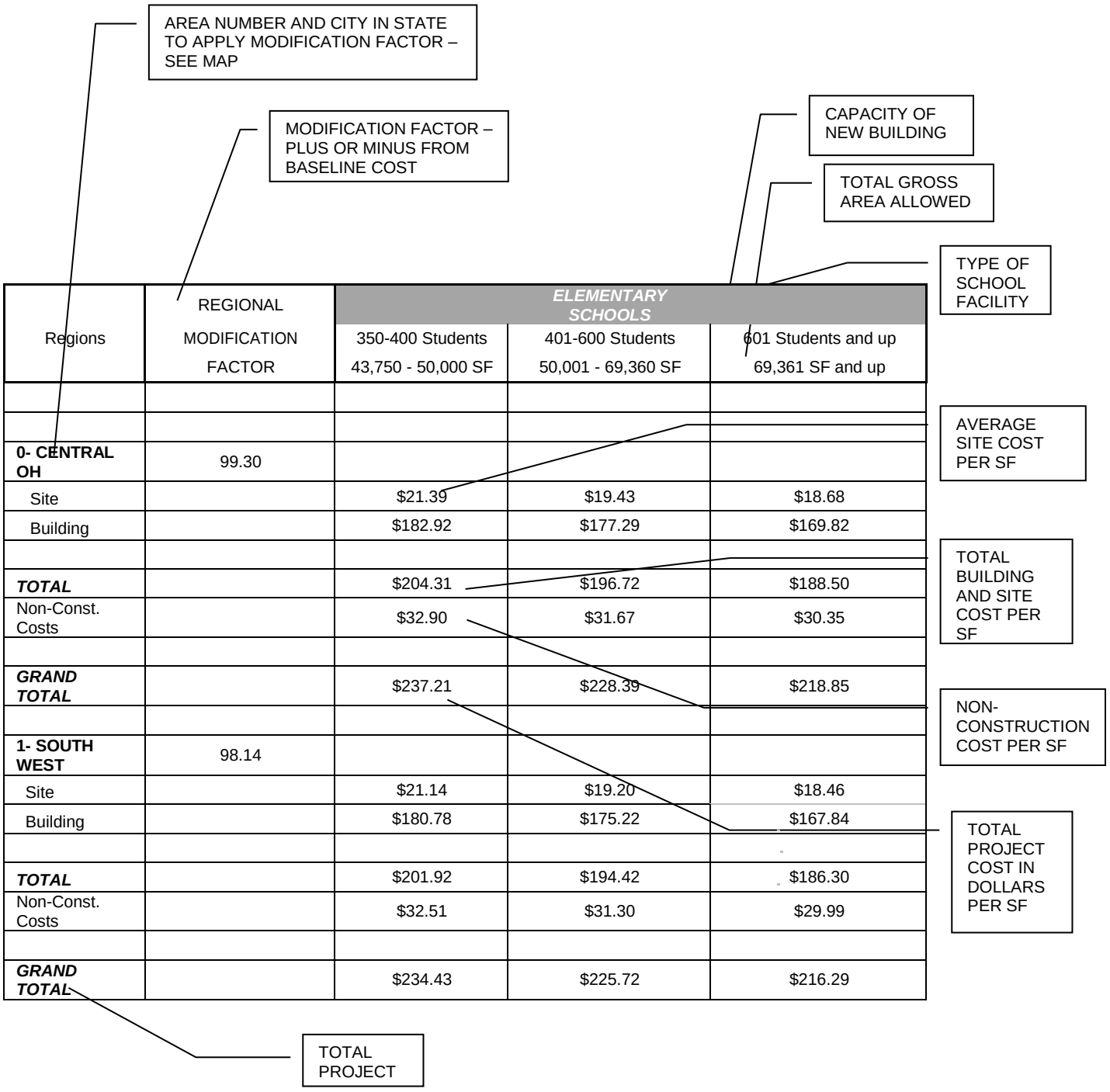
6-Southeast	***7-East Central***	***8-Northeast***	***Central OH***
Athens	Belmont	Ashtabula	Crawford
Fairfield	Carroll	Cuyahoga	Delaware
Guernsey	Columbiana	Geauga	Franklin
Hocking	Coshocton	Lake	Hardin
Meigs	Harrison	Portage	Knox
Monroe	Holmes	Summit	Licking
Morgan	Jefferson	Trumbull	Madison
Muskingum	Mahoning		Marion
Noble	Stark		Morrow
Perry	Tuscarawas		Richland
Vinton			Union
Washington			Wyandot

STATE OF OHIO SUMMARY OF NEW SCHOOL CONSTRUCTION "OPINION OF PROBABLE COSTS"
PER SQUARE FOOT OF FLOOR AREA
BASELINE; REGION 0 (CENTRAL OHIO)
Revised March 21, 2014 for 2014 Design Manual Update

Regions	REG. MODIF. FACTOR	ELEMENTARY SCHOOLS				MIDDLE SCHOOLS				HIGH SCHOOLS			
		350-400 Students 43,750 - 50,000 SF	401 - 600 Students 50,000 - 69,360 SF	601-865 Students 69,361 - 100,00 SF	866 Students and up 100,001 SF and up	350 - 450 Students 52,850 - 67,950 SF	451 - 650 Students 67,951 - 91,650 SF	651-709 Students 91,651-100,000 SF	710 Students and up 100,001 SF and up	350 - 598 Students 63,000 - 100,000 SF	599 - 800 Students 100,001 - 133,600 SF	801 - 1,200 Students 133,601 - 200,400 SF	1,201 Students and up 200,401 SF and up
0 - CENTRAL OH	100.00												
Site		$21.97	$19.96	$19.18	$18.62	$22.36	$20.86	$20.85	$20.26	$21.23	$20.62	$23.29	$22.00
Building		$187.89	$182.11	$174.45	$169.39	$188.09	$177.70	$177.18	$172.24	$188.41	$182.92	$176.24	$172.97
TOTAL		$209.86	$202.07	$193.63	$188.01	$210.45	$198.56	$198.03	$192.50	$209.64	$203.54	$199.53	$194.97
Non - Const. Costs		$33.79	$32.53	$31.17	$30.27	$33.88	$31.97	$31.88	$30.99	$33.75	$32.77	$32.12	$31.39
GRAND TOTAL		**$243.65**	**$234.60**	**$224.80**	**$218.28**	**$244.33**	**$230.53**	**$229.91**	**$223.49**	**$243.39**	**$236.31**	**$231.65**	**$226.36**
1 - SOUTH WEST	98.12												
Site		$21.56	$19.58	$18.82	$18.27	$21.94	$20.47	$20.46	$19.88	$20.83	$20.23	$22.87	$21.59
Building		$184.36	$178.69	$171.16	$166.20	$184.54	$174.36	$173.85	$169.01	$184.88	$179.48	$172.93	$169.72
TOTAL		$205.92	$198.27	$189.98	$184.47	$206.48	$194.83	$194.31	$188.89	$205.71	$199.71	$195.80	$191.31
Non - Const. Costs		$33.15	$31.92	$30.58	$29.70	$33.24	$31.37	$31.28	$30.41	$33.12	$32.15	$31.52	$30.80
GRAND TOTAL		**$239.07**	**$230.19**	**$220.56**	**$214.17**	**$239.72**	**$226.20**	**$225.59**	**$219.30**	**$238.83**	**$231.86**	**$227.32**	**$222.11**
2 - WEST CENTRAL	100.12												
Site		$22.00	$19.98	$19.21	$18.65	$22.39	$20.89	$20.88	$20.28	$21.26	$20.66	$23.32	$22.03
Building		$188.12	$182.33	$174.66	$169.59	$188.31	$177.91	$177.39	$172.45	$188.65	$183.14	$176.45	$173.18
TOTAL		$210.12	$202.31	$193.87	$188.24	$210.69	$198.80	$198.27	$192.73	$209.91	$203.80	$199.77	$195.21
Non - Const. Costs		$33.83	$32.57	$31.21	$30.31	$33.92	$32.01	$31.92	$31.03	$33.79	$32.81	$32.16	$31.43
GRAND TOTAL		**$243.95**	**$234.88**	**$225.08**	**$218.55**	**$244.61**	**$230.81**	**$230.19**	**$223.76**	**$243.70**	**$236.61**	**$231.93**	**$226.64**
3 - NORTHWEST	103.49												
Site		$22.74	$20.65	$19.84	$19.27	$23.14	$21.58	$21.58	$20.96	$21.97	$21.34	$24.12	$22.77
Building		$194.45	$188.48	$180.54	$175.30	$194.65	$183.90	$183.35	$178.25	$194.99	$189.31	$182.39	$179.01
TOTAL		$217.19	$209.13	$200.38	$194.57	$217.79	$205.48	$204.93	$199.21	$216.96	$210.65	$206.51	$201.78
Non - Const. Costs		$34.97	$33.67	$32.26	$31.33	$35.06	$33.09	$32.99	$32.07	$34.93	$33.91	$33.24	$32.49
GRAND TOTAL		**$252.16**	**$242.80**	**$232.64**	**$225.90**	**$252.85**	**$238.57**	**$237.92**	**$231.28**	**$251.89**	**$244.56**	**$239.75**	**$234.27**
4 - NORTH CENTRAL	102.44												
Site		$22.50	$20.44	$19.64	$19.08	$22.91	$21.37	$21.37	$20.75	$21.75	$21.13	$23.86	$22.54
Building		$192.47	$186.55	$178.71	$173.51	$192.68	$182.05	$181.49	$176.45	$193.01	$187.38	$180.54	$177.19
TOTAL		$214.97	$206.99	$198.35	$192.59	$215.59	$203.42	$202.86	$197.20	$214.76	$208.51	$204.40	$199.73
Non - Const. Costs		$34.61	$33.32	$31.93	$31.01	$34.71	$32.75	$32.66	$31.75	$34.57	$33.57	$32.90	$32.16
GRAND TOTAL		**$249.58**	**$240.31**	**$230.28**	**$223.60**	**$250.30**	**$236.17**	**$235.52**	**$228.95**	**$249.33**	**$242.08**	**$237.30**	**$231.89**
5 - SOUTH CENTRAL	100.31												
Site		$22.03	$20.02	$19.24	$18.68	$22.43	$20.93	$20.92	$20.32	$21.30	$20.69	$23.37	$22.08
Building		$188.47	$182.68	$174.99	$169.91	$188.67	$178.25	$177.73	$172.77	$188.99	$183.50	$176.79	$173.52
TOTAL		$210.50	$202.70	$194.23	$188.59	$211.10	$199.18	$198.65	$193.09	$210.29	$204.19	$200.16	$195.60
Non - Const. Costs		$33.89	$32.63	$31.27	$30.36	$33.99	$32.07	$31.98	$31.09	$33.85	$32.87	$32.22	$31.49
GRAND TOTAL		**$244.39**	**$235.33**	**$225.50**	**$218.95**	**$245.09**	**$231.25**	**$230.63**	**$224.18**	**$244.14**	**$237.06**	**$232.38**	**$227.09**
6 - SOUTHEAST	102.16												
Site		$22.44	$20.39	$19.60	$19.03	$22.84	$21.31	$21.30	$20.69	$21.69	$21.07	$23.80	$22.48
Building		$191.95	$186.05	$178.22	$173.04	$192.15	$181.54	$181.00	$175.97	$192.48	$186.87	$180.05	$176.71
TOTAL		$214.39	$206.44	$197.82	$192.07	$214.99	$202.85	$202.30	$196.66	$214.17	$207.94	$203.85	$199.19
Non - Const. Costs		$34.52	$33.23	$31.84	$30.92	$34.61	$32.66	$32.57	$31.66	$34.48	$33.48	$32.81	$32.07
GRAND TOTAL		**$248.91**	**$239.67**	**$229.66**	**$222.99**	**$249.60**	**$235.51**	**$234.87**	**$228.32**	**$248.65**	**$241.42**	**$236.66**	**$231.26**
7 - EAST CENRAL	100.85												
Site		$22.16	$20.13	$19.35	$18.78	$22.55	$21.04	$21.03	$20.43	$21.41	$20.80	$23.50	$22.19
Building		$189.49	$183.66	$175.93	$170.83	$189.69	$179.21	$178.69	$173.70	$190.01	$184.47	$177.74	$174.44
TOTAL		$211.65	$203.79	$195.28	$189.61	$212.24	$200.25	$199.72	$194.13	$211.42	$205.27	$201.24	$196.63
Non - Const. Costs		$34.08	$32.81	$31.43	$30.53	$34.17	$32.24	$32.15	$31.25	$34.04	$33.05	$32.39	$31.66
GRAND TOTAL		**$245.73**	**$236.60**	**$226.71**	**$220.14**	**$246.41**	**$232.49**	**$231.87**	**$225.38**	**$245.46**	**$238.32**	**$233.63**	**$228.29**
8 - NORTHEAST	103.76												
Site		$22.79	$20.71	$19.90	$19.32	$23.20	$21.65	$21.64	$21.02	$22.03	$21.41	$24.18	$22.83
Building		$194.95	$188.96	$181.01	$175.75	$195.16	$184.38	$183.84	$178.73	$195.49	$189.80	$182.87	$179.47
TOTAL		$217.74	$209.67	$200.91	$195.07	$218.36	$206.03	$205.48	$199.75	$217.52	$211.21	$207.05	$202.30
Non - Const. Costs		$35.06	$33.75	$32.34	$31.41	$35.15	$33.17	$33.08	$32.16	$35.02	$34.00	$33.33	$32.57
GRAND TOTAL		**$252.80**	**$243.42**	**$233.25**	**$226.48**	**$253.51**	**$239.20**	**$238.56**	**$231.91**	**$252.54**	**$245.21**	**$240.38**	**$234.87**

EXPLANATION OF K – 12 CHART

OPINION OF PROBABLE COST



Regions	REGIONAL MODIFICATION FACTOR	*ELEMENTARY SCHOOLS* 350-400 Students 43,750 - 50,000 SF	401-600 Students 50,001 - 69,360 SF	601 Students and up 69,361 SF and up
0- CENTRAL OH	99.30			
Site		$21.39	$19.43	$18.68
Building		$182.92	$177.29	$169.82
TOTAL		$204.31	$196.72	$188.50
Non-Const. Costs		$32.90	$31.67	$30.35
GRAND TOTAL		$237.21	$228.39	$218.85
1- SOUTH WEST	98.14			
Site		$21.14	$19.20	$18.46
Building		$180.78	$175.22	$167.84
TOTAL		$201.92	$194.42	$186.30
Non-Const. Costs		$32.51	$31.30	$29.99
GRAND TOTAL		$234.43	$225.72	$216.29

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OPINION OF PROBABLE CONSTRUCTION COSTS

Construction Costs

Site Cost		See Chart
Building Cost		See Chart
Building cost to include loose furnishings, technology, and security systems. Division of project budgets for these areas is to be determined by project team.		
Construction Contingency	(new)	5.0%
	(renovation)	7.0%

Non-Construction Costs (% of Site/Building Cost)	NEW	RENOV
Land Survey	0.08%	0.03%
Soils/Environmental Report	0.07%	0.10%
Agency Approval Fees	0.30%	0.25%
Construction Testing	***0.87%***	***0.40%***
Printing – Bid Documents	***0.19%***	***0.15%***
Advertising for Bids	0.02%	***0.02%***
Builder's Risk Insurance	0.28%	***0.12%***
Commissioning and Maintenance Plan Advisor	***0.40%***	***0.60%***
Non-Construction Contingency	1.39%	***1.12%***

Design Professional Fee*
Construction Management Fee*

Note: A factor for inflation is intended to address the cost of inflation for the duration of the project.

* The Non-Construction Costs includes a budget of 6.5% for new and 7.5% for renovations for the Design Professional Fee, and 6.0% for the Construction Management Fee.

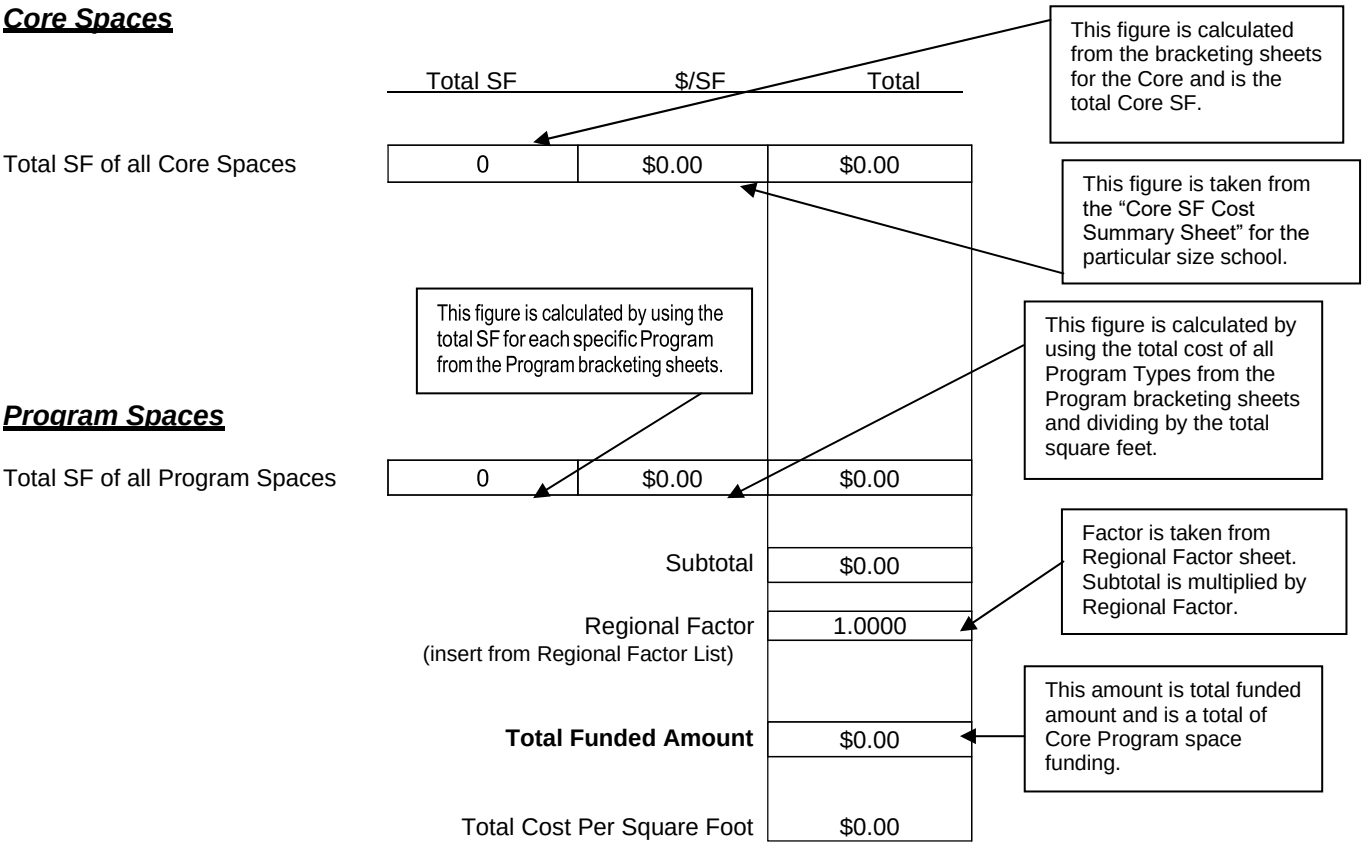
OHIO FACILITIES CONSTRUCTION
COMMISSION CAREER-TECHNICAL
OPINION OF PROBABLE COSTS FOR
CORE AND PROGRAM AREAS FOR NEW SCHOOL/ADDITION CONSTRUCTION

"OVERALL PROJECT COST SUMMARY SHEET"

BASELINE IS REGION 0 (CENTRAL OHIO)
Updated: 2013

Summary of Core Area and Program Costs

Core Spaces



OHIO FACILITIES CONSTRUCTION COMMISSION

CAREER TECHNICAL
OPINION OF PROBABLE COSTS FOR
NEW SCHOOL/ADDITION CONSTRUCTION

"REGIONAL FACTORS"

BASELINE IS REGION 0 (Central Ohio)

Updated: *2013*

Region	**Approximate Location**	***2013* Final Regional Factor**
0	Central OH	***0.9930***
1	South West	***0.9814***
2	West Central	***1.0013***
3	North West	***1.0459***
4	North Central	***1.0087***
5	South Central	***1.0005***
6	South East	***1.0192***
7	East Central	***1.0139***
8	North East	***1.0479***

Note: The above Regional Factors are to be used on the "Overall Project Cost Summary " Sheet when calculating total funding for a particular Career-Technical District.

Program Type 1

OHIO FACILITIES CONSTRUCTION COMMISSION CAREER-TECHNICAL SUPPLEMENT
2014 OSDM Update - Career Tech
Revised 3/21/2014

SUBJECT CODE	PROGRAM CODE	PROGRAM TYPE 1	QTY	PROG SF	2014 Site Cost ($/SF)	2014 Basic Building Cost ($/SF) (incl. Furn. and Tech.)	Contingency ($/SF based on 5% of + BBC)	Total Construction Cost (incl. site, bldg., contingency.)	Total Non-Constr. Costs ($/SF based on 16.1% of Site +BBC + Cont.)	2014 Update Total Line Item Component Cost($/SF)	% Change From 2013 to 2014
14.0100	G0	**Accounting**									
		Lab	1	**1,200**	$ 21.89	$ 173.34	$ 9.76	$ 204.99	$ 33.00	**$ 238.00**	2.00%
		Related Office	1	**120**	$ 21.89	$ 173.34	$ 9.76	$ 204.99	$ 33.00	**$ 238.00**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 173.34	$ 9.76	$ 204.99	$ 33.00	**$ 238.00**	2.00%
14.0300	C0	**Administrative and Professional Support**									
14.0310	C2	**Legal Management and Support**									
		Lab	1	**1,200**	$ 21.89	$ 169.94	$ 9.59	$ 201.42	$ 32.43	**$ 233.85**	2.00%
		Related Office	1	**120**	$ 21.89	$ 169.94	$ 9.59	$ 201.42	$ 32.43	**$ 233.85**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 169.94	$ 9.59	$ 201.42	$ 32.43	**$ 233.85**	2.00%
14.0320	C3	**Medical Management and Support**									
		Lab	1	**1,200**	$ 21.89	$ 169.94	$ 9.59	$ 201.42	$ 32.43	**$ 233.85**	2.00%
		Related Office	1	**120**	$ 21.89	$ 169.94	$ 9.59	$ 201.42	$ 32.43	**$ 233.85**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 169.94	$ 9.59	$ 201.42	$ 32.43	**$ 233.85**	2.00%
17.0400	T4	**Aviation Occupations**									
		Lab	1	**1,200**	$ 21.89	$ 204.48	$ 11.32	$ 237.69	$ 38.27	**$ 275.96**	2.00%
		Related Office	1	**120**	$ 21.89	$ 173.34	$ 9.76	$ 204.99	$ 33.00	**$ 238.00**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 173.34	$ 9.76	$ 204.99	$ 33.00	**$ 238.00**	2.00%
14.0800	C1	**Business Management**									
		Lab	1	**1,200**	$ 21.89	$ 194.28	$ 10.81	$ 226.98	$ 36.54	**$ 263.52**	2.00%
		Related Office	1	**120**	$ 21.89	$ 173.34	$ 9.76	$ 204.99	$ 33.00	**$ 238.00**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 173.34	$ 9.76	$ 204.99	$ 33.00	**$ 238.00**	2.00%
14.0210	N0	**Information Support & Services**									
14.0230	N3	**Programming & Software Development**									
14.0240	N1	**Interactive Media**									
14.0220	N2	**Network Systems**									
34.0005	B2	**Visual Design and Imaging**									
		Lab	1	**1,200**	$ 21.89	$ 170.79	$ 9.63	$ 202.31	$ 32.57	**$ 234.89**	2.00%
		Related Office	1	**120**	$ 21.89	$ 170.79	$ 9.63	$ 202.31	$ 32.57	**$ 234.89**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 170.79	$ 9.63	$ 202.31	$ 32.57	**$ 234.89**	2.00%
17.1503	R1	**Electronics**									
17.0370	R0	**Automation & Robotics**									
		Lab	1	**1,800**	$ 21.89	$ 158.74	$ 9.03	$ 189.66	$ 30.54	**$ 220.20**	2.00%
		Related Office	1	**120**	$ 21.89	$ 158.74	$ 9.03	$ 189.66	$ 30.54	**$ 220.20**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 158.74	$ 9.03	$ 189.66	$ 30.54	**$ 220.20**	2.00%
14.0110	G1	**Financial Services**									
		Lab	1	**1,200**	$ 21.89	$ 173.34	$ 9.76	$ 204.99	$ 33.00	**$ 238.00**	2.00%
		Related Office	1	**120**	$ 21.89	$ 173.34	$ 9.76	$ 204.99	$ 33.00	**$ 238.00**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 173.34	$ 9.76	$ 204.99	$ 33.00	**$ 238.00**	2.00%
17.1504	F5	**Telecommunications**									
		Lab	1	**1,200**	$ 21.89	$ 169.94	$ 9.59	$ 201.42	$ 32.43	**$ 233.85**	2.00%
		Related Office	1	**120**	$ 21.89	$ 169.94	$ 9.59	$ 201.42	$ 32.43	**$ 233.85**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 169.94	$ 9.59	$ 201.42	$ 32.43	**$ 233.85**	2.00%
33.0020	L2	**Travel and Tourism**									
		Lab	1	**1,200**	$ 21.89	$ 172.57	$ 9.72	$ 204.18	$ 32.87	**$ 237.06**	2.00%
		Related Office	1	**120**	$ 21.89	$ 172.57	$ 9.72	$ 204.18	$ 32.87	**$ 237.06**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 172.57	$ 9.72	$ 204.18	$ 32.87	**$ 237.06**	2.00%

Program Type 2

OHIO FACILITIES CONSTRUCTION COMMISSION CAREER-TECHNICAL SUPPLEMENT
2014 OSDM Update - Career Tech
Revised 3/21/2014

SUBJECT CODE	PROGRAM CODE	PROGRAM TYPE 2	QTY	PROG SF	2014 Site Cost ($/SF)	2014 Basic Building Cost ($/SF) (incl. Furn. and Tech.)	Contingency ($/SF based on 5% of + BBC)	Total Construction Cost (incl. site, bldg., contingency.)	Total Non-Constr. Costs ($/SF based on 16.1% of Site +BBC + Cont.)	2014 Update Total Line Item Component Cost($/SF)	% Change From 2013 to 2014
07.0913	J9	**Health Unit Coordinator**									
07.4890	J7	***Health Information Management***									
		Lab	1	**1,500**	$ 21.89	$ 153.52	$ 8.77	$ 184.18	$ 29.65	**$ 213.84**	2.00%
		Related Office	1	**120**	$ 21.89	$ 153.52	$ 8.77	$ 184.18	$ 29.65	**$ 213.84**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 153.52	$ 8.77	$ 184.18	$ 29.65	**$ 213.84**	2.00%
		Related Changing Room	1	**490**	$ 21.89	$ 153.52	$ 8.77	$ 184.18	$ 29.65	**$ 213.84**	2.00%
07.0307	JA	**Home Health**									
07.0906	J2	**Community Health Aide**									
		Lab	1	**1,500**	$ 21.89	$ 157.93	$ 8.99	$ 188.82	$ 30.40	**$ 219.22**	2.00%
		Related Office	1	**120**	$ 21.89	$ 157.93	$ 8.99	$ 188.82	$ 30.40	**$ 219.22**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 157.93	$ 8.99	$ 188.82	$ 30.40	**$ 219.22**	2.00%
		Related Changing Room	1	**490**	$ 21.89	$ 157.93	$ 8.99	$ 188.82	$ 30.40	**$ 219.22**	2.00%
07.0103	J4	**Dental Laboratory Technology**									
		Lab	1	**1,500**	$ 21.89	$ 190.98	$ 10.64	$ 223.52	$ 35.99	**$ 259.50**	2.00%
		Related Office	1	**120**	$ 21.89	$ 190.98	$ 10.64	$ 223.52	$ 35.99	**$ 259.50**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 190.98	$ 10.64	$ 223.52	$ 35.99	**$ 259.50**	2.00%
		Related Changing Room	1	**490**	$ 21.89	$ 190.98	$ 10.64	$ 223.52	$ 35.99	**$ 259.50**	2.00%
17.2811	P3	**Emergency Medical Technician - Secondary**									
		Lab	1	**1,500**	$ 21.89	$ 162.35	$ 9.21	$ 193.46	$ 31.15	**$ 224.60**	2.00%
		Related Office	1	**120**	$ 21.89	$ 162.35	$ 9.21	$ 193.46	$ 31.15	**$ 224.60**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 162.35	$ 9.21	$ 193.46	$ 31.15	**$ 224.60**	2.00%
		Related Changing Room	1	**490**	$ 21.89	$ 162.35	$ 9.21	$ 193.46	$ 31.15	**$ 224.60**	2.00%
07.0410	J6	**Exercise Science and Sports Medicine**									
		Lab	1	**1,500**	$ 21.89	$ 160.19	$ 9.10	$ 191.19	$ 30.78	**$ 221.97**	2.00%
		Related Office	1	**120**	$ 21.89	$ 160.19	$ 9.10	$ 191.19	$ 30.78	**$ 221.97**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 160.19	$ 9.10	$ 191.19	$ 30.78	**$ 221.97**	2.00%
		Related Changing Room	1	**490**	$ 21.89	$ 160.19	$ 9.10	$ 191.19	$ 30.78	**$ 221.97**	2.00%
07.0203	JC	**Medical Laboratory Technology**									
17.2815	P2	**Criminal Science Technology**									
01.2000	A3	***Biotechnology for Food, Plant & Animal Sciences***									
		Lab	1	**1,500**	$ 21.89	$ 187.76	$ 10.48	$ 220.14	$ 35.44	**$ 255.58**	2.00%
		Related Office	1	**120**	$ 21.89	$ 187.76	$ 10.48	$ 220.14	$ 35.44	**$ 255.58**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 187.76	$ 10.48	$ 220.14	$ 35.44	**$ 255.58**	2.00%
		Related Changing Room	1	**490**	$ 21.89	$ 187.76	$ 10.48	$ 220.14	$ 35.44	**$ 255.58**	2.00%
07.4850	J0	**Medical Bioscience**									
	F0	***Biomedical Science***									
	F2	***Engineering Science***									
	F6	***Engineering and Design***									
07.0912	JG	**Pharmacy Technician**									
17.1600	F1	**Energy Science**									
		Lab	1	**1,500**	$ 21.89	$ 193.72	$ 10.78	$ 226.40	$ 36.45	**$ 262.85**	2.00%
		Related Office	1	**120**	$ 21.89	$ 193.72	$ 10.78	$ 226.40	$ 36.45	**$ 262.85**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 193.72	$ 10.78	$ 226.40	$ 36.45	**$ 262.85**	2.00%
		Related Changing Room	1	**490**	$ 21.89	$ 193.72	$ 10.78	$ 226.40	$ 36.45	**$ 262.85**	2.00%
07.0302	JJ	**Practical Nursing**									
	JM	***Allied Health and Nursing***									
		Lab (includes optional restroom)	1	**1,500**	$ 21.89	$ 161.90	$ 9.19	$ 192.99	$ 31.07	**$ 224.06**	2.00%
		Related Office	1	**120**	$ 21.89	$ 161.90	$ 9.19	$ 192.99	$ 31.07	**$ 224.06**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 161.90	$ 9.19	$ 192.99	$ 31.07	**$ 224.06**	2.00%
		Related Changing Room	1	**490**	$ 21.89	$ 161.90	$ 9.19	$ 192.99	$ 31.07	**$ 224.06**	2.00%
07.4840	J8	**Health Support Pathway**									
07.4830	JL	**Therapeutic Pathway**									
		Lab	1	**1,500**	$ 21.89	$ 157.93	$ 8.99	$ 188.82	$ 30.40	**$ 219.22**	2.00%
		Related Office	1	**120**	$ 21.89	$ 157.93	$ 8.99	$ 188.82	$ 30.40	**$ 219.22**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 157.93	$ 8.99	$ 188.82	$ 30.40	**$ 219.22**	2.00%
		Related Changing Room	1	**490**	$ 21.89	$ 157.93	$ 8.99	$ 188.82	$ 30.40	**$ 219.22**	2.00%

Program Type 3

OHIO FACILITIES CONSTRUCTION COMMISSION CAREER-TECHNICAL SUPPLEMENT
2014 OSDM Update - Career Tech
Revised 3/21/2014

SUBJECT CODE	PROGRAM CODE	PROGRAM TYPE 3	QTY	PROG SF	2014 Site Cost ($/SF)	2014 Basic Building Cost ($/SF) (incl. Furn. and Tech.)	Contingency ($/SF based on 5% of + BBC)	Total Construction Cost (incl. site, bldg., contingency.)	Total Non-Constr. Costs ($/SF based on 16.1% of Site +BBC + Cont.)	2014 Update Total Line Item Component Cost($/SF)	% Change From 2013 to 2014
17.0403	T5	**Ground Operations**									
		Lab	1	**1,500**	$ 21.89	$ 152.05	$ 8.70	$ 182.64	$ 29.41	**$ 212.05**	2.00%
		Related Office	1	**120**	$ 21.89	$ 152.05	$ 8.70	$ 182.64	$ 29.41	**$ 212.05**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 152.05	$ 8.70	$ 182.64	$ 29.41	**$ 212.05**	2.00%
		Reference Room	1	**150**	$ 21.89	$ 152.05	$ 8.70	$ 182.64	$ 29.41	**$ 212.05**	2.00%
33.0010	L1	**Lodging**									
		Lab (includes optional restroom & laundry)	1	**1,500**	$ 21.89	$ 165.12	$ 9.35	$ 196.36	$ 31.61	**$ 227.97**	2.00%
		Related Office	1	**120**	$ 21.89	$ 165.12	$ 9.35	$ 196.36	$ 31.61	**$ 227.97**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 165.12	$ 9.35	$ 196.36	$ 31.61	**$ 227.97**	2.00%
		Banquet Room	1	**800**	$ 21.89	$ 165.12	$ 9.35	$ 196.36	$ 31.61	**$ 227.97**	2.00%
04.0810	S4	**Marketing Management**									
		Lab	1	**900**	$ 21.89	$ 201.57	$ 11.17	$ 234.63	$ 37.78	**$ 272.41**	2.00%
		Bookstore	1	**800**	$ 21.89	$ 173.31	$ 9.76	$ 204.96	$ 33.00	**$ 237.96**	2.00%
		Display	1	**100**	$ 21.89	$ 173.31	$ 9.76	$ 204.96	$ 33.00	**$ 237.96**	2.00%
		Related Office	1	**120**	$ 21.89	$ 173.31	$ 9.76	$ 204.96	$ 33.00	**$ 237.96**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 173.31	$ 9.76	$ 204.96	$ 33.00	**$ 237.96**	2.00%
04.4110	S1	**Entrepreneurship**									
04.0815	S3	**Marketing Communications**									
		Lab	1	**1,000**	$ 21.89	$ 201.57	$ 11.17	$ 234.63	$ 37.78	**$ 272.41**	2.00%
		Bookstore	1	**800**	$ 21.89	$ 173.31	$ 9.76	$ 204.96	$ 33.00	**$ 237.96**	2.00%
		Display	1	**100**	$ 21.89	$ 173.31	$ 9.76	$ 204.96	$ 33.00	**$ 237.96**	2.00%
		Related Office	1	**120**	$ 21.89	$ 173.31	$ 9.76	$ 204.96	$ 33.00	**$ 237.96**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 173.31	$ 9.76	$ 204.96	$ 33.00	**$ 237.96**	2.00%
35.0201	E0	**Early Childhood Education**									
		Lab	1	**1,500**	$ 21.89	$ 166.13	$ 9.40	$ 197.43	$ 31.79	**$ 229.22**	2.00%
		Related Office	1	**120**	$ 21.89	$ 166.13	$ 9.40	$ 197.43	$ 31.79	**$ 229.22**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 166.13	$ 9.40	$ 197.43	$ 31.79	**$ 229.22**	2.00%
		Observation	1	**120**	$ 21.89	$ 166.13	$ 9.40	$ 197.43	$ 31.79	**$ 229.22**	2.00%
		Infants	1	**700**	$ 21.89	$ 166.13	$ 9.40	$ 197.43	$ 31.79	**$ 229.22**	2.00%
		Kitchenette	1	**350**	$ 21.89	$ 166.13	$ 9.40	$ 197.43	$ 31.79	**$ 229.22**	2.00%
		Work Room	1	**150**	$ 21.89	$ 166.13	$ 9.40	$ 197.43	$ 31.79	**$ 229.22**	2.00%
		Toddler Restroom	1	**60**	$ 21.89	$ 166.13	$ 9.40	$ 197.43	$ 31.79	**$ 229.22**	2.00%
		Reception	1	**500**	$ 21.89	$ 166.13	$ 9.40	$ 197.43	$ 31.79	**$ 229.22**	2.00%
		Playground	1	**1,300**	$ 21.89	$ 81.06	$ 5.15	$ 108.10	$ 17.40	**$ 125.50**	2.00%
04.1900	S0	**Supply Chain Management**									
		Lab	1	**900**	$ 21.89	$ 201.57	$ 11.17	$ 234.63	$ 37.78	**$ 272.41**	2.00%
		Related Office	1	**120**	$ 21.89	$ 173.31	$ 9.76	$ 204.96	$ 33.00	**$ 237.96**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 173.31	$ 9.76	$ 204.96	$ 33.00	**$ 237.96**	2.00%

Program Type 4

OHIO FACILITIES CONSTRUCTION COMMISSION CAREER-TECHNICAL SUPPLEMENT
2014 OSDM Update - Career Tech
Revised 3/21/2014

SUBJECT CODE	PROGRAM CODE	PROGRAM TYPE 4	QTY	PROG SF	2014 Site Cost ($/SF)	2014 Basic Building Cost ($/SF) (incl. Furn. and Tech.)	Contingency ($/SF based on 5% of + BBC)	Total Construction Cost (incl. site, bldg., contingency.)	Total Non-Constr. Costs ($/SF based on 16.1% of Site +BBC + Cont.)	**2014 Update Total Line Item Component Cost($/SF)**	% Change From 2013 to 2014
17.2602	M1	**Cosmetology**									
		Lab	1	**1,600**	$ 21.89	$ 164.30	$ 9.31	$ 195.50	$ 31.48	**$ 226.98**	2.00%
		Related Classrooms	1	**900**	$ 21.89	$ 164.30	$ 9.31	$ 195.50	$ 31.48	**$ 226.98**	2.00%
		Related Office	1	**120**	$ 21.89	$ 164.30	$ 9.31	$ 195.50	$ 31.48	**$ 226.98**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 164.30	$ 9.31	$ 195.50	$ 31.48	**$ 226.98**	2.00%
		Related Changing Room	1	**450**	$ 21.89	$ 164.30	$ 9.31	$ 195.50	$ 31.48	**$ 226.98**	2.00%
		Dispensary	1	**175**	$ 21.89	$ 164.30	$ 9.31	$ 195.50	$ 31.48	**$ 226.98**	2.00%
		Laundry Room	1	**150**	$ 21.89	$ 164.30	$ 9.31	$ 195.50	$ 31.48	**$ 226.98**	2.00%
		Facial Room	1	**200**	$ 21.89	$ 164.30	$ 9.31	$ 195.50	$ 31.48	**$ 226.98**	2.00%
		Manicure Room	1	**200**	$ 21.89	$ 164.30	$ 9.31	$ 195.50	$ 31.48	**$ 226.98**	2.00%
		Customer Toilet	1	**60**	$ 21.89	$ 164.30	$ 9.31	$ 195.50	$ 31.48	**$ 226.98**	2.00%
17.2802	P1	**Criminal Justice**									
17.2808	P5	**Private Security**									
17.2810	P0	**Career Paths for the Law Profession**									
		Lab	1	**1,200**	$ 21.89	$ 160.43	$ 9.12	$ 191.44	$ 30.82	**$ 222.27**	2.00%
		Related Classrooms	1	**900**	$ 21.89	$ 160.43	$ 9.12	$ 191.44	$ 30.82	**$ 222.27**	2.00%
		Related Office	1	**120**	$ 21.89	$ 160.43	$ 9.12	$ 191.44	$ 30.82	**$ 222.27**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 160.43	$ 9.12	$ 191.44	$ 30.82	**$ 222.27**	2.00%
		Related Changing Room	1	**450**	$ 21.89	$ 160.43	$ 9.12	$ 191.44	$ 30.82	**$ 222.27**	2.00%
		Weight Room	1	**800**	$ 21.89	$ 160.43	$ 9.12	$ 191.44	$ 30.82	**$ 222.27**	2.00%
		Interrogation Room	1	**150**	$ 21.89	$ 160.43	$ 9.12	$ 191.44	$ 30.82	**$ 222.27**	2.00%
33.0005	L0	**Culinary and Food Service Operations**									
		Lab	1	**1,800**	$ 21.89	$ 303.93	$ 16.29	$ 342.12	$ 55.08	**$ 397.20**	2.00%
		Related Classrooms	1	**900**	$ 21.89	$ 175.47	$ 9.87	$ 207.23	$ 33.36	**$ 240.59**	2.00%
		Related Office	1	**120**	$ 21.89	$ 175.47	$ 9.87	$ 207.23	$ 33.36	**$ 240.59**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 175.47	$ 9.87	$ 207.23	$ 33.36	**$ 240.59**	2.00%
		Related Changing Room	1	**450**	$ 21.89	$ 175.47	$ 9.87	$ 207.23	$ 33.36	**$ 240.59**	2.00%
		Restaurant	1	**1,500**	$ 21.89	$ 175.47	$ 9.87	$ 207.23	$ 33.36	**$ 240.59**	2.00%
		Dry Storage	1	**150**	$ 21.89	$ 175.47	$ 9.87	$ 207.23	$ 33.36	**$ 240.59**	2.00%
07.0101	J3	**Dental Assistant**									
		Lab	1	**1,500**	$ 21.89	$ 193.20	$ 10.75	$ 225.85	$ 36.36	**$ 262.21**	2.00%
		Related Classrooms	1	**900**	$ 21.89	$ 173.31	$ 9.76	$ 204.97	$ 33.00	**$ 237.97**	2.00%
		Related Office	1	**120**	$ 21.89	$ 173.31	$ 9.76	$ 204.97	$ 33.00	**$ 237.97**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 173.31	$ 9.76	$ 204.97	$ 33.00	**$ 237.97**	2.00%
		Related Changing Room	1	**450**	$ 21.89	$ 173.31	$ 9.76	$ 204.97	$ 33.00	**$ 237.97**	2.00%
		X-Ray Room	1	**80**	$ 21.89	$ 173.31	$ 9.76	$ 204.97	$ 33.00	**$ 237.97**	2.00%
		Darkroom	1	**80**	$ 21.89	$ 173.31	$ 9.76	$ 204.97	$ 33.00	**$ 237.97**	2.00%
07.0904	JB	**Medical Assistant**									
		Lab	1	**1,200**	$ 21.89	$ 164.96	$ 9.34	$ 196.20	$ 31.59	**$ 227.79**	2.00%
		Related Classrooms	1	**900**	$ 21.89	$ 164.96	$ 9.34	$ 196.20	$ 31.59	**$ 227.79**	2.00%
		Related Office	1	**120**	$ 21.89	$ 164.96	$ 9.34	$ 196.20	$ 31.59	**$ 227.79**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 164.96	$ 9.34	$ 196.20	$ 31.59	**$ 227.79**	2.00%
		Related Changing Room	1	**450**	$ 21.89	$ 164.96	$ 9.34	$ 196.20	$ 31.59	**$ 227.79**	2.00%
		Training Restroom	1	**120**	$ 21.89	$ 164.96	$ 9.34	$ 196.20	$ 31.59	**$ 227.79**	2.00%
		Laundry Room	1	**120**	$ 21.89	$ 164.96	$ 9.34	$ 196.20	$ 31.59	**$ 227.79**	2.00%
07.0303	JD	**Nurse Assisting**									
07.1100	J1	**Clinical Health Care Services**									
		Lab	1	**1,200**	$ 21.89	$ 164.96	$ 9.34	$ 196.20	$ 31.59	**$ 227.79**	2.00%
		Related Classrooms	1	**900**	$ 21.89	$ 164.96	$ 9.34	$ 196.20	$ 31.59	**$ 227.79**	2.00%
		Related Office	1	**120**	$ 21.89	$ 164.96	$ 9.34	$ 196.20	$ 31.59	**$ 227.79**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 164.96	$ 9.34	$ 196.20	$ 31.59	**$ 227.79**	2.00%
		Related Changing Room	1	**450**	$ 21.89	$ 164.96	$ 9.34	$ 196.20	$ 31.59	**$ 227.79**	2.00%
		Training Restroom	1	**120**	$ 21.89	$ 164.96	$ 9.34	$ 196.20	$ 31.59	**$ 227.79**	2.00%
		Laundry Room	1	**120**	$ 21.89	$ 164.96	$ 9.34	$ 196.20	$ 31.59	**$ 227.79**	2.00%
07.0603	JE	**Optometric Occupations**									
		Lab	1	**1,200**	$ 21.89	$ 201.45	$ 11.17	$ 234.51	$ 37.76	**$ 272.27**	2.00%
		Related Classrooms	1	**900**	$ 21.89	$ 173.31	$ 9.76	$ 204.97	$ 33.00	**$ 237.97**	2.00%
		Related Office	1	**120**	$ 21.89	$ 173.31	$ 9.76	$ 204.97	$ 33.00	**$ 237.97**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 173.31	$ 9.76	$ 204.97	$ 33.00	**$ 237.97**	2.00%
		Related Changing Room	1	**450**	$ 21.89	$ 173.31	$ 9.76	$ 204.97	$ 33.00	**$ 237.97**	2.00%
		Exam Room	1	**200**	$ 21.89	$ 173.31	$ 9.76	$ 204.97	$ 33.00	**$ 237.97**	2.00%

Program Type 4 (continued)

07.0994	JF	**Patient Care Technician**												
		Lab	1	**1,500**	$ 21.89	$ 162.61	$ 9.22	$ 193.72	$ 31.19	**$ 224.91**	2.00%
		Related Classrooms	1	**900**	$ 21.89	$ 162.61	$ 9.22	$ 193.72	$ 31.19	**$ 224.91**	2.00%
		Related Office	1	**120**	$ 21.89	$ 162.61	$ 9.22	$ 193.72	$ 31.19	**$ 224.91**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 162.61	$ 9.22	$ 193.72	$ 31.19	**$ 224.91**	2.00%
		Related Changing Room	1	**450**	$ 21.89	$ 162.61	$ 9.22	$ 193.72	$ 31.19	**$ 224.91**	2.00%
		Training Restroom	1	**120**	$ 21.89	$ 162.61	$ 9.22	$ 193.72	$ 31.19	**$ 224.91**	2.00%
		Laundry Room	1	**120**	$ 21.89	$ 162.61	$ 9.22	$ 193.72	$ 31.19	**$ 224.91**	2.00%
07.4820	J5	**Diagnostic Pathway**									
		Lab	1	**1,200**	$ 21.89	$ 157.06	$ 8.95	$ 187.90	$ 30.25	**$ 218.15**	2.00%
		Related Classrooms	1	**900**	$ 21.89	$ 157.06	$ 8.95	$ 187.90	$ 30.25	**$ 218.15**	2.00%
		Related Office	1	**120**	$ 21.89	$ 157.06	$ 8.95	$ 187.90	$ 30.25	**$ 218.15**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 157.06	$ 8.95	$ 187.90	$ 30.25	**$ 218.15**	2.00%
		Related Changing Room	1	**450**	$ 21.89	$ 157.06	$ 8.95	$ 187.90	$ 30.25	**$ 218.15**	2.00%
		Exam Room	1	**200**	$ 21.89	$ 157.06	$ 8.95	$ 187.90	$ 30.25	**$ 218.15**	2.00%
01.0901	A2	**Animal Science and Management (small animal)**									
		Lab	1	**1,000**	$ 21.89	$ 175.04	$ 9.85	$ 206.78	$ 33.29	**$ 240.08**	2.00%
		Related Classrooms	1	**900**	$ 21.89	$ 175.04	$ 9.85	$ 206.78	$ 33.29	**$ 240.08**	2.00%
		Related Office	1	**120**	$ 21.89	$ 175.04	$ 9.85	$ 206.78	$ 33.29	**$ 240.08**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 175.04	$ 9.85	$ 206.78	$ 33.29	**$ 240.08**	2.00%
		Related Changing Room	1	**450**	$ 21.89	$ 175.04	$ 9.85	$ 206.78	$ 33.29	**$ 240.08**	2.00%
		Pet Shop	1	**1,200**	$ 21.89	$ 175.04	$ 9.85	$ 206.78	$ 33.29	**$ 240.08**	2.00%
		Clinic	1	**350**	$ 21.89	$ 175.04	$ 9.85	$ 206.78	$ 33.29	**$ 240.08**	2.00%
		Grooming	1	**350**	$ 21.89	$ 175.04	$ 9.85	$ 206.78	$ 33.29	**$ 240.08**	2.00%
		Animal Room	1	**200**	$ 21.89	$ 175.04	$ 9.85	$ 206.78	$ 33.29	**$ 240.08**	2.00%
		Animal Room	1	**600**	$ 21.89	$ 175.04	$ 9.85	$ 206.78	$ 33.29	**$ 240.08**	2.00%
		Kennel	1	**250**	$ 21.89	$ 175.04	$ 9.85	$ 206.78	$ 33.29	**$ 240.08**	2.00%
07.0305	JK	**Surgical Technology**									
		Lab	1	**1,000**	$ 21.89	$ 171.44	$ 9.67	$ 203.00	$ 32.68	**$ 235.68**	2.00%
		Operating Room	1	**800**	$ 21.89	$ 171.44	$ 9.67	$ 203.00	$ 32.68	**$ 235.68**	2.00%
		Instrument Room	1	**700**	$ 21.89	$ 171.44	$ 9.67	$ 203.00	$ 32.68	**$ 235.68**	2.00%
		Scrub Room	1	**500**	$ 21.89	$ 171.44	$ 9.67	$ 203.00	$ 32.68	**$ 235.68**	2.00%
		Related Classrooms	1	**900**	$ 21.89	$ 171.44	$ 9.67	$ 203.00	$ 32.68	**$ 235.68**	2.00%
		Related Office	1	**120**	$ 21.89	$ 171.44	$ 9.67	$ 203.00	$ 32.68	**$ 235.68**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 171.44	$ 9.67	$ 203.00	$ 32.68	**$ 235.68**	2.00%
		Related Changing Room	1	**450**	$ 21.89	$ 171.44	$ 9.67	$ 203.00	$ 32.68	**$ 235.68**	2.00%
17.2801	P4	**Fire Fighter Training**									
	P6	***Firefighting and Emergency Medical Services***									
		Lab	1	**1,500**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%
		Related Classrooms	1	**900**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%
		Related Office	1	**120**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%
		Related Changing Room	1	**490**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%
		Weight Room	1	**800**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%
34.0115	B0	**Media Arts**									
		Lab	1	**1,500**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%
		Media Arts Control Room/Edit	1	**450**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%
		Vestibule	1	**84**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%
		Related Classrooms	1	**900**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%
		Office	1	**120**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%
		Storage	1	**200**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%
		Changing Room	1	**490**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%
34.0020	B1	**Performing Arts**									
		Lab	1	**1,500**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%
		Practice Room	1	**150**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%
		Related Classrooms	1	**900**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%
		Office	1	**120**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%
		Storage	1	**200**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%
		Changing Room	1	**490**	$ 21.89	$ 172.06	$ 9.70	$ 203.66	$ 32.79	**$ 236.45**	2.00%

Program Type 5

OHIO FACILITIES CONSTRUCTION COMMISSION CAREER-TECHNICAL SUPPLEMENT
2014 OSDM Update - Career Tech
Revised 3/21/2014

SUBJECT CODE	PROGRAM CODE	PROGRAM TYPE 5	QTY	PROG SF	2014 Site Cost ($/SF)	2014 Basic Building Cost ($/SF) (incl. Furn. and Tech.)	Contingency ($/SF based on 5% of + BBC)	Total Construction Cost (incl. site, bldg., contingency.)	Total Non-Constr. Costs ($/SF based on 16.1% of Site +BBC + Cont.)	**2014 Update Total Line Item Component Cost($/SF)**	% Change From 2013 to 2014
01.0301	A0	***Agribusiness and Production***									
		Lab	1	**4,500**	$ 21.89	$ 168.25	$ 9.51	$ 199.65	$ 32.14	**$ 231.80**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 168.25	$ 9.51	$ 199.65	$ 32.14	**$ 231.80**	2.00%
		Related Office	1	**120**	$ 21.89	$ 168.25	$ 9.51	$ 199.65	$ 32.14	**$ 231.80**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 168.25	$ 9.51	$ 199.65	$ 32.14	**$ 231.80**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 168.25	$ 9.51	$ 199.65	$ 32.14	**$ 231.80**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 168.25	$ 9.51	$ 199.65	$ 32.14	**$ 231.80**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 168.25	$ 9.51	$ 199.65	$ 32.14	**$ 231.80**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 168.25	$ 9.51	$ 199.65	$ 32.14	**$ 231.80**	2.00%
		Greenhouse	1	**1,000**	$ 21.89	$ 58.95	$ 4.04	$ 84.88	$ 13.67	**$ 98.55**	2.00%
17.0303	T2	**Auto Specialization**									
		Lab	1	**3,500**	$ 21.89	$ 155.05	$ 8.85	$ 185.79	$ 29.91	**$ 215.71**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 155.05	$ 8.85	$ 185.79	$ 29.91	**$ 215.71**	2.00%
		Related Office	1	**120**	$ 21.89	$ 155.05	$ 8.85	$ 185.79	$ 29.91	**$ 215.71**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 155.05	$ 8.85	$ 185.79	$ 29.91	**$ 215.71**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 155.05	$ 8.85	$ 185.79	$ 29.91	**$ 215.71**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 155.05	$ 8.85	$ 185.79	$ 29.91	**$ 215.71**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 155.05	$ 8.85	$ 185.79	$ 29.91	**$ 215.71**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 155.05	$ 8.85	$ 185.79	$ 29.91	**$ 215.71**	2.00%
17.1011 17.1017	D1 D2	**Building & Property Maintenance** **Building Technology**									
		Lab	1	**3,000**	$ 21.89	$ 168.02	$ 9.50	$ 199.41	$ 32.10	**$ 231.51**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 168.02	$ 9.50	$ 199.41	$ 32.10	**$ 231.51**	2.00%
		Related Office	1	**120**	$ 21.89	$ 168.02	$ 9.50	$ 199.41	$ 32.10	**$ 231.51**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 168.02	$ 9.50	$ 199.41	$ 32.10	**$ 231.51**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 168.02	$ 9.50	$ 199.41	$ 32.10	**$ 231.51**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 168.02	$ 9.50	$ 199.41	$ 32.10	**$ 231.51**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 168.02	$ 9.50	$ 199.41	$ 32.10	**$ 231.51**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 168.02	$ 9.50	$ 199.41	$ 32.10	**$ 231.51**	2.00%
17.1100	D6	**Custodial Services**									
		Lab	1	**2,500**	$ 21.89	$ 142.42	$ 8.22	$ 172.53	$ 27.78	**$ 200.31**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 142.42	$ 8.22	$ 172.53	$ 27.78	**$ 200.31**	2.00%
		Related Office	1	**120**	$ 21.89	$ 142.42	$ 8.22	$ 172.53	$ 27.78	**$ 200.31**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 142.42	$ 8.22	$ 172.53	$ 27.78	**$ 200.31**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 142.42	$ 8.22	$ 172.53	$ 27.78	**$ 200.31**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 142.42	$ 8.22	$ 172.53	$ 27.78	**$ 200.31**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 142.42	$ 8.22	$ 172.53	$ 27.78	**$ 200.31**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 142.42	$ 8.22	$ 172.53	$ 27.78	**$ 200.31**	2.00%
17.1002	D7	**Electrical Trades**									
		Lab	1	**3,000**	$ 21.89	$ 145.76	$ 8.38	$ 176.04	$ 28.34	**$ 204.38**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 145.76	$ 8.38	$ 176.04	$ 28.34	**$ 204.38**	2.00%
		Related Office	1	**120**	$ 21.89	$ 145.76	$ 8.38	$ 176.04	$ 28.34	**$ 204.38**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 145.76	$ 8.38	$ 176.04	$ 28.34	**$ 204.38**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 145.76	$ 8.38	$ 176.04	$ 28.34	**$ 204.38**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 145.76	$ 8.38	$ 176.04	$ 28.34	**$ 204.38**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 145.76	$ 8.38	$ 176.04	$ 28.34	**$ 204.38**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 145.76	$ 8.38	$ 176.04	$ 28.34	**$ 204.38**	2.00%
17.0100	D8	**Environmental Control Technologies**									
		Lab	1	**3,000**	$ 21.89	$ 147.21	$ 8.45	$ 177.55	$ 28.59	**$ 206.14**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 147.21	$ 8.45	$ 177.55	$ 28.59	**$ 206.14**	2.00%
		Related Office	1	**120**	$ 21.89	$ 147.21	$ 8.45	$ 177.55	$ 28.59	**$ 206.14**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 147.21	$ 8.45	$ 177.55	$ 28.59	**$ 206.14**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 147.21	$ 8.45	$ 177.55	$ 28.59	**$ 206.14**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 147.21	$ 8.45	$ 177.55	$ 28.59	**$ 206.14**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 147.21	$ 8.45	$ 177.55	$ 28.59	**$ 206.14**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 147.21	$ 8.45	$ 177.55	$ 28.59	**$ 206.14**	2.00%

Program Type 5 (continued)

17.1003	D9	***Heavy Equipment Operations***										
		Lab	1	**4,500**	$ 21.89	$ 137.46	$ 7.97	$ 167.32	$ 26.94	**$ 194.26**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 137.46	$ 7.97	$ 167.32	$ 26.94	**$ 194.26**	2.00%
		Related Office	1	**120**	$ 21.89	$ 137.46	$ 7.97	$ 167.32	$ 26.94	**$ 194.26**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 137.46	$ 7.97	$ 167.32	$ 26.94	**$ 194.26**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 137.46	$ 7.97	$ 167.32	$ 26.94	**$ 194.26**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 137.46	$ 7.97	$ 167.32	$ 26.94	**$ 194.26**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 137.46	$ 7.97	$ 167.32	$ 26.94	**$ 194.26**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 137.46	$ 7.97	$ 167.32	$ 26.94	**$ 194.26**	2.00%
17.1012	R2	**Integrated Systems Technology**										
		Lab	1	**3,500**	$ 21.89	$ 171.16	$ 9.65	$ 202.71	$ 32.64	**$ 235.34**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 171.16	$ 9.65	$ 202.71	$ 32.64	**$ 235.34**	2.00%
		Related Office	1	**120**	$ 21.89	$ 171.16	$ 9.65	$ 202.71	$ 32.64	**$ 235.34**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 171.16	$ 9.65	$ 202.71	$ 32.64	**$ 235.34**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 171.16	$ 9.65	$ 202.71	$ 32.64	**$ 235.34**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 171.16	$ 9.65	$ 202.71	$ 32.64	**$ 235.34**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 171.16	$ 9.65	$ 202.71	$ 32.64	**$ 235.34**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 171.16	$ 9.65	$ 202.71	$ 32.64	**$ 235.34**	2.00%
17.1300	R3	**Manufacturing Design and Development**										
		Lab	1	**4,500**	$ 21.89	$ 137.91	$ 7.99	$ 167.79	$ 27.01	**$ 194.81**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 137.91	$ 7.99	$ 167.79	$ 27.01	**$ 194.81**	2.00%
		Related Office	1	**120**	$ 21.89	$ 137.91	$ 7.99	$ 167.79	$ 27.01	**$ 194.81**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 137.91	$ 7.99	$ 167.79	$ 27.01	**$ 194.81**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 137.91	$ 7.99	$ 167.79	$ 27.01	**$ 194.81**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 137.91	$ 7.99	$ 167.79	$ 27.01	**$ 194.81**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 137.91	$ 7.99	$ 167.79	$ 27.01	**$ 194.81**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 137.91	$ 7.99	$ 167.79	$ 27.01	**$ 194.81**	2.00%
17.1004	D0	**Brick, Block and Cement Masonry**										
		Lab	1	**3,500**	$ 21.89	$ 137.89	$ 7.99	$ 167.77	$ 27.01	**$ 194.78**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 137.89	$ 7.99	$ 167.77	$ 27.01	**$ 194.78**	2.00%
		Related Office	1	**120**	$ 21.89	$ 137.89	$ 7.99	$ 167.77	$ 27.01	**$ 194.78**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 137.89	$ 7.99	$ 167.77	$ 27.01	**$ 194.78**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 137.89	$ 7.99	$ 167.77	$ 27.01	**$ 194.78**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 137.89	$ 7.99	$ 167.77	$ 27.01	**$ 194.78**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 137.89	$ 7.99	$ 167.77	$ 27.01	**$ 194.78**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 137.89	$ 7.99	$ 167.77	$ 27.01	**$ 194.78**	2.00%
01.0701	A6	**Natural Resource Management**										
		Lab	1	**3,000**	$ 21.89	$ 167.04	$ 9.45	$ 198.38	$ 31.94	**$ 230.32**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 167.04	$ 9.45	$ 198.38	$ 31.94	**$ 230.32**	2.00%
		Related Office	1	**120**	$ 21.89	$ 167.04	$ 9.45	$ 198.38	$ 31.94	**$ 230.32**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 167.04	$ 9.45	$ 198.38	$ 31.94	**$ 230.32**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 167.04	$ 9.45	$ 198.38	$ 31.94	**$ 230.32**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 167.04	$ 9.45	$ 198.38	$ 31.94	**$ 230.32**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 167.04	$ 9.45	$ 198.38	$ 31.94	**$ 230.32**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 167.04	$ 9.45	$ 198.38	$ 31.94	**$ 230.32**	2.00%
		Greenhouse	1	**1,000**	$ 21.89	$ 58.95	$ 4.04	$ 84.88	$ 13.67	**$ 98.55**	2.00%
17.1005	DA	***Interior Design Applications***										
		Lab	1	**3,000**	$ 21.89	$ 144.88	$ 8.34	$ 175.11	$ 28.19	**$ 203.31**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 144.88	$ 8.34	$ 175.11	$ 28.19	**$ 203.31**	2.00%
		Related Office	1	**120**	$ 21.89	$ 144.88	$ 8.34	$ 175.11	$ 28.19	**$ 203.31**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 144.88	$ 8.34	$ 175.11	$ 28.19	**$ 203.31**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 144.88	$ 8.34	$ 175.11	$ 28.19	**$ 203.31**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 144.88	$ 8.34	$ 175.11	$ 28.19	**$ 203.31**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 144.88	$ 8.34	$ 175.11	$ 28.19	**$ 203.31**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 144.88	$ 8.34	$ 175.11	$ 28.19	**$ 203.31**	2.00%
17.1007	DB	**Plumbing & Pipefitting**										
		Lab	1	**3,000**	$ 21.89	$ 151.42	$ 8.67	$ 181.98	$ 29.30	**$ 211.27**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 151.42	$ 8.67	$ 181.98	$ 29.30	**$ 211.27**	2.00%
		Related Office	1	**120**	$ 21.89	$ 151.42	$ 8.67	$ 181.98	$ 29.30	**$ 211.27**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 151.42	$ 8.67	$ 181.98	$ 29.30	**$ 211.27**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 151.42	$ 8.67	$ 181.98	$ 29.30	**$ 211.27**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 151.42	$ 8.67	$ 181.98	$ 29.30	**$ 211.27**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 151.42	$ 8.67	$ 181.98	$ 29.30	**$ 211.27**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 151.42	$ 8.67	$ 181.98	$ 29.30	**$ 211.27**	2.00%

Program Type 5 (continued)

17.3100	T8	**Power Equipment Technology**												
		Lab	1	**3,500**	$ 21.89	$ 157.11	$ 8.95	$ 187.96	$ 30.26	**$ 218.22**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 157.11	$ 8.95	$ 187.96	$ 30.26	**$ 218.22**	2.00%
		Related Office	1	**120**	$ 21.89	$ 157.11	$ 8.95	$ 187.96	$ 30.26	**$ 218.22**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 157.11	$ 8.95	$ 187.96	$ 30.26	**$ 218.22**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 157.11	$ 8.95	$ 187.96	$ 30.26	**$ 218.22**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 157.11	$ 8.95	$ 187.96	$ 30.26	**$ 218.22**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 157.11	$ 8.95	$ 187.96	$ 30.26	**$ 218.22**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 157.11	$ 8.95	$ 187.96	$ 30.26	**$ 218.22**	2.00%
17.1402	F4	**Power Transmission**												
		Lab	1	**3,500**	$ 21.89	$ 149.31	$ 8.56	$ 179.77	$ 28.94	**$ 208.71**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 149.31	$ 8.56	$ 179.77	$ 28.94	**$ 208.71**	2.00%
		Related Office	1	**120**	$ 21.89	$ 149.31	$ 8.56	$ 179.77	$ 28.94	**$ 208.71**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 149.31	$ 8.56	$ 179.77	$ 28.94	**$ 208.71**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 149.31	$ 8.56	$ 179.77	$ 28.94	**$ 208.71**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 149.31	$ 8.56	$ 179.77	$ 28.94	**$ 208.71**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 149.31	$ 8.56	$ 179.77	$ 28.94	**$ 208.71**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 149.31	$ 8.56	$ 179.77	$ 28.94	**$ 208.71**	2.00%
17.2306	R6	**Welding & Cutting**												
		Lab	1	**3,500**	$ 21.89	$ 184.03	$ 10.30	$ 216.22	$ 34.81	**$ 251.03**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 184.03	$ 10.30	$ 216.22	$ 34.81	**$ 251.03**	2.00%
		Related Office	1	**120**	$ 21.89	$ 184.03	$ 10.30	$ 216.22	$ 34.81	**$ 251.03**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 184.03	$ 10.30	$ 216.22	$ 34.81	**$ 251.03**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 184.03	$ 10.30	$ 216.22	$ 34.81	**$ 251.03**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 184.03	$ 10.30	$ 216.22	$ 34.81	**$ 251.03**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 184.03	$ 10.30	$ 216.22	$ 34.81	**$ 251.03**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 184.03	$ 10.30	$ 216.22	$ 34.81	**$ 251.03**	2.00%

Program Type 6

OHIO FACILITIES CONSTRUCTION COMMISSION CAREER-TECHNICAL SUPPLEMENT
2014 OSDM Update - Career Tech
Revised 3/21/2014

SUBJECT CODE	PROGRAM CODE	PROGRAM TYPE 6	QTY	PROG SF	2014 Site Cost ($/SF)	2014 Basic Building Cost ($/SF) (incl. Furn. and Tech.)	Contingency ($/SF based on 5% of + BBC)	Total Construction Cost (incl. site, bldg., contingency.)	Total Non-Constr. Costs ($/SF based on 16.1% of Site +BBC + Cont.)	2014 Update Total Line Item Component Cost($/SF)	% Change From 2013 to 2014
01.0201	A1	***Industrial Power Technology***									
		Lab	1	**5,000**	$ 21.89	$ 140.02	$ 8.10	$ 170.01	$ 27.37	**$ 197.38**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 140.02	$ 8.10	$ 170.01	$ 27.37	**$ 197.38**	2.00%
		Related Office	1	**120**	$ 21.89	$ 140.02	$ 8.10	$ 170.01	$ 27.37	**$ 197.38**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 140.02	$ 8.10	$ 170.01	$ 27.37	**$ 197.38**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 140.02	$ 8.10	$ 170.01	$ 27.37	**$ 197.38**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 140.02	$ 8.10	$ 170.01	$ 27.37	**$ 197.38**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 140.02	$ 8.10	$ 170.01	$ 27.37	**$ 197.38**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 140.02	$ 8.10	$ 170.01	$ 27.37	**$ 197.38**	2.00%
		Engine Storage	1	**1,000**	$ 21.89	$ 140.02	$ 8.10	$ 170.01	$ 27.37	**$ 197.38**	2.00%
		Flammable Storage	1	**200**	$ 21.89	$ 140.02	$ 8.10	$ 170.01	$ 27.37	**$ 197.38**	2.00%
17.0301	T1	**Auto Collision Repair**									
		Lab	1	**5,000**	$ 21.89	$ 155.52	$ 8.87	$ 186.28	$ 29.99	**$ 216.27**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 155.52	$ 8.87	$ 186.28	$ 29.99	**$ 216.27**	2.00%
		Related Office	1	**120**	$ 21.89	$ 155.52	$ 8.87	$ 186.28	$ 29.99	**$ 216.27**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 155.52	$ 8.87	$ 186.28	$ 29.99	**$ 216.27**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 155.52	$ 8.87	$ 186.28	$ 29.99	**$ 216.27**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 155.52	$ 8.87	$ 186.28	$ 29.99	**$ 216.27**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 155.52	$ 8.87	$ 186.28	$ 29.99	**$ 216.27**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 155.52	$ 8.87	$ 186.28	$ 29.99	**$ 216.27**	2.00%
		Auto Parts Storage	1	**300**	$ 21.89	$ 155.52	$ 8.87	$ 186.28	$ 29.99	**$ 216.27**	2.00%
17.0302	T3	**Auto Technology**									
	T9	***Ground Transporation***									
		Lab	1	**5,000**	$ 21.89	$ 138.94	$ 8.04	$ 168.87	$ 27.19	**$ 196.06**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 138.94	$ 8.04	$ 168.87	$ 27.19	**$ 196.06**	2.00%
		Related Office	1	**120**	$ 21.89	$ 138.94	$ 8.04	$ 168.87	$ 27.19	**$ 196.06**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 138.94	$ 8.04	$ 168.87	$ 27.19	**$ 196.06**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 138.94	$ 8.04	$ 168.87	$ 27.19	**$ 196.06**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 138.94	$ 8.04	$ 168.87	$ 27.19	**$ 196.06**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 138.94	$ 8.04	$ 168.87	$ 27.19	**$ 196.06**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 138.94	$ 8.04	$ 168.87	$ 27.19	**$ 196.06**	2.00%
		Engine Storage	1	**800**	$ 21.89	$ 138.94	$ 8.04	$ 168.87	$ 27.19	**$ 196.06**	2.00%
		Machine Room	1	**900**	$ 21.89	$ 138.94	$ 8.04	$ 168.87	$ 27.19	**$ 196.06**	2.00%
		Flammable Material Storage	1	**60**	$ 21.89	$ 138.94	$ 8.04	$ 168.87	$ 27.19	**$ 196.06**	2.00%
17.1001	D3	**Carpentry**									
		Lab	1	**4,000**	$ 21.89	$ 147.31	$ 8.46	$ 177.67	$ 28.60	**$ 206.27**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 147.31	$ 8.46	$ 177.67	$ 28.60	**$ 206.27**	2.00%
		Related Office	1	**120**	$ 21.89	$ 147.31	$ 8.46	$ 177.67	$ 28.60	**$ 206.27**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 147.31	$ 8.46	$ 177.67	$ 28.60	**$ 206.27**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 147.31	$ 8.46	$ 177.67	$ 28.60	**$ 206.27**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 147.31	$ 8.46	$ 177.67	$ 28.60	**$ 206.27**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 147.31	$ 8.46	$ 177.67	$ 28.60	**$ 206.27**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 147.31	$ 8.46	$ 177.67	$ 28.60	**$ 206.27**	2.00%
		Finishing Room	1	**500**	$ 21.89	$ 147.81	$ 8.49	$ 178.19	$ 28.69	**$ 206.88**	2.00%
		Material Storage	1	**800**	$ 21.89	$ 147.31	$ 8.46	$ 177.67	$ 28.60	**$ 206.27**	2.00%
17.1810	F3	***Engineering Technology***									
	DD	***Structural Systems***									
	DE	***Mechanical, Electrical and Plumbing***									
	DF	***Construction Design and Management***									
		Lab	1	**1,500**	$ 21.89	$ 194.76	$ 10.83	$ 227.48	$ 36.62	**$ 264.11**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 194.76	$ 10.83	$ 227.48	$ 36.62	**$ 264.11**	2.00%
		Related Office	1	**120**	$ 21.89	$ 194.76	$ 10.83	$ 227.48	$ 36.62	**$ 264.11**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 194.76	$ 10.83	$ 227.48	$ 36.62	**$ 264.11**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 194.76	$ 10.83	$ 227.48	$ 36.62	**$ 264.11**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 194.76	$ 10.83	$ 227.48	$ 36.62	**$ 264.11**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 194.76	$ 10.83	$ 227.48	$ 36.62	**$ 264.11**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 194.76	$ 10.83	$ 227.48	$ 36.62	**$ 264.11**	2.00%
		CAD Room	1	**400**	$ 21.89	$ 194.76	$ 10.83	$ 227.48	$ 36.62	**$ 264.11**	2.00%
01.1001	A4	**Food Science and Technology**									
		Lab	1	**2,000**	$ 21.89	$ 146.33	$ 8.41	$ 176.64	$ 28.44	**$ 205.08**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 146.33	$ 8.41	$ 176.64	$ 28.44	**$ 205.08**	2.00%
		Related Office	1	**120**	$ 21.89	$ 146.33	$ 8.41	$ 176.64	$ 28.44	**$ 205.08**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 146.33	$ 8.41	$ 176.64	$ 28.44	**$ 205.08**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 146.33	$ 8.41	$ 176.64	$ 28.44	**$ 205.08**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 146.33	$ 8.41	$ 176.64	$ 28.44	**$ 205.08**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 146.33	$ 8.41	$ 176.64	$ 28.44	**$ 205.08**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 146.33	$ 8.41	$ 176.64	$ 28.44	**$ 205.08**	2.00%
		Freezer	1	**400**	$ 21.89	$ 146.33	$ 8.41	$ 176.64	$ 28.44	**$ 205.08**	2.00%
		Cooler	1	**400**	$ 21.89	$ 146.33	$ 8.41	$ 176.64	$ 28.44	**$ 205.08**	2.00%
		Retail	1	**400**	$ 21.89	$ 146.33	$ 8.41	$ 176.64	$ 28.44	**$ 205.08**	2.00%

Program Type 6 (continued)

01.0601	A5	**Horticulture**												
		Lab	1	**2,000**	$ 21.89	$ 149.88	$ 8.59	$ 180.36	$ 29.04	**$ 209.40**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 149.88	$ 8.59	$ 180.36	$ 29.04	**$ 209.40**	2.00%
		Related Office	1	**120**	$ 21.89	$ 149.88	$ 8.59	$ 180.36	$ 29.04	**$ 209.40**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 149.88	$ 8.59	$ 180.36	$ 29.04	**$ 209.40**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 149.88	$ 8.59	$ 180.36	$ 29.04	**$ 209.40**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 149.88	$ 8.59	$ 180.36	$ 29.04	**$ 209.40**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 149.88	$ 8.59	$ 180.36	$ 29.04	**$ 209.40**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 149.88	$ 8.59	$ 180.36	$ 29.04	**$ 209.40**	2.00%
		Retail	1	**400**	$ 21.89	$ 149.88	$ 8.59	$ 180.36	$ 29.04	**$ 209.40**	2.00%
		Greenhouse	1	**3,000**	$ 21.89	$ 58.95	$ 4.04	$ 84.88	$ 13.67	**$ 98.55**	2.00%
17.1200	T7	**Medium/Heavy Truck Technician**												
		Lab	1	**6,000**	$ 21.89	$ 139.65	$ 8.08	$ 169.62	$ 27.31	**$ 196.93**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 139.65	$ 8.08	$ 169.62	$ 27.31	**$ 196.93**	2.00%
		Related Office	1	**120**	$ 21.89	$ 139.65	$ 8.08	$ 169.62	$ 27.31	**$ 196.93**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 139.65	$ 8.08	$ 169.62	$ 27.31	**$ 196.93**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 139.65	$ 8.08	$ 169.62	$ 27.31	**$ 196.93**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 139.65	$ 8.08	$ 169.62	$ 27.31	**$ 196.93**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 139.65	$ 8.08	$ 169.62	$ 27.31	**$ 196.93**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 139.65	$ 8.08	$ 169.62	$ 27.31	**$ 196.93**	2.00%
		Engine Storage	1	**800**	$ 21.89	$ 139.65	$ 8.08	$ 169.62	$ 27.31	**$ 196.93**	2.00%
		Machine Room	1	**900**	$ 21.89	$ 139.65	$ 8.08	$ 169.62	$ 27.31	**$ 196.93**	2.00%
		Flammable Material Storage	1	**60**	$ 21.89	$ 139.65	$ 8.08	$ 169.62	$ 27.31	**$ 196.93**	2.00%
17.1806 17.1805	D5 D4	**Construction - Management** **Construction - Design/Build**												
		Lab	1	**3,000**	$ 21.89	$ 166.88	$ 9.44	$ 198.22	$ 31.91	**$ 230.13**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 166.88	$ 9.44	$ 198.22	$ 31.91	**$ 230.13**	2.00%
		Related Office	1	**120**	$ 21.89	$ 166.88	$ 9.44	$ 198.22	$ 31.91	**$ 230.13**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 166.88	$ 9.44	$ 198.22	$ 31.91	**$ 230.13**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 166.88	$ 9.44	$ 198.22	$ 31.91	**$ 230.13**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 166.88	$ 9.44	$ 198.22	$ 31.91	**$ 230.13**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 166.88	$ 9.44	$ 198.22	$ 31.91	**$ 230.13**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 166.88	$ 9.44	$ 198.22	$ 31.91	**$ 230.13**	2.00%
		CAD Room	1	**400**	$ 21.89	$ 166.88	$ 9.44	$ 198.22	$ 31.91	**$ 230.13**	2.00%
17.3601	DC	**Wood Product Technologies**												
		Lab	1	**3,000**	$ 21.89	$ 160.32	$ 9.11	$ 191.33	$ 30.80	**$ 222.13**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 160.32	$ 9.11	$ 191.33	$ 30.80	**$ 222.13**	2.00%
		Related Office	1	**120**	$ 21.89	$ 160.32	$ 9.11	$ 191.33	$ 30.80	**$ 222.13**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 160.32	$ 9.11	$ 191.33	$ 30.80	**$ 222.13**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 160.32	$ 9.11	$ 191.33	$ 30.80	**$ 222.13**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 160.32	$ 9.11	$ 191.33	$ 30.80	**$ 222.13**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 160.32	$ 9.11	$ 191.33	$ 30.80	**$ 222.13**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 160.32	$ 9.11	$ 191.33	$ 30.80	**$ 222.13**	2.00%
		Finishing Room	1	**500**	$ 21.89	$ 160.82	$ 9.14	$ 191.85	$ 30.89	**$ 222.74**	2.00%
		Material Storage	1	**800**	$ 21.89	$ 160.32	$ 9.11	$ 191.33	$ 30.80	**$ 222.13**	2.00%
17.2302	R5 R7	**Precision Machining** ***Manufacturing Operations***												
		Lab	1	**3,500**	$ 21.89	$ 131.75	$ 7.68	$ 161.33	$ 25.97	**$ 187.30**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 131.75	$ 7.68	$ 161.33	$ 25.97	**$ 187.30**	2.00%
		Related Office	1	**120**	$ 21.89	$ 131.75	$ 7.68	$ 161.33	$ 25.97	**$ 187.30**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 131.75	$ 7.68	$ 161.33	$ 25.97	**$ 187.30**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 131.75	$ 7.68	$ 161.33	$ 25.97	**$ 187.30**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 131.75	$ 7.68	$ 161.33	$ 25.97	**$ 187.30**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 131.75	$ 7.68	$ 161.33	$ 25.97	**$ 187.30**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 131.75	$ 7.68	$ 161.33	$ 25.97	**$ 187.30**	2.00%
		CNC Room	1	**900**	$ 21.89	$ 132.25	$ 7.71	$ 161.85	$ 26.06	**$ 187.91**	2.00%
		Inspection Room	1	**150**	$ 21.89	$ 132.25	$ 7.71	$ 161.85	$ 26.06	**$ 187.91**	2.00%

Program Type 7

OHIO FACILITIES CONSTRUCTION COMMISSION CAREER-TECHNICAL SUPPLEMENT
2014 OSDM Update - Career Tech
Revised 3/21/2014

SUBJECT CODE	PROGRAM CODE	PROGRAM TYPE 7	QTY	PROG SF	2014 Site Cost ($/SF)	2014 Basic Building Cost ($/SF) (incl. Furn. and Tech.)	Contingency ($/SF based on 5% of + BBC)	Total Construction Cost (incl. site, bldg., contingency.)	Total Non-Constr. Costs ($/SF based on 16.1% of Site +BBC + Cont.)	2014 Update Total Line Item Component Cost($/SF)	% Change From 2013 to 2014
17.0401	T0	**Aircraft Maintenance**									
	TA	***Air Transportation***									
		Lab	1	**13,000**	$ 21.89	$ 170.10	$ 9.60	$ 201.60	$ 32.46	**$ 234.05**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 170.10	$ 9.60	$ 201.60	$ 32.46	**$ 234.05**	2.00%
		Related Office	1	**120**	$ 21.89	$ 170.10	$ 9.60	$ 201.60	$ 32.46	**$ 234.05**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 170.10	$ 9.60	$ 201.60	$ 32.46	**$ 234.05**	2.00%
		Related Changing Room (one per type 5, 6 & 7)	1	**270**	$ 21.89	$ 170.10	$ 9.60	$ 201.60	$ 32.46	**$ 234.05**	2.00%
		Related Restroom	1	**68**	$ 21.89	$ 170.10	$ 9.60	$ 201.60	$ 32.46	**$ 234.05**	2.00%
		Related Tool Crib	1	**550**	$ 21.89	$ 170.10	$ 9.60	$ 201.60	$ 32.46	**$ 234.05**	2.00%
		Related Reference Room	1	**200**	$ 21.89	$ 170.10	$ 9.60	$ 201.60	$ 32.46	**$ 234.05**	2.00%
		Cleaning Room	1	**400**	$ 21.89	$ 170.10	$ 9.60	$ 201.60	$ 32.46	**$ 234.05**	2.00%
		Parts Storage	1	**300**	$ 21.89	$ 170.10	$ 9.60	$ 201.60	$ 32.46	**$ 234.05**	2.00%
		Hazardous Material Storage	1	**60**	$ 21.89	$ 170.10	$ 9.60	$ 201.60	$ 32.46	**$ 234.05**	2.00%
01.0901	A2	**Animal Science and Management (Equine)**									
		Lab	1	**8,000**	$ 21.89	$ 67.62	$ 4.48	$ 93.99	$ 15.13	**$ 109.12**	2.00%
		Stables	1	**6,800**	$ 21.89	$ 79.08	$ 5.05	$ 106.02	$ 17.07	**$ 123.09**	2.00%
		Related Classroom	1	**900**	$ 21.89	$ 170.42	$ 9.62	$ 201.93	$ 32.51	**$ 234.44**	2.00%
		Related Office	1	**120**	$ 21.89	$ 170.42	$ 9.62	$ 201.93	$ 32.51	**$ 234.44**	2.00%
		Related Storage	1	**200**	$ 21.89	$ 170.42	$ 9.62	$ 201.93	$ 32.51	**$ 234.44**	2.00%
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GENERAL DESIGN MANUAL DEFINITIONS

Auditeria	A student dining area with characteristics of an auditorium: sound, acoustical treatment, lighting, etc.
Composite	Two or more play structures attached or functionally linked, to create one integral unit that provides more than one play activity. The term "modular play structure" is also used interchangeable with this term.
Construction Factor	The construction factor shown is the area of a building which is used for ***wall thickness, pipe chase, etc. in the wall.***
Distance Learning	The process of transmitting and/or receiving instruction and demonstration via video and/or audio means.
Modular Play Structure	Two or more play structures attached or functionally linked, to create one integral unit that provides more than one play activity. The term "composite" is also used interchangeable with this term.
ORFF	Large instruments capable of being beat upon by children.
Plan for	The design is to accommodate the item. The item will be funded by the school district.
Provide for	The item is to be part of the project. The item will be funded by the Classroom Facilities Assistance Program.
School District	A general term applied to a legally constituted school entity which is governed by a Board of Education. They may include city, local, exempted village, and joint vocational school districts.

CAREER-TECHNICAL DEFINITIONS

Academies

Many Career-Technical Schools and Comprehensive High Schools group similar cluster programs into units called Academies. An Academy may contain 75 to 100 students in a general area such as Arts & Communications, Health Services, Business and Management, , etc. These units may be the equivalent of three to five individual program types within the Career-Technical clusters. The Ohio Facilities Construction Commission Design Manual defines instructional spaces such as laboratory and related spaces in terms of individual programs since academies can vary in the combination of programs making up the academy.

Career Clusters

The Ohio Department of Education, Career-Technical and Adult Education Division has created career fields under which programs/coursework are organized into pathways or specializations of study. ODE defines career field as “a grouping of occupations and broad industries based on commonalities.” “The career field concept calls for balancing broad-based, career-technical education and the specialized training necessary for success in employment, further study and adaptation ot an ever-changing economy.” The career fields are listed below. Additional information regarding the scope of each career field can be found on ODE’s website. They are shown here for definition purposes only and are not intended to directly relate to the seven program types found in the Program of Requirements.

Agricultural and Environmental Systems
Arts and Communication
Business and Administrative Services
Construction Technologies
Education and Training
Engineering and Science Technologies
Finance
Government and Public Administration
Health Science
Hospitality and Tourism
Human Services
Information Technology
Law and Public Safety
Manufacturing Technologies
Marketing
Transportation Systems

Career-Technical Education

Organized education programs that (a) offer a sequence of courses that provide individuals with the academic knowledge and skills the individuals need to prepare for further education and careers in current or emerging employment sectors; and (b) include competency-based applied learning that contributes to the academic knowledge higher-order reasoning and problem-solving skills, work attitudes, general employability skills, and occupational-specific skills of an individual.

B. CAREER-TECHNICAL DEFINITIONS, continued

Career-Technical School Districts

Synonymous with Vocational Education and the term that is utilized within the Career-Technical sections when addressing vocational programming.

Career-Technical Planning District (CT) by the Department of Education as being responsible for the planning and provision of Career-Technical Education services to students within the district or group of districts.
Compact CTPD – a vocational educational planning district composed of a group of school districts which contract within the group to deliver Career-Technical Education. A "lead district" acts as the funding agent and usually offers the majority of the programs.
Comprehensive CTPD – a vocational education planning district composed of a single school district. The high school providing such service is a Comprehensive High School.
Joint Career-Technical School District VEPD – a School district formed by a group of city, local, or exempted village school districts to offer Career-Technical education to students of all of the participating districts.

Instructional Spaces

The Ohio School Facilities Commission Design Manual defines instructional spaces such as laboratory and related spaces in terms of individual programs since academies can vary in the combination of programs making up the academy. The space needed to house an academy is generally the combined totals for the individual programs within the academy. Some economy of space should be realized in areas such as related classrooms and perhaps office, storage, and specialized facilities. These decisions will need to be determined on a case-by-case basis.

Satellite Program

A program offered by a Career-Technical, comprehensive, or compact school at an off-site location which could include a member school, a business, or any other facility properly equipped to house the program.

Subject Codes

The term utilized by the Ohio Department of Education, Career-Technical and Adult Division, to classify the various programs which may be approved for operation within a school district.

VE-26

The vocational education form which must be submitted by a school district to the Ohio Department of Education in order to gain approval to offer and conduct a vocational program.

VE-26A

The adult education equivalent of the VE-26 form.

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ABBREVIATIONS

AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ABAA	***Air Barrier Association of America***
ABMA	American Boiler Manufacturers Council
AC	Alternating Current
ACI	American Concrete Institute
ADA	American with Disabilities Act
ADC	American Diffusion Council
ADDM	Addendum Administration
AGA	American Gas Association
AHA	American Hardboard Association
AIA	American Institute of Architects
AISC	American Institute of Steel Construction, Inc.
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Movement and Control Association, Inc.
ANSI	American National Standards Institute
AP	Access Point
APA	American Plywood Association
API	American Petroleum Institute
APP	Atactic polypropylene
ARI	Air Condition and Refrigeration Institute
ARMA	Asphalt Roofing Manufacturers Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASLA	American Society of Landscape Architects
ASME	American Society of Civil Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing and Materials
ATM	Asynchronous Transfer Mode
AWCI	Association of the Wall and Ceiling Industries
AWG	American Wire Gauge
AWI	Architectural Woodwork Institute
AWS	American Welding Society
AWWA	American Waste Water Association
AWWA	American Water Work Association
B-B-G	Blinds between glass
BHMA	Builders Hardware Manufacturers Association
bhp	Brake Horsepower
BIA	Brick Institute of America
BICSI	Building Industry Consulting Services International
CAC	Ceiling Attenuation Class
CADD	Computer Aided Design Drafting
Carrier HAP	Carrier Hourly Analysis Program
CAT-5e	Category 5e

ABBREVIATIONS

CCTV	Closed Circuit Television
CD	Construction Documents
CD	Compact Disk
CDF	Combined Distributing Frame
CDS	Customer Direct Service
CFM	Cubic Feet per Minute
CFR	Code of Federal Regulations
CISCA	Ceilings and Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CL	Lighting Contactor
CM	Construction Manager
CMP	Communications Plenum Cable
CMU	Concrete Masonry Unit
COAX	Coaxial Cable
COE	Corps of Engineers
CPSC	Consumer Product Safety Commission
CPVC	Chlorinated Polyvinyl Chloride
CRI	Carpet and Rug Institute
CRI	Color Rendering Index
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standards
CSE	Central Switching Exchange
CSI	Construction Specification Institute
CTI	Cooling Tower Institute
CX	Commissioning
DB	Decibel
DC	Direct Current
DD	Design Development
DDC	Direct Digital Control
DEMARC	Demarcation
DFT	Dry Film Thickness
Div.	Division
DNR	Department of Natural Resources
DOE	Department of Energy
DSL	Digital Subscriber Line
DVD	Digital Versatile Disk
DX	Direct Expansion
EIA	Electronic Industries Association
EIFS	Exterior Insulation and Finish System
EIMA	EIFS Industry Members Association
EIMA	Exterior Insulation Manufacturer Association
EIT	Engineer in Training
EJMA	Expansion Joint Manufacturers Association, Inc.
EF	Entrance Facilities
ELA	Extended Learning Area
EMT	Electrical Metallic Tubing
EPA	Environmental Protection Agency or Effective Projected Area
EPDM	Ethylene Propylene Diene Monomers
EPS	Expanded Polystyrene

ABBREVIATIONS

ER	Main Control/Equipment Room
ET	***Enhanced Tile***
ETL	Electrical Testing Laboratories
f'c	Specified Compressive Strength (Concrete at the age of 28 days)
FCAN	Full Capacity Above Normal
FCBN	Full Capacity Below Normal
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FEP	Front End Processor
FF/FL	Floor Flatness/Floor Levelness
FGMA	Flat Glass Marketing Association
Flt-Fn	Float Finish
FM	Factory Mutual
FS	Federal Specification
Gb	Gigabit (billion bits)
Gbps	Gigabits (billions of bits) per Second
GC	General Contractor
GG	Geogrid
Gnd	Ground
gpm	Gallon per Minute
GRI	Geosynthetic Research Institute
Grt-Cl-Fn	Grout Clean Finish
HCFC	Hydrochlorofluorocarbons
HDPE	High Density Polyethylene
HI	Hydronics Institute
HID	High Intensity Discharge
HPMA	Hardwood Plywood Manufacturers Association
HPVA	Hardwood Plywood and Veneer Association
HSS	Hollow Structural Sections
HUD/FHA	U.S. Department of Housing and Urban Development/Federal Housing
HVAC	Heating, Ventilating, and Air Conditioning
IAPMO	International Association of Plumbing and Mechanical Officials
ICEA	Insulated Cable Engineers Association
ID	Inside Dimension
IDF	Intermediate Distribution Frame Closets
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IEP	Individual Education Programs
IES	Illuminating Engineers Society
IP	Internet Protocol
IPCEA	Insulated Power Cable Engineers Association
IR	Infrared
ISDN	Integrated Services Digital Network
ITL	Independent Testing Laboratories
IVDL	Interactive Video Distance Learning
kb	Kilobit
kB	KiloByte
kbps	Kilo (thousand) bits per second
L/H	Length/Height

LAN Local Area Network

ABBREVIATIONS

LEC	Local Exchange Carrier (Now Service Provider [SP])
LED	Light Emitting Diode
LP	Liquid Petroleum
LP	Liquid Propane
MB	MegaByte
Mb	Megabit
MBA	Modified Bitumen APP
Mbps	Millions of bits per Second
MC	Main Cross-connect (aka Technology Control Center)
MERV	Minimum Efficiency Reporting Value
MFMA	Maple Flooring Manufacturers Association
MHz	Million Hertz (Cycles per Second)
MIA	Masonry Institute of America
MLMA	Metal Lath Manufacturer Association
mm	Multi-Mode
MSS	Manufacturers Standardization Society of the Valve and Fitting Industry
MW	Moderate Weather
NAB	National Association of Broadcasters
NAEB	National Association of Educational Broadcasters
NBC	National Building Code
NBS	National Bureau of Standards
NCMA	National Concrete Masonry Association
NCPI	National Clay Pipe Institute
NDL	No Dollar Limit
NEBB	National Environmental Balancing Bureau
NEC	Nation Electric Code-Latest Edition
NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NMC	National Mechanical Code
NPA	National Particleboard Association
NPC	National Plumbing Code
NRC	Noise Reduction Coefficient
NRCA	National Roofing Contractors Association
NsBrm-Fn	Non-slip Broom Finish
NSF	National Sanitation Foundation
NWWDA	National Wood Window and Door Association
OBC	Ohio Building Code
ODOT	Ohio Department of Transportation
OEPA	Ohio Environmental Protection Agency
ORC	Ohio Revised Code
OFCC	Ohio Facilities Construction Commission
OSN	Ohio SchoolNet Commission
OSP	Outside Plant
OTDR	Optical Time Division Reflectometer
PA	Project Administrator
PABX	Private Automatic Branch Exchange
PC	Personal Computer
PCA	Portland Cement Association

PDI	Plumbing and Drainage Institute
PID	Proportional, Integral, Derivative
PPM	Parts per Million
PRI	Primary Rate Interface
psi	Pounds per Square Inch
psig	Pounds per Square Inch Gauge
PSTN	Public Switched Telephone Network
PVC	Polyvinyl Chloride
PVC	Permanent Virtual Circuit
QoS	Quality of Service
RCDD	Registered Communications Distribution Designer
RF	Radio Frequency
RfFm-Fn	Rough Formed Finish
RFI	Request for Information
RIS	Redwood Inspection Service
RJ	Residential Jack
SACMU	Sound Absorbing Concrete Masonry Unit
SBS	Styrene-Butadiene-Styrene
SC	Subscriber Connector (Fiber-Optic Connector)
SCP	System Control Processor
SD	Schematic Design
SDI	Steel Deck Institute
SDI	Steel Door Institute
SF	Square Feet or Square Foot
SFRM	***Sprayed Fire Resistive Material***
SJI	Steel Joist Institute
sm	Single-Mode
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association, Inc.
SmFm-Fn	Smooth Formed Finish
SNMP	Simple Network Management Protocol
SP	Service Provider
SPL	Sound Pressure Level
SPRI	Single Ply Roofing Institute
ST	Straight Tip (Fiber-Optic Connector)
STC	Sound Transmission Coefficient
STI	Steel Tank Institute
SVC	Switched Virtual Circuit
SW	Severe Weather
SWP	Standard Water Pressure
TBB	Telecommunications Bonding Backbone
TC	Telecommunications Closet (aka Telecommunications Room)
TCA	Tile Council of America
TCC	Technology Control Center (aka Main Cross-Connect)
TCP/IP	Transmission Control Protocol/Internet Protocol
TDM	Time Division Multiplexing
TGB	Telecommunications Grounding Busbar
THHN	Heat Resistant Thermoplastic Conductor
THWN	Moisture and Heat Resistant Thermoplastic Conductor
TIA	Telecommunications Industry Association
TIS	Traffic Impact Study
TMGB	Telecommunications Main Grounding Busbar

ABBREVIATIONS

THWN	Moisture and Heat Resistant Thermoplastic Conductor
TIA	Telecommunications Industry Association
TIS	Traffic Impact Study
TMGB	Telecommunications Main Grounding Busbar
TMS	The Masonry Society
TR	Telecommunications Room (aka Telecommunications Closet)
Tr-Fn	Trowel Finish
TV	Television
TWS	Tackable Wall Surface
UL	Underwriters Laboratories
UL	Underwriter's Lab
UPS	Uninterruptible Power Supply
UTP	Unshielded Twisted Pair
VAV	Variable Air Volume
VCP	Visual Comfort Probability
VCR	Video Cassette Recorder
VCT	Vinyl Composition Tile
VCTT	Vinyl Cushion Tufted Textiles
VET	Vinyl Enhanced Tile
VGA	Video Graphic Array (800 x 640)
VLAN	Virtual Local Area Network
VOC	Volatile Organic Compound
VoIP	Voice over IP
WAN	Wide Area Network
WLAN	Wireless Local Area Network
WSP	Working Steam Pressure
WWF	Welded Wire Fabric
WWPA	Western Wood Products Association
XGA	Extended Graphic Array (1024 x 768)

INTRODUCTION

PURPOSE:

The purpose of this chapter is to assist the school district in establishing the gross square feet for a new facility. The size of the facility is based on student capacity, grade configuration, and community services that will meet the needs of the school district.

ALLOCATING BUILDING SQUARE FEET:

Square feet allocations for spaces in the program areas and grade levels have been established. A worksheet for each program area follows the Summary of Spaces. With the aid of the educational specifications, the school district and its Design Professional can tailor the facility to meet the needs of the district by entering the appropriate quantities for each space.

The spaces of each program area are further defined in Chapter 4, Elementary School; Chapter 5, Middle School; and Chapter 6, High School. Refer to these chapters for specific requirements.

Certain building-related areas are included in the Summary of Spaces. These spaces are directly or indirectly related to the student capacity. These areas will be calculated as the district selects educational spaces. The basis for these calculations is shown on the space plates.

Interactive bracketing templates are included in the electronic version of this manual. Current available standard grade groupings include:

PK-5 Elementary School
6-8 Middle School
9-12 High School
PK-12 Combination School
PK-8 Elementary/Middle Combination School
6-12 Middle/High Combination School

Other grade grouping arrangements do not have an exact corresponding template available. See the following page for instructions.

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INTRODUCTION

REMINDER: The minimum school size for any grade configuration is 350 students.

GRADE GROUPINGS WHICH DO NOT EXACTLY FIT THE AVAILABLE TEMPLATES CAN BE ACCOMMODATED AS FOLLOWS:

PK-5 Elementary School template grade groupings:

PK-4, PK-3, PK-2, PK-1, PK only
K-4, K-3, K-2, K-1, K only
K only, 1 only, 2 only, 3 only, 4 only, 5 only
PK-6, K-6, 1-6, 2-6, 3-6, 4-6: For these grade groupings (which cross over into another grade grouping by one grade only), the total GSF building area must be manually entered into the POR Summary page by overriding the cell formula. This number is obtained from the Master Plan.

6-8 Middle School template grade groupings:

7-8, 6 only, 7 only, 8 only
5-6, 5-7, 5-8, 5-9, 6-9, 7-9, 8-9: For these grade groupings (which cross over into another grade grouping by one grade only), the total GSF building area must be manually entered into the POR Summary page by overriding the cell formula. This number is obtained from the Master Plan.

9-12 High School template grade groupings:

10-12, 11-12, 10 only, 11 only, 12 only
8-12: For this grade grouping (which crosses over into another grade grouping by one grade only), the total GSF building area must be manually entered into the POR Summary page by overriding the cell formula. This number is obtained from the Master Plan.

PK-12 Combination School template grade groupings:

PK-11, K-11, PK-10, K-10, 1-12, 2-12, 3-12, 4-12

PK-8 Elementary/Middle Combination School template grade groupings:

PK-7, K-7, K-8, 1-7, 1-8, 2-7, 2-8, 3-7, 3-8, 4-7, 4-8
PK-9, K-9, 1-9, 2-9, 3-9, 4-9: For these grade groupings (which cross over into another grade grouping by one grade only), the total GSF building area must be manually entered into the POR Summary page by overriding the cell formula. This number is obtained from the Master Plan.

6-12 Middle/High Combination School template grade groupings:

7-12, 7-11, 6-11
: For this grade grouping (which crosses over into another grade grouping by one grade only), the total GSF building area must be manually entered into the POR Summary page by overriding the cell formula. This number is obtained from the Master Plan.

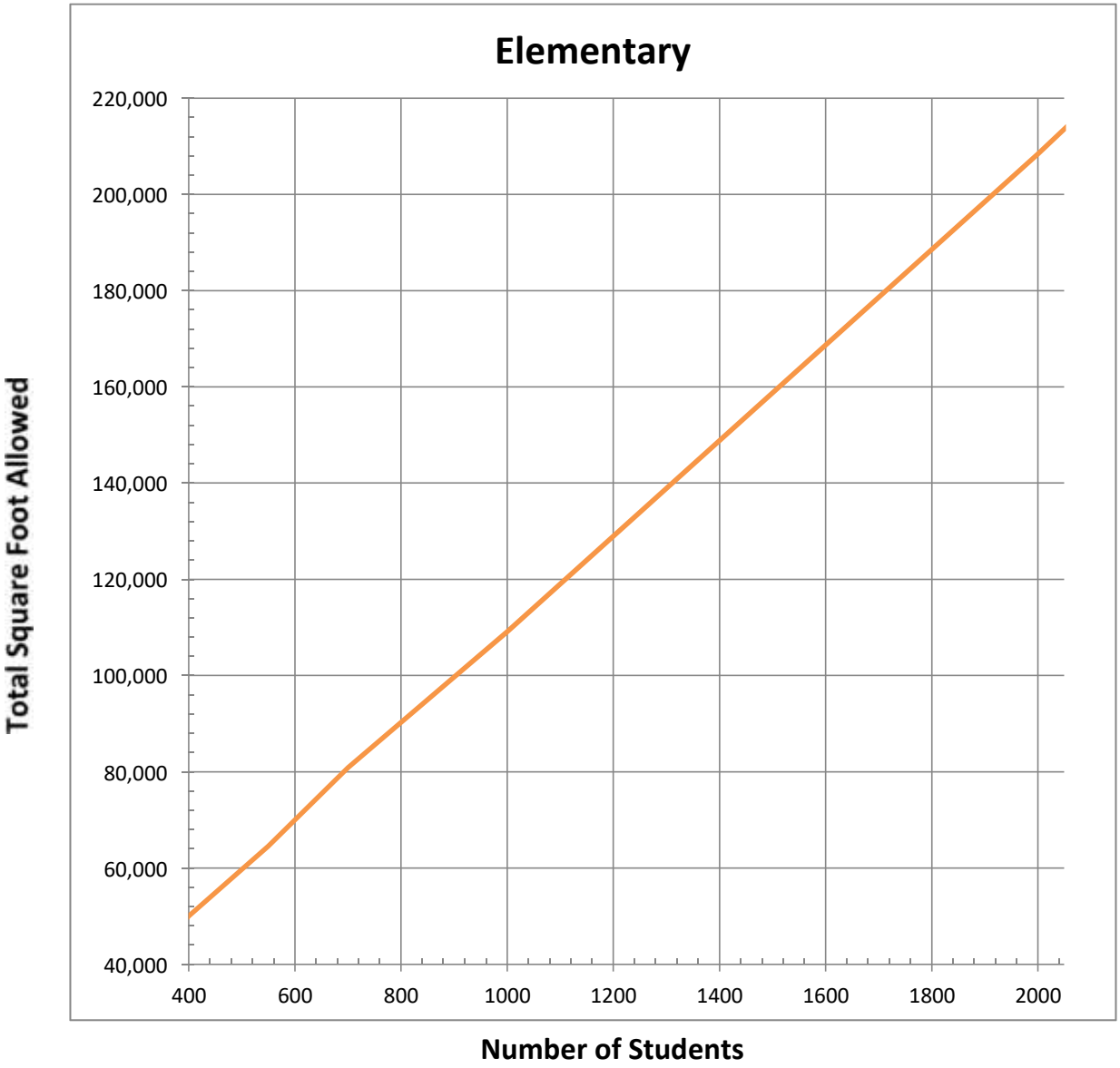
For facilities developed under the Student Centered Learning Environment (SCLE), overall project costs must not exceed those of traditional facilities, however with the variety of spaces within a SCLE facility it is possible to develop planning concepts that reflect less square footage than a traditional facility. The OFCC will entertain flexibility between square footage and cost per square foot, provided the traditionally calculated budget is not exceeded. Request for a reduction in square footage will be reviewed on a case by case basis. This applied only to SCLE based facilities.

Previously, changes or additions made during the annual update of the Design Manual have been ***"bolded and italicized"*** for easy identification. Changes have been made to the formulas on this sheet which have not been bolded and italicized. The user is advised to carefully review all information.

Enter # of students	450
SF/student	121.87
Total SF for building	54,840

ELEMENTARY SCHOOL: Grades PK 5

0 - 349 students, 125 SF/student
350 - 399 students, 125–125 SF/student
400 - 549 students, 125–117 SF/student
550 - 699 students, 117–116 SF/student
700 - 999 students, 115–109 SF/student
1000 - 1499 students, 109–106 SF/student
1500 - 1999 students, 106–104 SF/student
2000 - 4999 students, 104–104 SF/student
5000+ students, 104 SF/student



MIDDLE SCHOOLS

SQUARE FOOT ALLOWANCE

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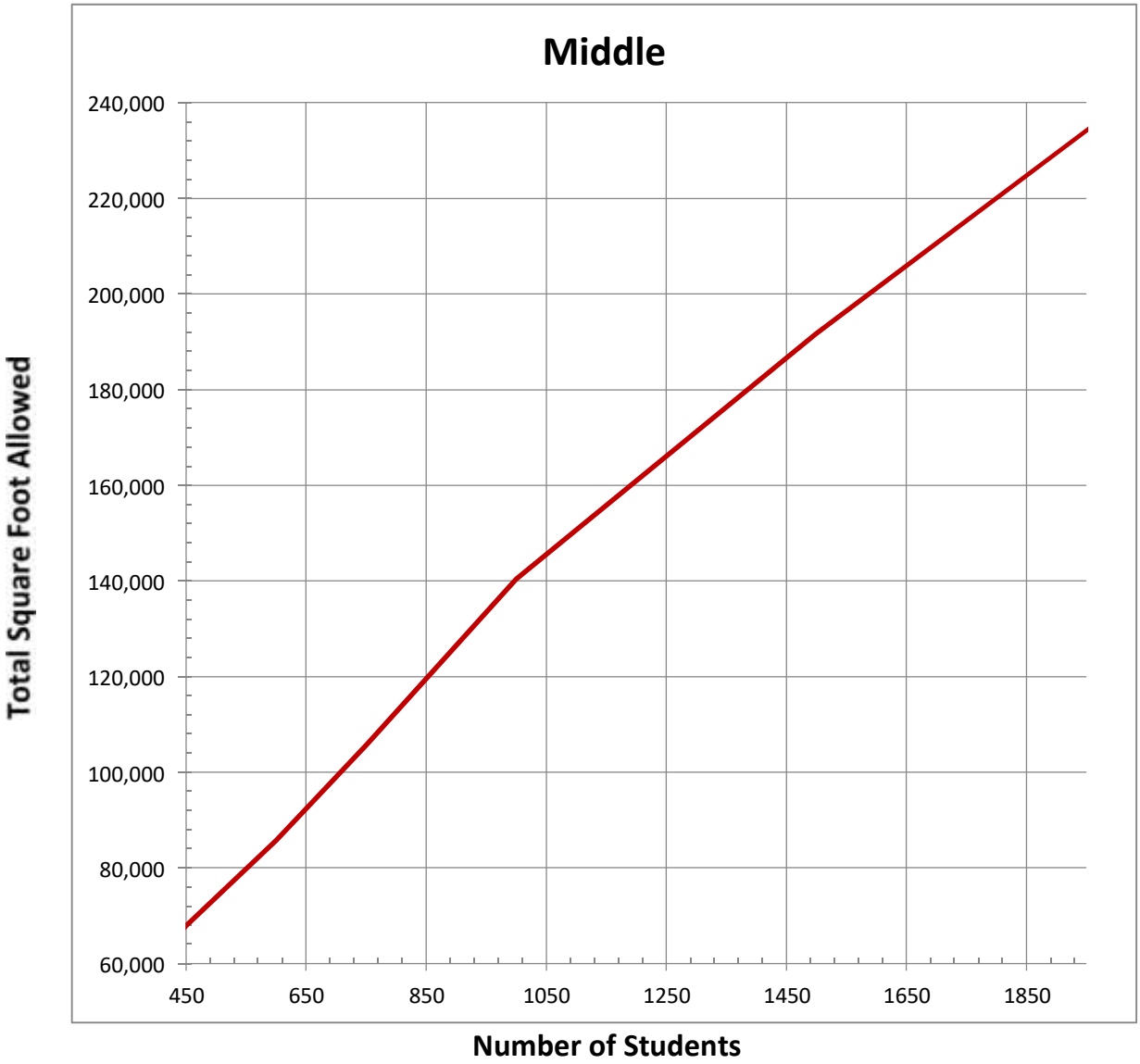
Enter # of students	450
SF/student	151.00
Total SF for building	67,950

MIDDLE SCHOOL: Grades 6 – 8

0 - 349 students, 151 SF/student
350 - 449 students, 151–151 SF/student
450 - 599 students, 151–143 SF/student
600 - 749 students, 143–141 SF/student
750 - 999 students, 141–140 SF/student
1000 - 1499 students, 140–128 SF/student
1500 - 1999 students, 128–119 SF/student
2000 - 4999 students, 119–119 SF/student
5000+ students, 119 SF/student



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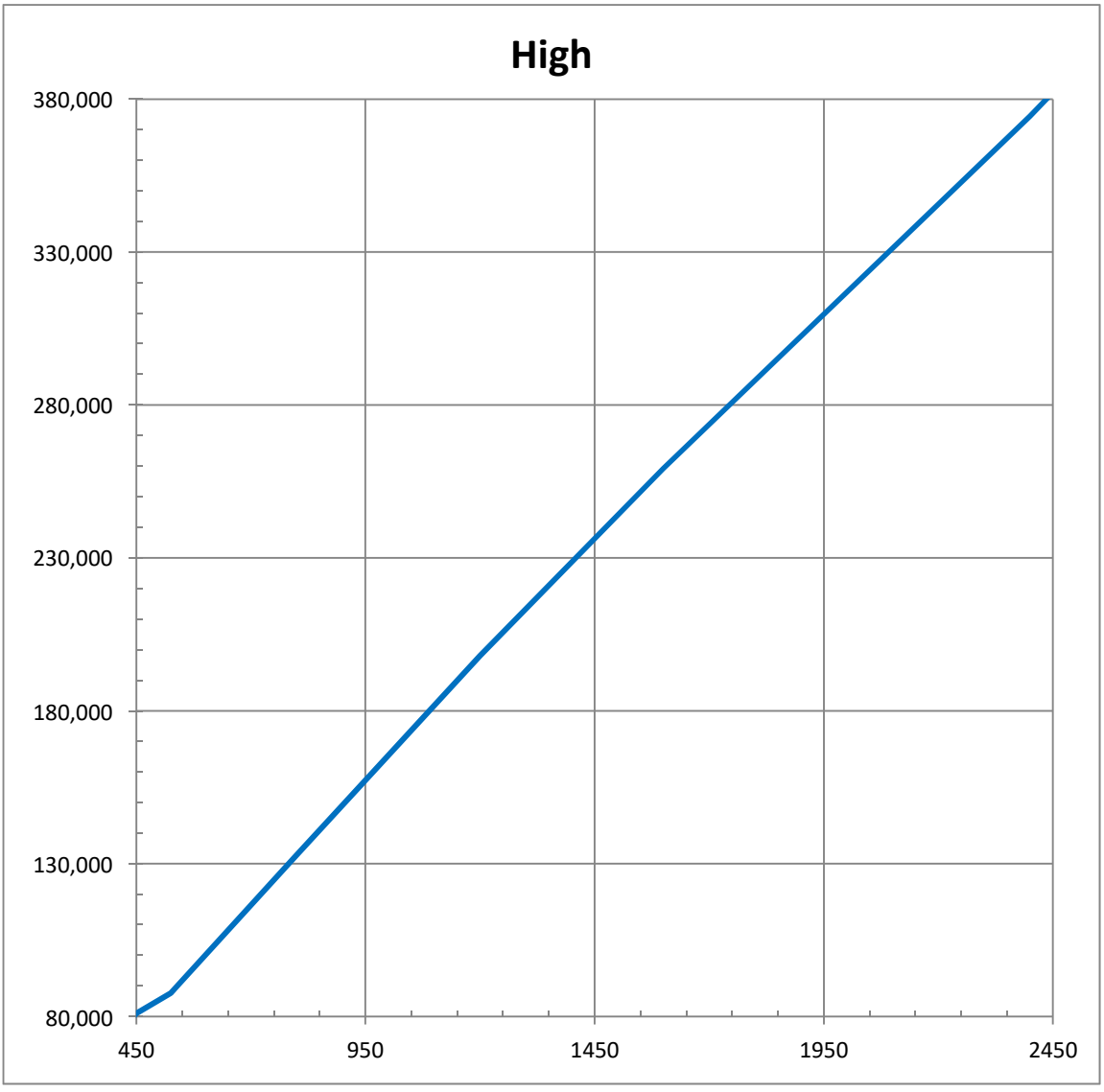
Enter # of students	600
SF/student	166.64
Total SF for building	99,982

HIGH SCHOOL: Grades 9 – 12

0 - 349 students, 180 SF/student
350 - 449 students, 179–180 SF/student
450 - 524 students, 180–167 SF/student
525 - 799 students, 167–166 SF/student
800 - 1199 students, 166–165 SF/student
1200 - 1599 students, 165–162 SF/student
1600 - 2399 students, 162–156 SF/student
2400 - 4999 students, 156–156 SF/student
5000+ students, 156 SF/student



COMBINATION SCHOOLS

SQUARE FOOT ALLOWANCE

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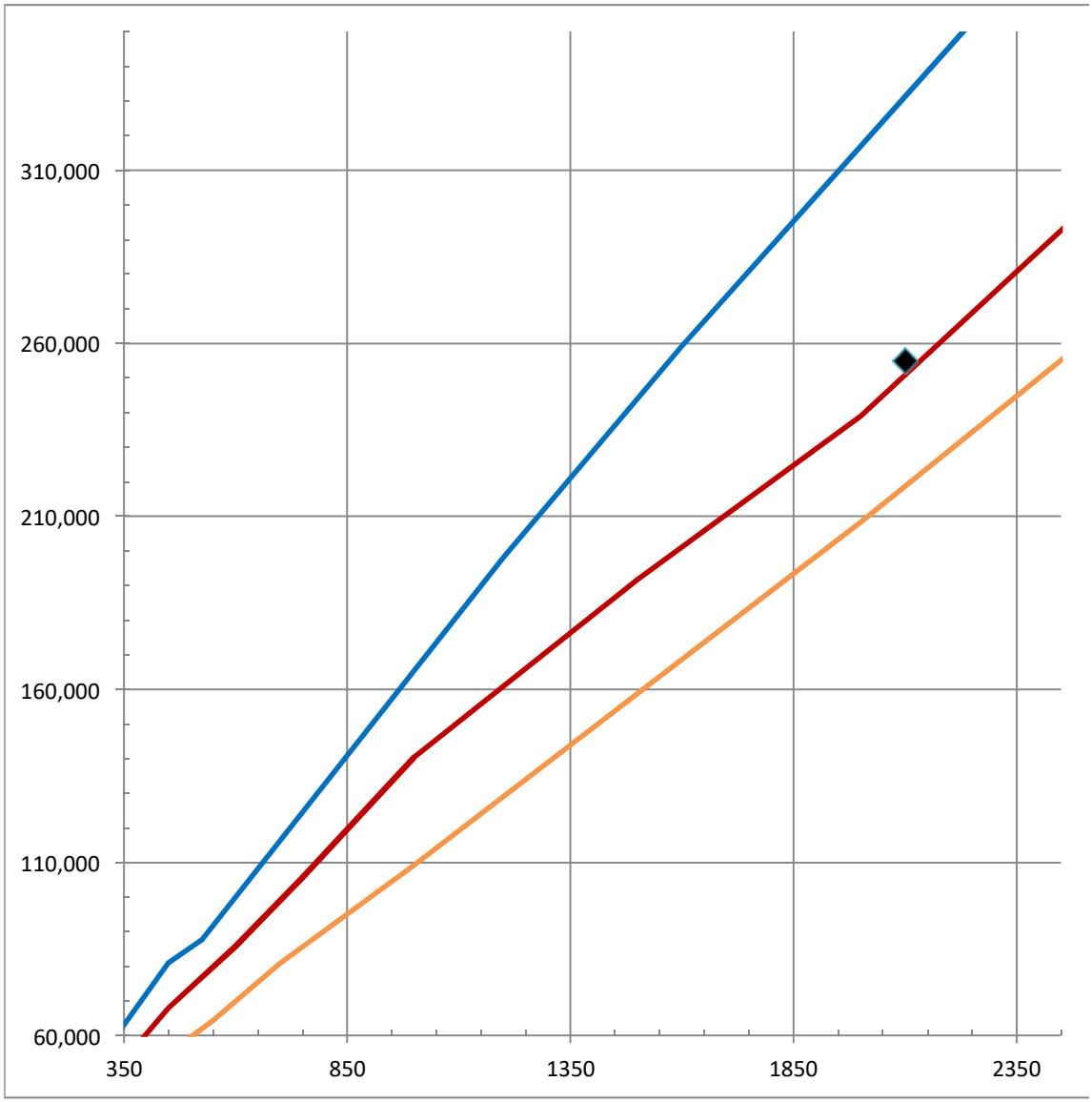
Enter # of students grades PK – 5	1,050
Enter # of students grades 6 – 8	450
Enter # of students grades 9 – 12	600
SF/student	121.48
Total SF for building	255,102



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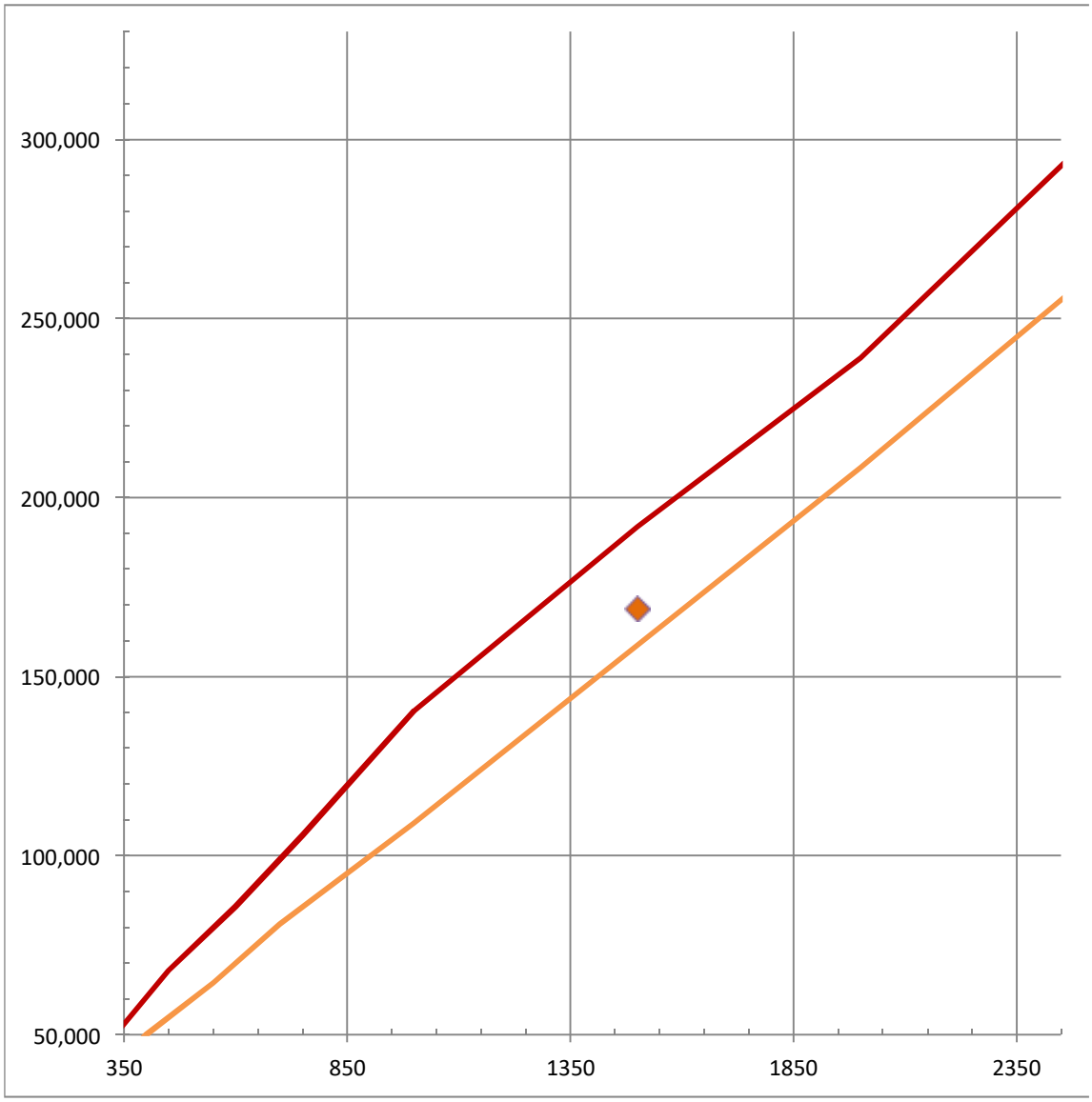
Enter # of students grades PK – 5	1,050
Enter # of students grades 6 – 8	450
SF/student	112.61
Total SF for building	168,919

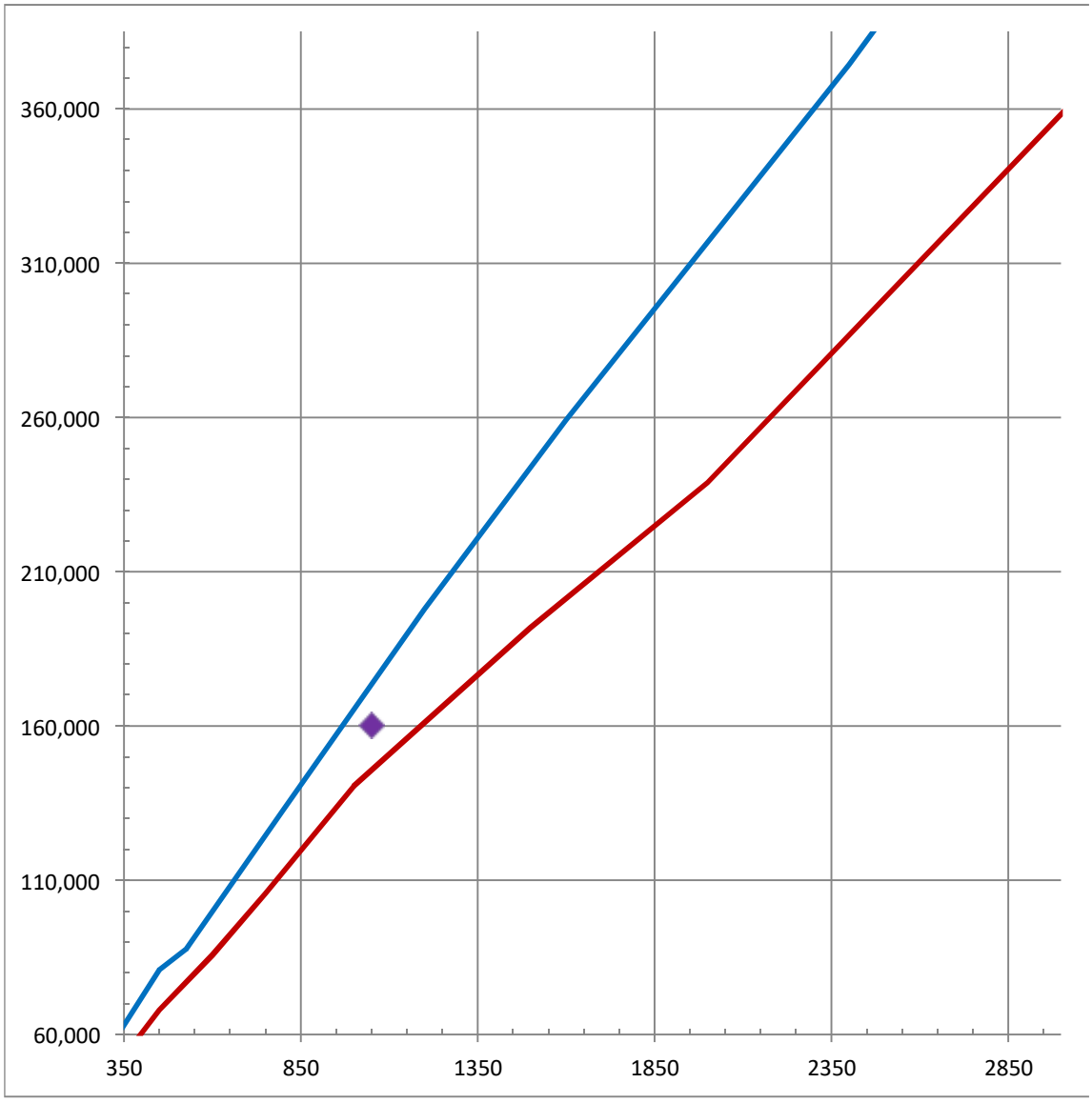


COMBINATION SCHOOLS

SQUARE FOOT ALLOWANCE

Previously, changes or additions made during the annual update of the Design Manual have been ***"bolded and italicized"*** for easy identification. Changes have been made to the formulas on this sheet which have not been bolded and italicized. The user is advised to carefully review all

Enter # of students grades 6 – 8	450
Enter # of students grades 9 – 12	600
SF/student	152.54
Total SF for building	160,166



Sample School District, SAMPLE ELEMENTARY SCHOOL

SUMMARY OF SPACES

Previously, changes or additions made during the annual update of the Design Manual have been ***"bolded and italicized"*** for easy identification. Changes have been made to the formulas on this sheet which have not been bolded and italicized. The user is advised to carefully review all information.

EXAMPLE	400 Students	550 Students	700 Students	1000 Students	1500 Students	2000 Students
	SF	SF	SF	SF	SF	SF
Grade Configuration: PK-5						
Number of Students	400	550	700	1,000	1,500	2,000
Square Feet Per Student	125.00	117.31	115.60	109.16	105.93	104.19
Total Gross Square Feet Funded	**50,000**	**64,520**	**80,920**	**109,163**	**158,888**	**208,383**
PROGRAM AREA						
E-AC Academic Core Spaces	16,680	23,500	29,060	42,280	62,640	82,280
E-SE Special Education Spaces	1,150	1,750	2,300	3,100	4,900	6,650
E-AD Administrative Spaces	2,173	2,569	3,519	3,615	5,530	6,340
E-MC Media Center Spaces	1,810	2,520	3,260	3,970	5,720	7,220
E-VA Visual Arts Spaces	1,400	1,425	2,650	2,900	4,250	5,600
E-MU Music Spaces	1,200	1,200	1,200	1,400	2,600	3,900
E-PE Physical Education Spaces	3,700	4,300	5,100	6,500	7,600	10,800
E-SD Student Dining Spaces	4,180	4,430	5,280	6,980	9,980	12,830
E-FS Food Service Spaces	1,615	2,140	2,665	3,855	5,605	7,355
E-CU Custodial Spaces	300	400	500	700	900	900
E-BS Building Services	11,247	14,420	18,030	23,939	34,718	45,564
Facility Total	**45,455**	**58,654**	**73,564**	**99,239**	**144,443**	**189,439**
Construction Factor	0.10	0.10	0.10	0.10	0.10	0.10
Gross Square Feet Developed	**50,000**	**64,520**	**80,920**	**109,163**	**158,888**	**208,383**

Worksheet Summary

Enter Grade Configuration		
Enter Student Enrollment		
Square Feet Per Student from Page 2000-2		
Total Gross Square Feet Funded	**0**	
SELECT ON (●) Single or Two Story Bu ( ) 3 Stories or greater		
Vert. Cir. Area Allowance (3 Stories or greater)	**0**	
Total Adjusted POR Gross Square Footage	**0**	

Vert. Cir. = Vertical Circulation (3 Stories or greater) refers only to stairways/stairtowers, monumental stairs, elevators and elevator equipment rooms.

PROGRAM AREA	New SF	Exst. SF*	TOTAL SF	
E-AC Academic Core Spaces	0	0	0	
E-SE Special Education Spaces	0	0	0	
E-AD Administrative Spaces	0	0	0	
E-MC Media Center Spaces	0	0	0	
E-VA Visual Arts Spaces	0	0	0	
E-MU Music Spaces	0	0	0	
E-PE Physical Education Spaces	0	0	0	
E-SD Student Dining Spaces	0	0	0	
E-FS Food Service Spaces	0	0	0	
E-CU Custodial Spaces	0	0	0	
E-BS Building Services	0	0	0	
Facility Total	**0**	**0**	**0**	
Construction Factor (10% x facility total)	0.10	na	na	
Gross Square Feet (GSF) Developed	**0**	**0**	**0**	See Note 1
Minus exst. co-funded Oversize Area from Master Plan		0	-	See Note 2
Adjusted Existing Area		0	-	
Total Adjusted GSF Developed (without Oversize Area)			**0**	
Difference of GSF developed from GSF allowable			**0**	

Worksheet Summary Notes

Number	Notes:
	Existing Gross Square Feet taken from master facility plan.
	Oversize Area also taken from master facility plan.
*	The Existing SF column is used in projects where there are to be building additions or renovations.

Sample School District, SAMPLE ELEMENTARY SCHOOL

ACADEMIC CORE SPACES

The following school size examples illustrate the suggested instructional and support spaces. The examples are intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	400 Students			550 Students			700 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-AC-1 Pre-Kindergarten Classroom	1	1200	1200	2	1200	2400	2	1200	2400	
E-AC-1 Kindergarten Classroom	1	1200	1200	2	1200	2400	2	1200	2400	
E-AC-2 Pre-Kindergarten Restroom	1	60	60	2	60	120	2	60	120	
E-AC-2 Kindergarten Restroom	1	60	60	2	60	120	2	60	120	
E-AC-3 Elementary Classroom	14	900	12600	18	900	16,200	24	900	21,600	
E-AC-4 Science/Computer Lab	1	1000	1000	1	1000	1000	1	1000	1,000	
E-AC-5 Teacher Prep Area/Workroom	1	300	300	1	300	300	2	300	600	
E-AC-6 Individual Restroom	1	60	60	1	60	60	2	60	120	
E-AC-7 Instructional Material Storage	1	200	200	2	200	400	2	200	400	
E-AC-8 Small Group Room	***0***	***150***	***0***	***3***	***167***	***500***	***2***	***150***	***300***	***See Note 1***
E-AC-9 Multi-use Studio	***0***	***1,500***	***0***	***0***	***1,500***	***0***	***0***	***1,500***	***0***	***See Note 1***
E-AC-10 Kinesthetic Learning Studio	***0***	***1,200***	***0***	***0***	***1,200***	***0***	***0***	***1,200***	***0***	***See Note 1***
Academic Core Total			***16,680***			***23,500***			***29,060***	

EXAMPLE	1000 Students			1500 Students			2000 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-AC-1 Pre-Kindergarten Classroom	4	1200	4800	6	1200	7200	6	1200	7200	
E-AC-1 Kindergarten Classroom	6	1200	7200	9	1200	10800	12	1200	14400	
E-AC-2 Pre-Kindergarten Restroom	4	60	240	6	60	360	6	60	360	
E-AC-2 Kindergarten Restroom	6	60	360	9	60	540	12	60	720	
E-AC-3 Elementary Classroom	30	900	27000	45	900	40,500	62	900	55,800	
E-AC-4 Science/Computer Lab	1	1000	1000	1	1000	1000	1	1000	1,000	
E-AC-5 Teacher Prep Area/Workroom	3	300	900	4	300	1,200	5	300	1,500	
E-AC-6 Individual Restroom	3	60	180	4	60	240	5	60	300	
E-AC-7 Instructional Material Storage	3	200	600	4	200	800	5	200	1,000	
E-AC-8 Small Group Room	***0***	***150***	***0***	***0***	***150***	***0***	***0***	***150***	***0***	***See Note 1***
E-AC-9 Multi-use Studio	***0***	***1,500***	***0***	***0***	***1,500***	***0***	***0***	***1,500***	***0***	***See Note 1***
E-AC-10 Kinesthetic Learning Studio	***0***	***1,500***	***0***	***0***	***1,700***	***0***	***0***	***2,000***	***0***	***See Note 1***
Academic Core Total			***42,280***			***62,640***			***82,280***	

Academic Core Worksheet

Space	New SF			Existing SF			TOTAL SF			
	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-AC-1 Pre-Kindergarten Classroom	0	1200	0	0	0	0	0	varies	0	
E-AC-1 Kindergarten Classroom	0	1200	0	0	0	0	0	varies	0	
E-AC-2 Pre-Kindergarten Restroom	0	60	0	0	0	0	0	varies	0	
E-AC-2 Kindergarten Restroom	0	60	0	0	0	0	0	varies	0	
E-AC-3 Elementary Classroom	0	900	0	0	0	0	0	varies	0	
E-AC-4 Science/Computer Lab	0	1,000	0	0	0	0	0	varies	0	
E-AC-5 Teacher Prep Area/Workroom	0	300	0	0	0	0	0	varies	0	
E-AC-6 Individual Restroom	0	60	0	0	0	0	0	varies	0	
E-AC-7 Instructional Material Storage	0	200	0	0	0	0	0	varies	0	
E-AC-8 Small Group Room	0	***150***	***0***	0	0	***0***	0	varies	0	***See Note 1***
E-AC-9 Multi-use Studio	0	***1,500***	***0***	0	0	***0***	0	varies	0	***See Note 1***
E-AC-10 Kinesthetic Learning Studio	0	***1,200***	***0***	0	0	***0***	0	varies	0	***See Note 1***
Academic Core Total			***0***			***0***			***0***	

Academic Core Notes	
Number	*Notes:*
1	*Spaces E-AC-8, E-AC-9, E-AC-10 are provided to encourage the development of student centered learning environments as found in Section 1020. Minimum sizes are E-AC-8=150 SF, E-AC-9=1500, E-AC-10=1200 SF.*

The following school size examples illustrate the suggested instructional and support spaces.
The examples are intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE		400 Students			550 Students			700 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-SE-1	Self-contained Classroom	1	900	900	1	900	900	1	900	900	See Note 1
E-SE-2	Workroom/Conference	1	150	150	1	150	150	2	150	300	See Note 2
E-SE-3	Restroom/Shower	1	100	100	1	100	100	2	100	200	
E-SE-4	Special Education/Resource	0	900	0	0	900	0	1	900	900	See Note 3
E-SE-5	Small Self-contained Classroom	0	600	0	1	600	600	0	600	0	
Special Education Total				**1,150**			**1,750**			**2,300**	

EXAMPLE		1000 Students			1500 Students			2000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-SE-1	Self-contained Classroom	2	900	1,800	3	900	2,700	3	900	2,700	See Note 1
E-SE-2	Workroom/Conference	2	150	300	2	150	300	3	150	450	See Note 2
E-SE-3	Restroom/Shower	1	100	100	1	100	100	2	100	200	
E-SE-4	Special Education/Resource	1	900	900	2	900	1,800	3	900	2,700	See Note 3
E-SE-5	Small Self-contained Classroom	0	600	0	0	600	0	1	600	600	
Special Education Total				**3,100**			**4,900**			**6,650**	

Special Education Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-SE-1	Self-contained Classroom	0	900	0	0	0	0	0	varies	0	See Note 1
E-SE-2	Workroom/Conference	0	150	0	0	0	0	0	varies	0	See Note 2
E-SE-3	Restroom/Shower	0	100	0	0	0	0	0	varies	0	
E-SE-4	Special Education/Resource	0	900	0	0	0	0	0	varies	0	See Note 3
E-SE-5	Small Self-contained Classroom	0	600	0	0	0	0	0	varies	0	
Special Education Total				**0**			**0**			**0**	

Special Education Notes	
Number	**Notes:**
	Self-contained classroom(s) could 'house' various special education programs including, but not limited to, cognitive disability, emotional disturbance, multiple disabilities, etc.
	Workroom/Conference could 'house' orthopedic impairment, autism, speech therapy, occupational therapy, and physical therapy.
	Special Education/Resource could 'house' cognitive disability, hearing impairment, visual impairment, emotional disturbance, orthopedic impairment, autistic, traumatic, brain injury, learning disability, deaf/blindness, etc. See Chapter 1, Section 1110 for more information.
	For student capacities above 2,000 students, areas remain the same or increase proportioinally as indicated in the examples.

Sample School District, SAMPLE ELEMENTARY SCHOOL

ADMINISTRATIVE SPACES

E-AD

The following school size examples illustrate the suggested instructional and support spaces. The examples are intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE		400 Students			550 Students			700 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-AD-1	Reception Area	1	239	239	1	345	345	1	377	377	See Note 1
E-AD-2	Secretarial Area	1	239	239	1	344	344	1	377	377	See Note 2
E-AD-3	Principal's Office	1	150	150	1	150	150	1	150	150	
E-AD-4	Assistant Principal's Office	0	120	0	0	120	0	1	120	120	
E-AD-5	Conference Room	1	250	250	1	250	250	2	250	500	
E-AD-6	Mail/Work/Copy Room	1	200	200	1	250	250	1	300	300	See Note 3
E-AD-7	Administrative Storage	1	150	150	1	150	150	1	150	150	
E-AD-8	Vault/Records Storage	1	85	85	1	100	100	1	115	115	See Note 4
E-AD-9	In-school Suspension	1	225	225	1	250	250	1	300	300	See Note 5
E-AD-10	Restroom	1	60	60	1	60	60	1	60	60	
E-AD-11	Guidance Counselor's Offic	1	100	100	1	100	100	2	100	200	
E-AD-12	Guidance Records/Storage	1	55	55	1	100	100	1	100	100	
E-AD-13	Parent/Volunteer Room	0	200	0	0	200	0	1	200	200	
E-AD-14	Health Clinic (incl. RR)	1	300	300	1	350	350	1	450	450	See Note 6
E-AD-15	Itinerant Personnel Office	1	120	120	1	120	120	1	120	120	
Administrative Total				**2,173**			**2,569**			**3,519**	

EXAMPLE		1000 Students			1500 Students			2000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-AD-1	Reception Area	2	200	400	2	300	600	2	350	700	See Note 1
E-AD-2	Secretarial Area	2	200	400	2	300	600	2	350	700	See Note 2
E-AD-3	Principal's Office	1	150	150	1	150	150	1	150	150	
E-AD-4	Assistant Principal's Office	1	120	120	2	120	240	3	120	360	
E-AD-5	Conference Room	1	250	250	2	250	500	2	250	500	
E-AD-6	Mail/Work/Copy Room	1	400	400	2	300	600	2	300	600	See Note 3
E-AD-7	Administrative Storage	2	100	200	2	150	300	2	150	300	
E-AD-8	Vault/Records Storage	1	80	80	1	80	80	1	100	100	See Note 4
E-AD-9	In-school Suspension	1	400	400	1	500	500	1	600	600	See Note 5
E-AD-10	Restroom	1	60	60	2	60	120	2	60	120	
E-AD-11	Guidance Counselor's Offic	3	120	360	5	120	600	6	120	720	
E-AD-12	Guidance Records/Storage	1	75	75	1	100	100	1	150	150	
E-AD-13	Parent/Volunteer Room	1	200	200	1	300	300	1	300	300	
E-AD-14	Health Clinic (incl. RR)	1	400	400	1	600	600	1	800	800	See Note 6
E-AD-15	Itinerant Personnel Office	1	120	120	2	120	240	2	120	240	
Administrative Total				**3,615**			**5,530**			**6,340**	

Square Footage Allowance Notes						
Student Enrollment	**1**	**2**	**3**	**4**	**5**	**6**
350-400 Students	200	200	200	50	225	300
401-550 Students	300	300	250	65	250	350
551-700 Students	400	400	300	80	300	450
701-1000 Students	200	200	400	80	400	400
1001-1500 Students	300	300	300	80	500	600
1501-2000 Students	350	350	300	100	600	800
Enrollment Determines SF Allowed						

Administrative Worksheet

Space		New SF Qty	New SF SF	New SF Area	Existing SF Qty	Existing SF SF	Existing SF Area	TOTAL SF Qty	TOTAL SF SF	TOTAL SF Area	
E-AD-1	Reception Area	0	200	0	0	0	0	0	varies	0	See Note 1
E-AD-2	Secretarial Area	0	200	0	0	0	0	0	varies	0	See Note 2
E-AD-3	Principal's Office	0	150	0	0	0	0	0	varies	0	
E-AD-4	Assistant Principal's Office	0	120	0	0	0	0	0	varies	0	
E-AD-5	Conference Room	0	250	0	0	0	0	0	varies	0	
E-AD-6	Mail/Work/Copy Room	0	200	0	0	0	0	0	varies	0	See Note 3
E-AD-7	Administrative Storage	0	150	0	0	0	0	0	varies	0	
E-AD-8	Vault/Records Storage	0	50	0	0	0	0	0	varies	0	See Note 4
E-AD-9	In-school Suspension	0	225	0	0	0	0	0	varies	0	See Note 5
E-AD-10	Restroom	0	60	0	0	0	0	0	varies	0	
E-AD-11	Guidance Counselor's Offic	0	120	0	0	0	0	0	varies	0	
E-AD-12	Guidance Records/Storage	0	100	0	0	0	0	0	varies	0	
E-AD-13	Parent/Volunteer Room	0	200	0	0	0	0	0	varies	0	
E-AD-14	Health Clinic (incl. RR)	0	300	0	0	0	0	0	varies	0	See Note 6
E-AD-15	Itinerant Personnel Office	0	120	0	0	0	0	0	varies	0	
Administrative Total				**0**			**0**			**0**	

Square Footage Allowance Notes						
Student Enrollment	**1**	**2**	**3**	**4**	**5**	**6**
350-400 Students	200	200	200	50	225	300
401-550 Students	300	300	250	65	250	350
551-700 Students	400	400	300	80	300	450
701-1000 Students	200	200	400	80	400	400
1001-1500 Students	300	300	300	80	500	600
1501-2000 Students	350	350	300	100	600	800
Enrollment Determines SF Allowed						

Sample School District, SAMPLE ELEMENTARY SCHOOL

MEDIA CENTER SPACES

E-MC

The following school size examples illustrate the suggested instructional and support spaces. The examples are intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	400 Students			550 Students			700 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-MC-1 Reading Room/Circulation	1	1,200	1,200	1	1,650	1,650	1	2,100	2,100	See Note 1
E-MC-2 Media Specialist Office	1	120	120	1	120	120	1	120	120	
E-MC-3 Workroom/Storage	1	190	190	1	250	250	1	340	340	See Note 2
E-MC-4 Main Control/Equipment Rm	1	300	300	1	300	300	1	300	300	
E-MC-5 Conference Room	0	200	0	1	200	200	2	200	400	
Media Center Total			**1,810**			**2,520**			**3,260**	

EXAMPLE	1000 Students			1500 Students			2000 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-MC-1 Reading Room/Circulation	1	3,000	3,000	1	4,500	4,500	1	6,000	6,000	See Note 1
E-MC-2 Media Specialist Office	1	120	120	1	120	120	1	120	120	
E-MC-3 Workroom/Storage	1	350	350	1	400	400	1	400	400	See Note 2
E-MC-4 Main Control/Equipment Rm	1	300	300	1	300	300	1	300	300	
E-MC-5 Conference Room	1	200	200	2	200	400	2	200	400	
Media Center Total			**3,970**			**5,720**			**7,220**	

Media Center Worksheet

Space	New SF			Existing SF			TOTAL SF			
	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-MC-1 Reading Room/Circulation	0	0	0	0	0	0	0	varies	0	See Note 1
E-MC-2 Media Specialist Office	0	120	0	0	0	0	0	varies	0	
E-MC-3 Workroom/Storage	0	190	0	0	0	0	0	varies	0	See Note 2
E-MC-4 Main Control/Equipment Rm	0	300	0	0	0	0	0	varies	0	
E-MC-5 Conference Room	0	200	0	0	0	0	0	varies	0	
Media Center Total			**0**			**0**			**0**	

Media Center Notes	
Number	**Notes:**
1	The size of the Reading Room/Circulation space is equal to 10% of the student enrollment multiplied by 30 SF per student.

Square Footage Allowance Notes	
Student Enrollment	**2**
350-400 Students	190
401-550 Students	250
551-700 Students	340
701-1000 Students	350
1001-1500 Students	400
1501-2000 Students	400
Enrollment Determines SF Allowed	

The following school size examples illustrate the suggested instructional and support spaces
The examples are intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE	400 Students			550 Students			700 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-VA-1 Art Room	1	1,200	1,200	1	1,200	1,200	2	1,200	2,400	
E-VA-2 Kiln/Ceramic Storage	1	100	100	1	100	100	1	100	100	
E-VA-3 Art Material Storage	1	100	100	1	125	125	1	150	150	See Note 1
Visual Arts Total			**1,400**			**1,425**			**2,650**	

EXAMPLE	1000 Students			1500 Students			2000 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-VA-1 Art Room	2	1,200	2,400	3	1,200	3,600	4	1,200	4,800	
E-VA-2 Kiln/Ceramic Storage	2	100	200	2	100	200	2	100	200	
E-VA-3 Art Material Storage	2	150	300	3	150	450	4	150	600	See Note 1
Visual Arts Total			**2,900**			**4,250**			**5,600**	

Visual Art Worksheet

	New SF			Existing SF			TOTAL SF			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-VA-1 Art Room	0	1,200	0	0	0	0	0	varies	0	
E-VA-2 Kiln/Ceramic Storage	0	100	0	0	0	0	0	varies	0	
E-VA-3 Art Material Storage	0	100	0	0	0	0	0	varies	0	See Note 1
Visual Arts Total			**0**			**0**			**0**	

Square Footage Allowance Notes	
Student Enrollment	1
350-400 Students	100
401-550 Students	125
551-700 Students	150
701-1000 Students	150
1001-1500 Students	150
1501-2000 Students	150
Enrollment Determines SF Allowed	

Sample School District, SAMPLE ELEMENTARY SCHOOL

MUSIC SPACES

E-MU

The following school size examples illustrate the suggested instructional and support spaces. The examples are intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE		400 Students			550 Students			700 Students		
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
E-MU-1	Music Room	1	1,200	1,200	1	1,200	1,200	1	1,200	1,200
E-MU-2	Music Storage	0	100	0	0	100	0	0	100	0
Music Total				**1,200**			**1,200**			**1,200**

EXAMPLE		1000 Students			1500 Students			2000 Students		
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
E-MU-1	Music Room	1	1,200	1,200	2	1,200	2,400	3	1,200	3,600
E-MU-2	Music Storage	2	100	200	2	100	200	3	100	300
Music Total				**1,400**			**2,600**			**3,900**

Music Worksheet										
		New SF			Existing SF			TOTAL SF		
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
E-MU-1	Music Room	0	1,200	0	0	0	0	0 varies		0
E-MU-2	Music Storage	0	***100***	0	0	0	0	0 varies		0
Music Total				**0**			**0**			**0**

The following school size examples illustrate the suggested instructional and support spaces.
The examples are intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	400 Students			550 Students			700 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-PE-1 Gymnasium	1	3,500	3,500	1	***4,000***	4,000	1	***4,700***	4,700	See Note 1
E-PE-2 P. E. Workroom/Storage	1	200	200	1	300	300	1	400	400	See Note 2
Physical Education Total			**3,700**			**4,300**			**5,100**	

EXAMPLE	1000 Students			1500 Students			2000 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-PE-1 Gymnasium	1	6,000	6,000	1	7,000	7,000	2	5,000	10,000	See Note 1
E-PE-2 P. E. Workroom/Storage	1	500	500	1	600	600	2	400	800	See Note 2
Physical Education Total			**6,500**			**7,600**			**10,800**	

Physical Education Worksheet

	New SF			Existing SF			TOTAL SF			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-PE-1 Gymnasium	0	***3,500***	0	0	0	0	0	varies	0	See Note 1
E-PE-2 P. E. Workroom/Storage	0	200	0	0	0	0	0	varies	0	See Note 2
Physical Education Total			**0**			**0**			**0**	

Square Footage Allowance Notes		
Student Enrollment	**1**	**2**
350-400 Students	3500	200
401-550 Students	***4000***	300
551-700 Students	***4700***	400
701-1000 Students	6000	500
1001-1500 Students	7000	600
1501-2000 Students	5000	400
Enrollment Determines SF Allowed		

Sample School District, SAMPLE ELEMENTARY SCHOOL

STUDENT DINING SPACES

E-SD

The following school size examples illustrate the suggested instructional and support spaces
The examples are intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE		400 Students			550 Students			700 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-SD-1	Student Dining	1	3,000	3,000	1	3,000	3,000	1	3,500	3,500	See Note 1
E-SD-2	Stage	1	900	900	1	1,100	1,100	1	1,400	1,400	
E-SD-3	Staff Dining	0	200	0	0	250	0	0	300	0	See Note 2
E-SD-4	Table Storage	1	200	200	1	250	250	1	300	300	See Note 3
E-SD-5	Family Restroom	1	80	80	1	80	80	1	80	80	
Student Dining Total				**4,180**			**4,430**			**5,280**	

EXAMPLE		1000 Students			1500 Students			2000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-SD-1	Student Dining	1	5,000	5,000	1	7,500	7,500	1	10,000	10,000	See Note 1
E-SD-2	Stage	1	1,200	1,200	1	1,500	1,500	1	1,750	1,750	
E-SD-3	Staff Dining	1	300	300	1	300	300	1	400	400	See Note 2
E-SD-4	Table Storage	2	200	400	2	300	600	2	300	600	See Note 3
E-SD-5	Family Restroom	1	80	80	1	80	80	1	80	80	
Student Dining Total				**6,980**			**9,980**			**12,830**	

Student Dining Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-SD-1	Student Dining	0	3,000	0	0	0	0	0	varies	0	See Note 1
E-SD-2	Stage	0	900	0	0	0	0	0	varies	0	
E-SD-3	Staff Dining	0	200	0	0	0	0	0	varies	0	See Note 2
E-SD-4	Table Storage	0	200	0	0	0	0	0	varies	0	See Note 3
E-SD-5	Family Restroom	0	80	0	0	0	0	0	varies	0	
Student Dining Total				**0**			**0**			**0**	

Student Dining Notes	
Number	**Notes:**
1	The size of the Student Dining space is equal to one-third of the student enrollment multiplied by 15 SF per student or 3,000 SF, whichever is greater.

Square Footage Allowance Notes		
Student Enrollment	**2**	**3**
350-400 Students	200	200
401-550 Students	250	250
551-700 Students	300	300
701-1000 Students	300	200
1001-1500 Students	300	300
1501-2000 Students	400	300
Enrollment Determines SF Allowed		

The following school size examples illustrate the suggested instructional and support spaces
The examples are intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE		400 Students			550 Students			700 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-FS-0	Warming Kitchen	0	800	0	0	1,100	0	0	1,400	0	See Note 1
E-FS-1	Kitchen (total)	1		1,400	1		1,925	1		2,450	See Note 1 & 2
E-FS-1a	Preparation Area		504			693			882		See Kitchend Area Notes
E-FS-1b	Serving Area		476			655			833		See Kitchend Area Notes
E-FS-1c	Dry Food Storage		154			212			270		See Kitchend Area Notes
E-FS-1d	Cooler/Freezer		140			193			245		See Kitchend Area Notes
E-FS-1e	Ware Washing		126			173			221		See Kitchend Area Notes
E-FS-2	Dietician Office	1	75	75	1	75	75	1	75	75	
E-FS-3	Restroom/Locker Rm	1	140	140	1	140	140	1	140	140	
Food Service Total				**1,615**			**2,140**			**2,665**	

EXAMPLE		1000 Students			1500 Students			2000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-FS-0	Warming Kitchen	0	0	0	0	0	0	0	0	0	See Note 1
E-FS-1	Kitchen (total)	1		3,500	1		5,250	1		7,000	See Note 1 & 2
E-FS-1a	Preparation Area		1,260			1,890			2,520		See Kitchen Area Notes
E-FS-1b	Serving Area		1,190			1,785			2,380		See Kitchen Area Notes
E-FS-1c	Dry Food Storage		385			578			770		See Kitchen Area Notes
E-FS-1d	Cooler/Freezer		350			525			700		See Kitchen Area Notes
E-FS-1e	Ware Washing		315			473			630		See Kitchen Area Notes
E-FS-2	Dietician Office	1	75	75	1	75	75	1	75	75	
E-FS-3	Restroom/Locker Rm	2	140	280	2	140	280	2	140	280	
Food Service Total				**3,855**			**5,605**			**7,355**	

Food Service Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-FS-0	Warming Kitchen	0	0	0	0	0	0	0	varies	0	See Note 1
E-FS-1	Kitchen (total)	0		0	0		0	0		0	See Note 1 & 2
E-FS-1a	Preparation Area		0			0			varies		See Kitchen Area Notes
E-FS-1b	Serving Area		0			0			varies		See Kitchen Area Notes
E-FS-1c	Dry Food Storage		0			0			varies		See Kitchen Area Notes
E-FS-1d	Cooler/Freezer		0			0			varies		See Kitchen Area Notes
E-FS-1e	Ware Washing		0			0			varies		See Kitchen Area Notes
E-FS-2	Dietician Office	0	75	0	0	0	0	0	varies	0	
E-FS-3	Restroom/Locker Rm	0	140	0	0	0	0	0	varies	0	
Food Service Total				**0**			**0**			**0**	

Food Service Notes	
Number	**Notes:**
	Only one of the two Kitchens is to be used - either E-FS-0 or E-FS-1 - not both.
	The size of the kitchen is equal to the sum of preparation area, serving area, dry food storage area, cooler/freezer area, and ware washing area.

Kitchen Area Sizes					
Food Service Area	**Enroll**	**X**	**SF/Student**	**x**	**%**
Preparation Area	Enroll	x	3.5	x	36%
Serving Areas	Enroll	x	3.5	x	34%
Dry Food Storage	Enroll	x	3.5	x	11%
Cooler/	Enroll	x	3.5	x	10%
Ware Washing Area	Enroll	x	3.5	x	9%
Warming Kitchen	Enroll	x	2.0		
Multiply Enrollment x SF/Student x % to achieve size of area					

Sample School District, SAMPLE ELEMENTARY SCHOOL

CUSTODIAL SPACES

E-CU

The following school size examples illustrate the suggested instructional and support spaces
The examples are intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE		400 Students			550 Students			700 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-CU-1	Workroom	1	200	200	1	300	300	1	400	400	See Note 1
E-CU-2	Custodial Office	1	100	100	1	100	100	1	100	100	
Custodial Total				**300**			**400**			**500**	

EXAMPLE		1000 Students			1500 Students			2000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-CU-1	Workroom	2	300	600	2	400	800	2	400	800	See Note 1
E-CU-2	Custodial Office	1	100	100	1	100	100	1	100	100	
Custodial Total				**700**			**900**			**900**	

Custodial Worksheet											
		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-CU-1	Workroom	0	200	0	0	0	0	0	varies	0	See Note 1
E-CU-2	Custodial Office	0	100	0	0	0	0	0	varies	0	
Custodial Total				**0**			**0**			**0**	

Square Footage Allowance Notes	
Student Enrollment	**1**
350-400 Students	200
401-550 Students	300
551-700 Students	400
701-1000 Students	300
1001-1500 Students	400
1501-2000 Students	400
Enrollment Determines SF Allowed	

The following school size examples illustrate the suggested instructional and support spaces.
The examples are intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE	400 Students			550 Students			700 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-BS-1 Large Group Restrooms	-	1,197	1,197	-	1,548	1,548	-	1,944	1,944	See Build Svc Sizes
E-BS-2 Custodial Closet	2	50	100	2	50	100	3	50	150	
E-BS-3 Electrical Closet	2	50	100	2	50	100	3	50	150	
E-BS-4 Telecommunications Room (TR)	2	64	128	2	64	128	2	64	128	See Note 1
E-BS-5 Corridors	-	6,842	6,842	-	8,847	8,847	-	11,107	11,107	See Build Svc Sizes
Vertical Circulation	-	0	0	-	0	0	-	0	0	See Note 2
E-BS-6 Mechanical/Electrical Space/Decks	-	2,360	2,360	-	3,052	3,052	-	3,832	3,832	See Build Svc Sizes
E-BS-7 Storage Area	1	150	150	1	200	200	1	250	250	See SF Allowance
E-BS-8 Central Storage Area	1	***170***	170	1	***235***	235	1	***240***	240	See SF Allowance
E-BS-9 Loading/Receiving Area	1	120	120	1	120	120	1	120	120	
E-BS-10 Restroom	0	60	0	0	60	0	0	60	0	
E-BS-11 Recycling Room	***1***	***80***	***80***	***1***	***90***	***90***	***1***	***110***	***110***	***See SF Allowance***
Building Services Total			**11,247**			**14,420**			**18,030**	

EXAMPLE	1000 Students			1500 Students			2000 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-BS-1 Large Group Restrooms	-	2,636	2,636	-	3,840	3,840	-	5,036	5,036	See Build Svc Sizes
E-BS-2 Custodial Closet	2	50	100	3	50	150	4	50	200	
E-BS-3 Electrical Closet	2	50	100	3	50	150	4	50	200	
E-BS-4 Telecommunications Room (TR)	2	64	128	3	64	192	4	64	256	See Note 1
E-BS-5 Corridors	-	15,060	15,060	-	21,945	21,945	-	28,775	28,775	See Build Svc Sizes
Vertical Circulation	-	0	0	-	0	0	-	0	0	See Note 2
E-BS-6 Mechanical/Electrical Space/Decks	-	5,196	5,196	-	7,571	7,571	-	9,927	9,927	See Build Svc Sizes
E-BS-7 Storage Area	1	250	250	1	250	250	1	350	350	See SF Allowance
E-BS-8 Central Storage Area	1	***240***	240	1	***360***	360	1	***540***	540	See SF Allowance
E-BS-9 Loading/Receiving Area	1	120	120	1	120	120	1	120	120	
E-BS-10 Restroom	0	60	0	0	60	0	0	60	0	
E-BS-11 Recycling Room	***1***	***110***	***110***	***1***	***140***	***140***	***1***	***160***	***160***	***See SF Allowance***
Building Services Total			**23,939**			**34,718**			**45,564**	

Building Services Notes	
Number	**Notes:**
	Size of Telecommunications Room varies with size of elementary school. See page 4111***4***.
	Vertical Circulation refers only to the following: Stairways/stairtowers, monumental stairs, elevators and elevator equipment room.

Building Services Area Sizes			
Building Services Areas	**Prog**	**X**	**%**
Large Group Restrooms	Prog	x	3.5
Corridors	Prog	x	20.0
Mechanical/Electrical Space/Decks	Prog	x	6.9
Multiply Sum of Program Areas - Building Services x % to achieve size of area			

Square Footage Allowance Notes			
Student Enrollment	**Stor**	**Ctl Stor**	**Recyle**
350-400 Students	150	***170***	***80***
401-550 Students	200	***235***	***90***
551-700 Students	250	***240***	***110***
701-1000 Students	250	***240***	***110***
1001-1500 Students	250	***360***	***140***
1501-2000 Students	350	***540***	***160***
Enrollment Determines SF Allowed			

Sample School District, SAMPLE ELEMENTARY SCHOOL

BUILDING SERVICES SPACES

S CHAPTER 2: BRACKETING

Building Services Worksheet

Space	New SF Qty	New SF SF	New SF Area	Existing SF Qty	Existing SF SF	Existing SF Area	TOTAL SF Qty	TOTAL SF SF	TOTAL SF Area	
E-BS-1 Large Group Restrooms	-	0	0	-	0	0	-	varies	0	See Build Svc Sizes
E-BS-2 Custodial Closet	0	50	0	0	0	0	0	varies	0	
E-BS-3 Electrical Closet	0	50	0	0	0	0	0	varies	0	
E-BS-4 Telecommunications Room (TR)	0	64	0	0	0	0	0	varies	0	See Note 1
E-BS-5 Corridors	-	0	0	-	0	0	-	varies	0	See Build Svc Sizes
Vertical Circulation	-	0	0	-	0	0	-	varies	0	See Note 2
E-BS-6 Mechanical/Electrical Space/Decks	-	0	0	-	0	0	-	varies	0	See Build Svc Sizes
E-BS-7 Storage Area	0	150	0	0	0	0	0	varies	0	See SF Allowance
E-BS-8 Central Storage Area	0	**170**	0	0	0	0	0	varies	0	See SF Allowance
E-BS-9 Loading/Receiving Area	0	120	0	0	0	0	0	varies	0	
E-BS-10 Restroom	0	60	0	0	0	0	0	varies	0	
E-BS-11 Recycling Room	***0***	**80**	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See SF Allowance***
Building Services Total			**0**			**0**			**0**	

Building Services Notes	
Number	**Notes:**
	Size of Telecommunications Room varies with size of elementary school. See page 4111-***4*** .
	Vertical Circulation refers only to the following: Stairways/stairtowers, monumental stairs, elevators and elevator equipment room.

Building Services Area Sizes			
Building Services Areas	**Prog**	**X**	**%**
Large Group Restrooms	Prog	x	3.5
Corridors	Prog	x	20.0
Mechanical/Electrical Space/Decks	Prog	x	6.9
Multiply Sum of Program Areas - Building Services x % to achieve size of area			

Square Footage Allowance Notes			
Student Enrollment	**Stor**	**Ctl Stor**	**Recyle**
350-400 Students	150	***170***	***80***
401-550 Students	200	***235***	***90***
551-700 Students	250	***240***	***110***
701-1000 Students	250	***240***	***110***
1001-1500 Students	250	***360***	***140***
1501-2000 Students	350	***540***	***160***
Enrollment Determines SF Allowed			

Sample School District, SAMPLE MIDDLE SCHOOL

SUMMARY OF SPACES

Previously, changes or additions made during the annual update of the Design Manual have been ***"bolded and italicized"*** for easy identification. Changes have been made to the formulas on this sheet which have not been bolded and italicized. The user is advised to carefully review all information.

EXAMPLES		450 Students	600 Students	750 Students	1000 Students	1500 Students	2000 Students
		SF	SF	SF	SF	SF	SF
Grade Configuration: 6-8							
Number of Students		450	600	750	1,000	1,500	2,000
Square Feet Per Student		151.00	142.88	141.00	140.37	127.83	119.45
Total Gross Square Feet Funded		**67,950**	**85,725**	**105,750**	**140,370**	**191,742**	**238,908**
	PROGRAM AREA						
M-AC	Academic Core Spaces	19,480	25,980	31,380	41,980	60,940	79,510
M-SE	Special Education Spaces	1,750	2,350	3,700	4,000	4,900	6,650
M-AD	Administrative Spaces	2,282	2,750	3,380	4,190	5,530	6,140
M-MC	Media Center Spaces	2,755	3,433	4,105	4,980	6,870	8,620
M-VA	Visual Arts Spaces	1,400	1,450	2,700	2,900	4,250	5,600
M-MU	Music Spaces	1,600	2,900	3,000	4,400	5,800	5,800
M-TE	Technology Education Spaces	1,450	1,450	2,750	4,050	4,200	5,600
M-FCS	Family and Consumer Science Space	0	1,200	1,200	1,200	2,400	2,400
M-PE	Physical Education Spaces	9,300	9,825	10,600	16,575	20,050	22,250
M-SD	Student Dining Spaces	4,150	4,300	5,812	7,180	9,980	12,830
M-FS	Food Service Spaces	1,790	2,315	2,840	3,855	5,605	7,355
M-CU	Custodial Spaces	300	400	500	700	900	900
M-BS	Building Services	14,960	18,876	23,304	30,449	41,315	51,577
Facility Total		**61,217**	**77,229**	**95,270**	**126,459**	**172,740**	**215,232**
Construction Factor		0.11	0.11	0.11	0.11	0.11	0.11
Gross Square Feet Developed		**67,951**	**85,725**	**105,750**	**140,370**	**191,742**	**238,908**

Worksheet Summary

Enter Grade Configuration:			
Enter Student Enrollment			
Square Feet Per Student from Page 2000-3			
Total Gross Square Feet Funded		**0**	
SELECT ONE ◉ Single or Two Story ○ 3 Stories or greater			
Vert. Cir. Area Allowance (3 Stories or greater)		**0**	
Total Adjusted POR Gross Square Footage		**0**	

Vertical Circulation (3 Stories or greater) refers only to stairways/stairtowers, monumental stairs, elevators and elevator equipment rooms.

	PROGRAM AREA	New SF	Exst. SF*	TOTAL SF	
M-AC	Academic Core Spaces	0	0	0	
M-SE	Special Education Spaces	0	0	0	
M-AD	Administrative Spaces	0	0	0	
M-MC	Media Center Spaces	0	0	0	
M-VA	Visual Arts Spaces	0	0	0	
M-MU	Music Spaces	0	0	0	
M-TE	Technology Education Spaces	0	0	0	
M-FCS	Family and Consumer Science Space	0	0	0	
M-PE	Physical Education Spaces	0	0	0	
M-SD	Student Dining Spaces	0	0	0	
M-FS	Food Service Spaces	0	0	0	
M-CU	Custodial Spaces	0	0	0	
M-BS	Building Services	0	0	0	
Facility Total		**0**	**0**	**0**	
Construction Factor (11% multiplied by the facility tot	a	0.11	na	na	
Gross Square Feet (GSF) Developed		**0**	**0**	**0**	See Note 1
Minus exst. co-funded Oversize Area from Maste			0	-	See Note 2
Adjusted Existing Area			0	-	
Total Adjusted GSF Developed (without Oversize Area)				**0**	
Difference of GSF developed from GSF allowable				**0**	

Worksheet Summary Notes	
Number	**Notes:**
	Existing Gross Square Feet taken from master facility plan.
	Oversize Area also taken from master facility plan.
*	The Existing SF column is used in projects where there are to be building additions or renovations.

Sample School District, SAMPLE MIDDLE SCHOOL

ACADEMIC CORE SPACES

M-AC

The following school size examples illustrate the suggested instructional and support spaces. The examples are intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	450 Students			600 Students			750 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-AC-1 Middle School Classroom	15	900	13,500	18	900	16,200	24	900	21,600	
M-AC-2 Project Laboratory	3	1,100	3,300	6	1,100	6,600	6	1,100	6,600	
M-AC-3 Sci/Tech/Eng/Math/Computer Lab	1	1,000	1,000	1	1,000	1,000	1	1,000	1,000	
M-AC-4 Teacher Prep Area/Workroom	3	300	900	3	300	900	3	300	900	
M-AC-5 Individual Restroom	3	60	180	3	60	180	3	60	180	
M-AC-6 Instructional Material Storage	3	200	600	3	200	600	3	200	600	
M-AC-7 Small Group Room	0	150	0	0	150	0	0	150	0	
M-AC-7a Small Group Room	0	150	0	3	167	500	3	167	500	See note 1
M-AC-8 Multi-use Studio	0	1,500	0	0	1,500	0	0	1,500	0	See note 1
M-AC-9 Kinesthetic Learning Studio	0	1,200	0	0	1,200	0	0	1,200	0	See note 1
Academic Core Total			***19,480***			***25,980***			***31,380***	

EXAMPLE	1000 Students			1500 Students			2000 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-AC-1 Middle School Classroom	36	900	32,400	54	900	48,600	72	900	64,800	
M-AC-2 Project Laboratory	6	1,100	6,600	8	1,100	8,800	9	1,100	9,900	
M-AC-3 Sci/Tech/Eng/Math/Computer Lab	1	1,000	1,000	1	1,000	1,000	1	1,000	1,000	
M-AC-4 Teacher Prep Area/Workroom	3	300	900	4	300	1,200	6	300	1,800	
M-AC-5 Individual Restroom	3	60	180	4	60	240	6	60	360	
M-AC-6 Instructional Material Storage	3	200	600	4	200	800	6	200	1,200	
M-AC-7 Small Group Room	2	150	300	2	150	300	3	150	450	
M-AC-7a Small Group Room	0	150	0	0	150	0	0	150	0	See note 1
M-AC-8 Multi-use Studio	0	1,500	0	0	1,500	0	0	1,500	0	See note 1
M-AC-9 Kinesthetic Learning Studio	0	1,500	0	0	1,700	0	0	2,000	0	See note 1
Academic Core Total			***41,980***			***60,940***			***79,510***	

Academic Core Worksheet

	New SF			Existing SF			TOTAL SF			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-AC-1 Middle School Classroom	0	900	0	0	0	0	0	varies	0	
M-AC-2 Project Laboratory	0	1,100	0	0	0	0	0	varies	0	
M-AC-3 Sci/Tech/Eng/Math/Computer Lab	0	1,000	0	0	0	0	0	varies	***0***	
M-AC-4 Teacher Prep Area/Workroom	0	300	0	0	0	0	0	varies	0	
M-AC-5 Individual Restroom	0	60	0	0	0	0	0	varies	0	
M-AC-6 Instructional Material Storage	0	200	0	0	0	0	0	varies	0	
M-AC-7 Small Group Room	0	150	0	0	0	0	0	varies	0	
M-AC-7a Small Group Room	0	150	0	0	0	0	0	varies	0	See note 1
M-AC-8 Multi-use Studio	0	1,500	0	0	0	0	0	varies	***0***	See note 1
M-AC-9 Kinesthetic Learning Studio	0	1,200	0	0	0	0	0	varies	***0***	See note 1
Academic Core Total			***0***			***0***			***0***	

Academic Core Notes	
Number	Notes:
1	Additional M-AC-7a and M-AC-8, M-AC-9 spaces are provided to encourage the development of student centered learning environments as found in Section 1020. Minimum sizes are M-AC-7a=150 SF, M-AC-8=1500 SF, M-AC-9=1200 SF. Use M-AC-7 space plate for M-AC-7a.

The following school size examples illustrate the suggested instructional and support spaces.
The examples are intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE		450 Students			600 Students			750 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-SE-1	Self-contained Classroom	1	900	900	1	900	900	2	900	1,800	See Note 1
M-SE-2	Workroom/Conference	1	150	150	1	150	150	2	150	300	See Note 2
M-SE-3	Restroom/Shower	1	100	100	1	100	100	1	100	100	
M-SE-4	Special Education/Resource	0	900	0	0	900	0	1	900	900	See Note 3
M-SE-5	Small Self-contained Classroom	1	600	600	2	600	1,200	1	600	600	
Special Education Total				**1,750**			**2,350**			***3,700***	

EXAMPLE		1000 Students			1500 Students			2000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-SE-1	Self-contained Classroom	3	900	2,700	3	900	2,700	3	900	2,700	See Note 1
M-SE-2	Workroom/Conference	2	150	300	2	150	300	3	150	450	See Note 2
M-SE-3	Restroom/Shower	1	100	100	1	100	100	2	100	200	
M-SE-4	Special Education/Resource	1	900	900	2	900	1,800	3	900	2,700	See Note 3
M-SE-5	Small Self-contained Classroom	0	600	0	0	600	0	1	600	600	
Special Education Total				**4,000**			**4,900**			***6,650***	

Special Education Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-SE-1	Self-contained Classroom	0	900	0	0	0	0	0	varies	0	See Note 1
M-SE-2	Workroom/Conference	0	150	0	0	0	0	0	varies	0	See Note 2
M-SE-3	Restroom/Shower	0	100	0	0	0	0	0	varies	0	
M-SE-4	Special Education/Resource	0	900	0	0	0	0	0	varies	0	See Note 3
M-SE-5	Small Self-contained Classroom	0	600	0	0	0	0	0	varies	0	
Special Education Total				**0**			**0**			**0**	

Special Education Notes

Number	Notes:
	Self-contained classroom(s) could 'house' various special education programs including, but not limited to, cognitive disability, emotional disturbance, multiple disabilities, etc.
	Workroom/Conference could 'house' orthopedic impairment, autism, speech therapy, occupational therapy, and physical therapy.
	Special Education/Resource could 'house' cognitive disability, hearing impairment, visual impairment, emotional disturbance, orthopedic impairment, autistic, traumatic, brain injury, learning disability, deaf/blindness, etc. See Chapter 1, Section 1110 for more information.
	For student capacities above 2,000 students, areas remain the same or increase proportioinally as indicated in the examples.

Sample School District, SAMPLE MIDDLE SCHOOL
ADMINISTRATIVE SPACES
M-AD

The following school size examples illustrate the suggested instructional and support spaces
The examples are intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE		450 Students			600 Students			750 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-AD-1	Reception Area	1	200	200	1	300	300	1	400	400	See Note 1
M-AD-2	Secretarial Area	1	200	200	1	300	300	1	400	400	See Note 2
M-AD-3	Principal's Office	1	150	150	1	150	150	1	150	150	
M-AD-4	Assistant Principal's Office	0	120	0	0	120	0	1	120	120	
M-AD-5	Conference Room	1	250	250	1	250	250	1	250	250	
M-AD-6	Mail/Work/Copy Room	1	200	200	1	250	250	1	300	300	See Note 3
M-AD-7	Administrative Storage	1	150	150	1	150	150	1	150	150	
M-AD-8	Vault/Records Storage	1	85	85	1	100	100	1	115	115	See Note 4
M-AD-9	In-school Suspension	1	200	200	1	250	250	1	325	325	See Note 5
M-AD-10	Restroom	1	60	60	1	60	60	1	60	60	
M-AD-11	Guidance Counselor's Office	1	120	120	1	120	120	2	120	240	
M-AD-12	Guidance Records/Storage	0	100	0	1	100	100	1	100	100	
M-AD-13	Parent/Volunteer Room	1	200	200	1	200	200	1	200	200	
M-AD-14	Health Clinic (incl. RR)	1	347	347	1	400	400	1	450	450	See Note 6
M-AD-15	Itinerant Personnel Office	1	120	120	1	120	120	1	120	120	
Administrative Total				**2,282**			**2,750**			**3,380**	

EXAMPLE		1000 Students			1500 Students			2000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-AD-1	Reception Area	1	450	450	2	300	600	2	350	700	See Note 1
M-AD-2	Secretarial Area	1	450	450	2	300	600	2	350	700	See Note 2
M-AD-3	Principal's Office	1	150	150	1	150	150	1	150	150	
M-AD-4	Assistant Principal's Office	2	120	240	2	120	240	3	120	360	
M-AD-5	Conference Room	1	250	250	2	250	500	2	250	500	
M-AD-6	Mail/Work/Copy Room	1	400	400	2	300	600	2	300	600	See Note 3
M-AD-7	Administrative Storage	1	200	200	2	150	300	2	150	300	
M-AD-8	Vault/Records Storage	1	80	80	1	80	80	1	100	100	See Note 4
M-AD-9	In-school Suspension	1	400	400	1	500	500	1	600	600	See Note 5
M-AD-10	Restroom	2	60	120	2	60	120	2	60	120	
M-AD-11	Guidance Counselor's Office	4	120	480	5	120	600	6	120	720	
M-AD-12	Guidance Records/Storage	1	100	100	1	100	100	1	150	150	
M-AD-13	Parent/Volunteer Room	1	250	250	1	300	300	1	300	300	
M-AD-14	Health Clinic (incl. RR)	1	500	500	1	600	600	1	600	600	See Note 6
M-AD-15	Itinerant Personnel Office	1	120	120	2	120	240	2	120	240	
Administrative Total				**4,190**			**5,530**			**6,140**	

Square Footage Allowance Notes						
Student Enrollment	**1**	**2**	**3**	**4**	**5**	**6**
350-450 Students	200	200	200	85	200	350
451-600 Students	300	300	250	100	250	400
601-750 Students	400	400	300	115	325	450
751-1000 Students	450	450	400	80	400	500
1001-1500 Students	300	300	300	80	500	600
1501-2000 Students	350	350	300	100	600	600
Enrollment Determines SF Allowed						

Administrative Worksheet

Space		New SF Qty	New SF SF	New SF Area	Existing SF Qty	Existing SF SF	Existing SF Area	TOTAL SF Qty	TOTAL SF SF	TOTAL SF Area	
M-AD-1	Reception Area	0	200	0	0	0	0	0	varies	0	See Note 1
M-AD-2	Secretarial Area	0	200	0	0	0	0	0	varies	0	See Note 2
M-AD-3	Principal's Office	0	150	0	0	0	0	0	varies	0	
M-AD-4	Assistant Principal's Office	0	120	0	0	0	0	0	varies	0	
M-AD-5	Conference Room	0	250	0	0	0	0	0	varies	0	
M-AD-6	Mail/Work/Copy Room	0	200	0	0	0	0	0	varies	0	See Note 3
M-AD-7	Administrative Storage	0	150	0	0	0	0	0	varies	0	
M-AD-8	Vault/Records Storage	0	80	0	0	0	0	0	varies	0	See Note 4
M-AD-9	In-school Suspension	0	200	0	0	0	0	0	varies	0	See Note 5
M-AD-10	Restroom	0	60	0	0	0	0	0	varies	0	
M-AD-11	Guidance Counselor's Office	0	120	0	0	0	0	0	varies	0	
M-AD-12	Guidance Records/Storage	0	100	0	0	0	0	0	varies	0	
M-AD-13	Parent/Volunteer Room	0	200	0	0	0	0	0	varies	0	
M-AD-14	Health Clinic (incl. RR)	0	350	0	0	0	0	0	varies	0	See Note 6
M-AD-15	Itinerant Personnel Office	0	120	0	0	0	0	0	varies	0	
Administrative Total				**0**			**0**			**0**	

Square Footage Allowance Notes						
Student Enrollment	**1**	**2**	**3**	**4**	**5**	**6**
350-450 Students	200	200	200	85	200	350
451-600 Students	300	300	250	100	250	400
601-750 Students	400	400	300	115	325	450
751-1000 Students	450	450	400	80	400	500
1001-1500 Students	300	300	300	80	500	600
1501-2000 Students	350	350	300	100	600	600
Enrollment Determines SF Allowed						

Sample School District, SAMPLE MIDDLE SCHOOL

MEDIA CENTER SPACES

M-MC

The following school size examples illustrate the suggested instructional and support spaces. The examples are intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE		450 Students			600 Students			750 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-MC-1	Reading Room/Circulation	1	1,575	1,575	1	2,100	2,100	1	2,625	2,625	See Note 1
M-MC-2	Media Specialist Office	1	120	120	1	120	120	1	120	120	
M-MC-3	Workroom/Storage	1	150	150	1	233	233	1	350	350	See Note 2
M-MC-4	Main Control/Equipment Rm	1	300	300	1	300	300	1	300	300	
M-MC-5	Conference Room	1	210	210	1	280	280	1	310	310	See Note 3
M-MC-6	Multimedia Production Room	1	400	400	1	400	400	1	400	400	
Media Center Total				**2,755**			**3,433**			**4,105**	

EXAMPLE		1000 Students			1500 Students			2000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-MC-1	Reading Room/Circulation	1	3,500	3,500	1	5,250	5,250	1	7,000	7,000	See Note 1
M-MC-2	Media Specialist Office	1	120	120	1	120	120	1	120	120	
M-MC-3	Workroom/Storage	1	350	350	1	400	400	1	400	400	See Note 2
M-MC-4	Main Control/Equipment Rm	1	300	300	1	300	300	1	300	300	
M-MC-5	Conference Room	1	310	310	2	200	400	2	200	400	See Note 3
M-MC-6	Multimedia Production Room	1	400	400	1	400	400	1	400	400	
Media Center Total				**4,980**			**6,870**			**8,620**	

Media Center Worksheet

Space		New SF			Existing SF			TOTAL SF			
		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-MC-1	Reading Room/Circulation	0	0	0	0	0	0	0	varies	0	See Note 1
M-MC-2	Media Specialist Office	0	120	0	0	0	0	0	varies	0	
M-MC-3	Workroom/Storage	0	150	0	0	0	0	0	varies	0	See Note 2
M-MC-4	Main Control/Equipment Rm	0	300	0	0	0	0	0	varies	0	
M-MC-5	Conference Room	0	210	0	0	0	0	0	varies	0	See Note 3
M-MC-6	Multimedia Production Room	0	400	0	0	0	0	0	varies	0	
Media Center Total				**0**			**0**			**0**	

Media Center Notes	
Number	**Notes:**
1	The size of the Reading Room/Circulation space is equal to 10% of the student enrollment multiplied by 35 SF per student.

Square Footage Allowance Notes		
Student Enrollment	**2**	**3**
350-450 Students	150	210
451-600 Students	233	280
601-750 Students	350	310
751-1000 Students	350	310
1001-1500 Students	400	200
1501-2000 Students	400	200
Enrollment Determines SF Allowed		

The following school size examples illustrate the suggested instructional and support spaces.
The examples are intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE		450 Students			600 Students			750 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-VA-1	Art Room	1	1,200	1,200	1	1,200	1,200	2	1,200	2,400	
M-VA-2	Kiln/Ceramic Storage	1	100	100	1	100	100	1	100	100	
M-VA-3	Art Material Storage	1	100	100	1	150	150	1	200	200	See Note 1
Visual Arts Total				**1,400**			**1,450**			**2,700**	

EXAMPLE		1000 Students			1500 Students			2000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-VA-1	Art Room	2	1,200	2,400	3	1,200	3,600	4	1,200	4,800	
M-VA-2	Kiln/Ceramic Storage	2	100	200	2	100	200	2	100	200	
M-VA-3	Art Material Storage	2	150	300	3	150	450	4	150	600	See Note 1
Visual Arts Total				**2,900**			**4,250**			**5,600**	

Visual Arts Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-VA-1	Art Room	0	1,200	0	0	0	0	0	varies	0	
M-VA-2	Kiln/Ceramic Storage	0	100	0	0	0	0	0	varies	0	
M-VA-3	Art Material Storage	0	100	0	0	0	0	0	varies	0	See Note 1
Visual Arts Total				**0**			**0**			**0**	

Square Footage Allowance Notes	
Student Enrollment	1
350-450 Students	100
451-600 Students	150
601-750 Students	200
751-1000 Students	150
1001-1500 Students	150
1501-2000 Students	150
Enrollment Determines SF Allowed	

Sample School District, SAMPLE MIDDLE SCHOOL

MUSIC SPACES

M-MU

The following school size examples illustrate the suggested instructional and support spaces
The examples are intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE		450 Students			600 Students			750 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-MU-1	Instrumental Room	1	1,400	1,400	1	1,500	1,500	1	1,600	1,600	See Note 1
M-MU-2	Vocal Room	0	1,200	0	1	1,200	1,200	1	1,200	1,200	
M-MU-3	Music Library	1	200	200	1	200	200	1	200	200	
Music Total				**1,600**			**2,900**			**3,000**	

EXAMPLE		1000 Students			1500 Students			2000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-MU-1	Instrumental Room	2	1,400	2,800	2	1,500	3,000	2	1,500	3,000	See Note 1
M-MU-2	Vocal Room	1	1,200	1,200	2	1,200	2,400	2	1,200	2,400	
M-MU-3	Music Library	2	200	400	2	200	400	2	200	400	
Music Total				**4,400**			**5,800**			**5,800**	

Music Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-MU-1	Instrumental Room	0	1,400	0	0	0	0	0	varies	0	See Note 1
M-MU-2	Vocal Room	0	1,200	0	0	0	0	0	varies	0	
M-MU-3	Music Library	0	200	0	0	0	0	0	varies	0	
Music Total				**0**			**0**			**0**	

Square Footage Allowance Notes	
Student Enrollment	**1**
350-450 Students	1400
451-600 Students	1500
601-750 Students	1600
751-1000 Students	1400
1001-1500 Students	1500
1501-2000 Students	1500
Enrollment Determines SF Allowed	

The following school size examples illustrate the suggested instructional and support spaces. The examples are intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE		450 Students			600 Students			750 Students		
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
M-TE-1a	Modular Technology Lab	1	1,300	1,300	1	1,300	1,300	1	1,300	1,300
	or									
M-TE-1b	Production Lab	0	1,300	0	0	1,300	0	1	1,300	1,300
M-TE-2	Storage	1	150	150	1	150	150	1	150	150
Technology Education Total				**1,450**			**1,450**			**2,750**

EXAMPLE		1000 Students			1500 Students			2000 Students		
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
M-TE-1a	Modular Technology Lab	2	1,300	2,600	2	1,300	2,600	2	1,300	2,600
	or									
M-TE-1b	Production Lab	1	1,300	1,300	1	1,300	1,300	2	1,300	2,600
M-TE-2	Storage	1	150	150	2	150	300	2	200	400
Technology Education Total				**4,050**			**4,200**			**5,600**

Technology Education Worksheet

		New SF			Existing SF			TOTAL SF		
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
M-TE-1a	Modular Technology Lab	0	1,300	0	0	0	0	0	varies	0
	or									
M-TE-1b	Production Lab	0	1,300	0	0	0	0	0	varies	0
M-TE-2	Storage	0	150	0	0	0	0	0	varies	0
Technology Education Total				**0**			**0**			**0**

Sample School District, SAMPLE MIDDLE SCHOOL

FAMILY AND CONSUMER SCIENCE SPACES

M-FCS

The following school size examples illustrate the suggested instructional and support spaces. The examples are intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE		450 Students			600 Students			750 Students		
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
M-FCS-1	Life Skills Lab	0	1,100	0	1	1,100	1,100	1	1,100	1,100
M-FCS-2	Life Skills Storage	0	100	0	1	100	100	1	100	100
Family and Consumer Science Total				**0**			**1,200**			**1,200**

EXAMPLE		1000 Students			1500 Students			2000 Students		
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
M-FCS-1	Life Skills Lab	1	1,100	1,100	2	1,100	2,200	2	1,100	2,200
M-FCS-2	Life Skills Storage	1	100	100	2	100	200	2	100	200
Family and Consumer Science Total				**1,200**			**2,400**			**2,400**

Family & Consumer Science Worksheet										
		New SF			Existing SF			TOTAL SF		
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
M-FCS-1	Life Skills Lab	0	1,100	0	0	0	0	0	varies	0
M-FCS-2	Life Skills Storage	0	100	0	0	0	0	0	varies	0
Family and Consumer Science Total				**0**			**0**			**0**

The following school size examples illustrate the suggested instructional and support spaces
The examples are intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE		450 Students			600 Students			750 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-PE-1	Gymnasium	1	7,000	7,000	1	***7,500***	7,500	1	***8,000***	8,000	See Note 1
M-PE-2	Auxilary Gym	0	0	0	0	0	0	0	0	0	See Note 2
M-PE-3	P.E./Athletic Office	2	75	150	2	75	150	2	75	150	
M-PE-4	Staff Shower	2	75	150	2	75	150	2	75	150	
M-PE-5	Student Locker Room	2	600	1,200	2	600	1,200	2	650	1,300	See Note 3
M-PE-6	Student Restroom/Shower	2	250	500	2	250	500	2	250	500	
M-PE-7	Physical Education Storage	1	300	300	1	325	325	1	500	500	See Note 4
Physical Education Total				**9,300**			**9,825**			**10,600**	

EXAMPLE		1000 Students			1500 Students			2000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-PE-1	Gymnasium	1	8,500	8,500	1	10,000	10,000	1	12,000	12,000	See Note 1
M-PE-2	Auxilary Gym	1	5,000	5,000	1	6,500	6,500	1	6,500	6,500	See Note 2
M-PE-3	P.E./Athletic Office	3	75	225	4	75	300	4	75	300	
M-PE-4	Staff Shower	2	75	150	2	75	150	2	75	150	
M-PE-5	Student Locker Room	2	700	1,400	2	800	1,600	2	900	1,800	See Note 3
M-PE-6	Student Restroom/Shower	2	250	500	2	250	500	2	250	500	
M-PE-7	Physical Education Storage	2	400	800	2	500	1,000	2	500	1,000	See Note 4
Physical Education Total				**16,575**			**20,050**			**22,250**	

Physical Education Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-PE-1	Gymnasium	0	***7,000***	0	0	0	0	0	varies	0	See Note 1
M-PE-2	Auxilary Gym	0	***0***	0	0	0	0	0	varies	0	See Note 2
M-PE-3	P.E./Athletic Office	0	75	0	0	0	0	0	varies	0	
M-PE-4	Staff Shower	0	75	0	0	0	0	0	varies	0	
M-PE-5	Student Locker Room	0	600	0	0	0	0	0	varies	0	See Note 3
M-PE-6	Student Restroom/Shower	0	250	0	0	0	0	0	varies	0	
M-PE-7	Physical Education Storage	0	300	0	0	0	0	0	varies	0	See Note 4
Physical Education Total				**0**			**0**			**0**	

Square Footage Allowance Notes				
Student Enrollment	**1**	**2**	**3**	**4**
350-450 Students	7000	0	600	300
451-600 Students	***7500***	0	600	325
601-750 Students	***8000***	0	650	500
751-1000 Students	8500	5000	700	400
1001-1500 Students	10000	6500	800	500
1501-2000 Students	12000	6500	900	500
Enrollment Determines SF Allowed				

Sample School District, SAMPLE MIDDLE SCHOOL

STUDENT DINING SPACES

M-SD

The following school size examples illustrate the suggested instructional and support spaces
The examples are intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE		450 Students			600 Students			750 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-SD-1	Student Dining	1	3,000	3,000	1	3,000	3,000	1	3,750	3,750	See Note 1
M-SD-2	Stage	1	900	900	1	1,050	1,050	1	1,382	1,382	
M-SD-3	Staff Dining	0	200	0	0	250	0	1	300	300	See Note 2
M-SD-4	Table Storage	1	250	250	1	250	250	1	300	300	See Note 3
M-SD-5	Family Restroom	0	80	0	0	80	0	1	80	80	
Student Dining Total				**4,150**			**4,300**			**5,812**	

EXAMPLE		1000 Students			1500 Students			2000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-SD-1	Student Dining	1	5,000	5,000	1	7,500	7,500	1	10,000	10,000	See Note 1
M-SD-2	Stage	1	1,400	1,400	1	1,500	1,500	1	1,750	1,750	
M-SD-3	Staff Dining	1	300	300	1	300	300	1	400	400	See Note 2
M-SD-4	Table Storage	1	400	400	2	300	600	2	300	600	See Note 3
M-SD-5	Family Restroom	1	80	80	1	80	80	1	80	80	
Student Dining Total				**7,180**			**9,980**			**12,830**	

Student Dining Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-SD-1	Student Dining	0	3,000	0	0	0	0	0	varies	0	See Note 1
M-SD-2	Stage	0	900	0	0	0	0	0	varies	0	
M-SD-3	Staff Dining	0	200	0	0	0	0	0	varies	0	See Note 2
M-SD-4	Table Storage	0	250	0	0	0	0	0	varies	0	See Note 3
M-SD-5	Family Restroom	0	80	0	0	0	0	0	varies	0	
Student Dining Total				**0**			**0**			**0**	

Student Dining Notes	
Number	**Notes:**
1	The size of the Student Dining space is equal to one-third of the student enrollment multiplied by 15 SF per student or 3,000 SF, whichever is greater.

Square Footage Allowance Notes		
Student Enrollment	**2**	**3**
350-450 Students	200	250
451-600 Students	250	250
601-750 Students	300	300
751-1000 Students	300	400
1001-1500 Students	300	300
1501-2000 Students	400	300
Enrollment Determines SF Allowed		

The following school size examples illustrate the suggested instructional and support spaces.
The examples are intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE		450 Students			600 Students			750 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-FS-0	Warming Kitchen	0	900	0	0	1,200	0	0	1,500	0	See Note 1
M-FS-1	Kitchen (total)	1		1,575	1		2,100	1		2,625	See Note 1 & 2
M-FS-1a	Preparation Area		567			756			945		See Kitchend Area Notes
M-FS-1b	Serving Area		536			714			893		See Kitchend Area Notes
M-FS-1c	Dry Food Storage		173			231			289		See Kitchend Area Notes
M-FS-1d	Cooler/Freezer		158			210			263		See Kitchend Area Notes
M-FS-1e	Ware Washing		142			189			236		See Kitchend Area Notes
M-FS-2	Dietician Office	1	75	75	1	75	75	1	75	75	
M-FS-3	Restroom/Locker Rm	1	140	140	1	140	140	1	140	140	
Food Service Total				**1,790**			**2,315**			**2,840**	

EXAMPLE		1000 Students			1500 Students			2000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-FS-0	Warming Kitchen	0	2,000	0	0	3,000	0	0	4,000	0	See Note 1
M-FS-1	Kitchen (total)	1		3,500	1		5,250	1		7,000	See Note 1 & 2
M-FS-1a	Preparation Area		1,260			1,890			2,520		See Kitchen Area Notes
M-FS-1b	Serving Area		1,190			1,785			2,380		See Kitchen Area Notes
M-FS-1c	Dry Food Storage		385			578			770		See Kitchen Area Notes
M-FS-1d	Cooler/Freezer		350			525			700		See Kitchen Area Notes
M-FS-1e	Ware Washing		315			473			630		See Kitchen Area Notes
M-FS-2	Dietician Office	1	75	75	1	75	75	1	75	75	
M-FS-3	Restroom/Locker Rm	2	140	280	2	140	280	2	140	280	
Food Service Total				**3,855**			**5,605**			**7,355**	

Food Service Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-FS-0	Warming Kitchen	0	0	0	0	0	0	0	varies	0	See Note 1
M-FS-1	Kitchen (total)	0		0	0		0	0		0	See Note 1 & 2
M-FS-1a	Preparation Area		0			0			varies		See Kitchen Area Notes
M-FS-1b	Serving Area		0			0			varies		See Kitchen Area Notes
M-FS-1c	Dry Food Storage		0			0			varies		See Kitchen Area Notes
M-FS-1d	Cooler/Freezer		0			0			varies		See Kitchen Area Notes
M-FS-1e	Ware Washing		0			0			varies		See Kitchen Area Notes
M-FS-2	Dietician Office	0	75	0	0	0	0	0	varies	0	
M-FS-3	Restroom/Locker Rm	0	140	0	0	0	0	0	varies	0	
Food Service Total				**0**			**0**			**0**	

Food Service Notes	
Number	**Notes:**
	Only one of the two Kitchens is to be used - either M-FS-0 OR M-FS-1 - not both.
	The size of the kitchen is equal to the sum of preparation area, serving area, dry food storage area, cooler/freezer area, and ware washing area.

Kitchen Area Sizes					
Food Service Area	**Enroll**	**X**	**SF/Student**	**x**	**%**
Preparation Area	Enroll	x	3.5	x	36%
Serving Areas	Enroll	x	3.5	x	34%
Dry Food Storage	Enroll	x	3.5	x	11%
Cooler/	Enroll	x	3.5	x	10%
Ware Washing Area	Enroll	x	3.5	x	9%
Warming Kitchen	Enroll	x	2.0		
Multiply Enrollment x SF/Student x % to achieve size of area					

Sample School District, SAMPLE MIDDLE SCHOOL

CUSTODIAL SPACES

M-CU

The following school size examples illustrate the suggested instructional and support spaces. The examples are intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE		450 Students			600 Students			750 Students		
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
M-CU-1	Workroom	1	200	200	1	300	300	1	400	400
M-CU-2	Custodial Office	1	100	100	1	100	100	1	100	100
Custodial Total				**300**			**400**			**500**

EXAMPLE		1000 Students			1500 Students			2000 Students		
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
M-CU-1	Workroom	1	600	600	2	400	800	2	400	800
M-CU-2	Custodial Office	1	100	100	1	100	100	1	100	100
Custodial Total				**700**			**900**			**900**

Custodial Worksheet										
		New SF			Existing SF			TOTAL SF		
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
M-CU-1	Workroom - note 1	0	200	0	0	0	0	0	varies	0
M-CU-2	Custodial Office	0	100	0	0	0	0	0	varies	0
Custodial Total				**0**			**0**			**0**

Square Footage Allowance Notes	
Student Enrollment	**1**
350-450 Students	200
451-600 Students	300
601-750 Students	400
751-1000 Students	600
1001-1500 Students	400
1501-2000 Students	400
Enrollment Determines SF Allowed	

The following school size examples illustrate the suggested instructional and support spaces.
The examples are intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	450 Students			600 Students			750 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-BS-1 Large Group Restrooms	-	1,619	1,619	-	2,042	2,042	-	2,519	2,519	See Build Svc Sizes
M-BS-2 Custodial Closet	2	50	100	3	50	150	4	50	200	
M-BS-3 Electrical Closet	2	50	100	3	50	150	4	50	200	
M-BS-4 Telecommunications Room (TR)	2	64	128	3	64	192	4	64	256	See Note 1
M-BS-5 Corridors	-	9,251	9,251	-	11,671	11,671	-	14,393	14,393	See Build Svc Sizes
Vertical Circulation		0	0		0	0		0	0	See Note 2
M-BS-6 Mechanical/Electrical Space/Decks	-	3,192	3,192	-	4,026	4,026	-	4,966	4,966	See Build Svc Sizes
M-BS-7 Outdoor Storage Area	1	150	150	1	200	200	1	250	250	See SF Allowance
M-BS-8 Central Storage Area	1	***220***	220	1	***245***	245	1	***290***	290	See SF Allowance
M-BS-9 Loading/Receiving Area	1	120	120	1	120	120	1	120	120	
M-BS-10 Restroom	0	60	0	0	60	0	0	60	0	
M-BS-11 Recycling Room	***1***	***80***	***80***	***1***	***80***	***80***	***1***	***110***	***110***	***See SF Allowance***
Building Services Total			**14,960**			**18,876**			**23,304**	

EXAMPLE	1000 Students			1500 Students			2000 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-BS-1 Large Group Restrooms	-	3,360	3,360	-	4,600	4,600	-	5,728	5,728	See Build Svc Sizes
M-BS-2 Custodial Closet	3	50	150	3	50	150	4	50	200	
M-BS-3 Electrical Closet	3	50	150	3	50	150	4	50	200	
M-BS-4 Telecommunications Room (TR)	3	64	192	3	64	192	4	64	256	See Note 1
M-BS-5 Corridors	-	19,202	19,202	-	26,285	26,285	-	32,731	32,731	See Build Svc Sizes
Vertical Circulation		0	0		0	0		0	0	See Note 2
M-BS-6 Mechanical/Electrical Space/Decks	-	6,625	6,625	-	9,068	9,068	-	11,292	11,292	See Build Svc Sizes
M-BS-7 Outdoor Storage Area	1	250	250	1	250	250	1	350	350	See SF Allowance
M-BS-8 Central Storage Area	1	***290***	290	1	***360***	360	1	***540***	540	See SF Allowance
M-BS-9 Loading/Receiving Area	1	120	120	1	120	120	1	120	120	
M-BS-10 Restroom	0	60	0	0	60	0	0	60	0	
M-BS-11 Recycling Room	***1***	***110***	***110***	***1***	***140***	***140***	***1***	***160***	***160***	***See SF Allowance***
Building Services Total			**30,449**			**41,315**			**51,577**	

Building Services Notes	
Number	**Notes:**
	Size of Telecommunications Room varies with size of middle school. See page 5113-***4*** .
	Vertical Circulation refers only to the following: Stairways/stairtowers, monumental stairs, elevators and elevator equipment room.

Building Services Area Sizes			
Building Services Areas	**Prog**	**X**	**%**
Large Group Restrooms	Prog	x	3.5
Corridors	Prog	x	20.0
Mechanical/Electrical Space/Decks	Prog	x	6.9
Multiply Sum of Program Areas - Building Services x % to achieve size of area			

Square Footage Allowance Notes			
Student Enrollment	**Stor**	**Ctl Stor**	**Recycle**
350-450 Students	150	***220***	***80***
451-600 Students	200	***245***	***80***
601-750 Students	250	***290***	***110***
751-1000 Students	250	***290***	***110***
1001-1500 Students	250	***360***	***140***
1501-2000 Students	350	***540***	***160***
Enrollment Determines SF Allowed			

Sample School District, SAMPLE MIDDLE SCHOOL

BUILDING SERVICES SPACES

M-BS

Building Services Worksheet

Space	New SF Qty	New SF SF	New SF Area	Existing SF Qty	Existing SF SF	Existing SF Area	TOTAL SF Qty	TOTAL SF SF	TOTAL SF Area	
M-BS-1 Large Group Restrooms	-	0	0	-	0	0	-	varies	0	See Build Svc Sizes
M-BS-2 Custodial Closet	0	50	0	0	0	0	0	varies	0	
M-BS-3 Electrical Closet	0	50	0	0	0	0	0	varies	0	
M-BS-4 Telecommunications Room (TR)	0	64	0	0	0	0	0	varies	0	See Note 1
M-BS-5 Corridors	-	0	0	-	0	0	-	varies	0	See Build Svc Sizes
Vertical Circulation	-	0	0	-	0	0	-	varies	0	See Note 2
M-BS-6 Mechanical/Electrical Space/Decks	-	0	0	-	0	0	-	varies	0	See Build Svc Sizes
M-BS-7 Outdoor Storage Area	0	150	0	0	0	0	0	varies	0	See SF Allowance
M-BS-8 Central Storage Area	0	***220***	0	0	0	0	0	varies	0	See SF Allowance
M-BS-9 Loading/Receiving Area	0	120	0	0	0	0	0	varies	0	
M-BS-10 Restroom	0	60	0	0	0	0	0	varies	0	
M-BS-11 Recycling Room	***0***	***80***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See SF Allowance***
Building Services Total			**0**			**0**			**0**	

Building Services Notes	
Number	**Notes:**
	Size of Telecommunications Room varies with size of middle school. See page 5113-***4*** .
	Vertical Circulation refers only to the following: Stairways/stairtowers, monumental stairs, elevators and elevator equipment room.

Building Services Area Sizes			
Building Services Areas	**Prog**	**X**	**%**
Large Group Restrooms	Prog	x	3.5
Corridors	Prog	x	20.0
Mechanical/Electrical Space/Decks	Prog	x	6.9
Multiply Sum of Program Areas - Building Services x % to achieve size of area			

Square Footage Allowance Notes			
Student Enrollment	**Stor**	**Ctl Stor**	**Recycle**
350-450 Students	150	***220***	***80***
451-600 Students	200	***245***	***80***
601-750 Students	250	***290***	***110***
751-1000 Students	250	***290***	***110***
1001-1500 Students	250	***360***	***140***
1501-2000 Students	350	***540***	***160***
Enrollment Determines SF Allowed			

Sample School District, SAMPLE HIGH SCHOOL

CHAPTER 2: BRACKETING

SUMMARY OFSPACES

Previously, changes or additions made during the annual update of the Design Manual have been ***"bolded and italicized"*** for easy identification. Changes have been made to the formulas on this sheet which have not been bolded and italicized. The user is advised to carefully review all information.

EXAMPLES	450 Students	800 Students	1200 Students	1600 Students	2400 Students
	SF	SF	SF	SF	SF
Grade Configuration: 9-12					
Number of Students	450	800	1,200	1,600	2,400
Square Feet Per Student	180	166	165	162	156
Total Gross Square Feet Funded	**81,000**	**132,800**	**198,000**	**259,200**	**374,400**
Program Area					
H-AC Academic Core Spaces	18,870	32,640	52,072	67,899	95,250
H-SE Special Education Spaces	2,200	3,100	4,400	5,900	7,950
H-AD Administrative Spaces	3,185	4,395	6,422	7,648	10,475
H-MC Media Center Spaces	2,905	4,930	6,820	8,720	12,530
H-VA Visual Arts Spaces	1,500	2,900	3,500	5,500	9,100
H-MU Music Spaces	2,870	4,970	6,310	10,690	13,420
H-TE Technology Education Spaces	1,950	3,600	5,000	7,200	13,800
H-BE Business Education Spaces	1,100	2,100	2,150	4,700	7,000
H-FCS Family and Consumer Science Spaces	1,550	2,800	2,850	4,100	6,950
H-PE Physical Education Spaces	11,611	16,950	28,770	32,970	46,790
H-SD Student Dining Spaces	5,480	8,997	12,530	16,213	23,360
H-FS Food Service Spaces	1,790	3,015	4,415	5,815	8,830
H-CU Custodial Spaces	300	500	500	500	1,200
H-BS Building Services	17,662	28,744	42,640	55,658	80,643
Facility Total	**72,973**	**119,640**	**178,378**	**233,513**	**337,297**
Construction Factor	***0.11***	***0.11***	***0.11***	***0.11***	***0.11***
Gross Square Feet Developed	**81,000**	**132,800**	**198,000**	**259,200**	**374,400**

Worksheet Summary

Enter Grade Configuration				
Enter Student Enrollment				
Square Feet Per Student from Page 2000-4				Vert. Cir. = Vertical Circulation (3 Stories or greater)
Total Gross Square Feet Funded		0		refers only to stairways/stairtowers,
SELECT ON ◉ Single or Two Story ○ 3 Stories or greater				monumental stairs, elevators and
Vert. Cir. Area Allowance (3 Stories or greater)		**0**		elevator equipment rooms.
Total Adjusted POR Gross Square Footage		**0**		
Program Area	**New SF**	**Exst. SF***	**TOTAL SF**	
H-AC Academic Core Spaces	0	0	0	
H-SE Special Education Spaces	0	0	0	
H-AD Administrative Spaces	0	0	0	
H-MC Media Center Spaces	0	0	0	
H-VA Visual Arts Spaces	0	0	0	
H-MU Music Spaces	0	0	0	
H-TE Technology Education Spaces	0	0	0	
H-BE Business Education Spaces	0	0	0	
H-FCS Family and Consumer Science Spaces	0	0	0	
H-PE Physical Education Spaces	0	0	0	
H-SD Student Dining Spaces	0	0	0	
H-FS Food Service Spaces	0	0	0	
H-CU Custodial Spaces	0	0	0	
H-BS Building Services	0	0	0	
Facility Total	**0**	**0**	**0**	
Construction Factor (11% multiplied by the facility total)	***0.11***	na	na	
Gross Square Feet (GSF) Developed	**0**	**0**	**0**	See Note 1
Minus exst. co-funded Oversize Area from Master Pl		0	-	See Note 2
Adjusted Existing Area		0	-	

Total Adjusted GSF Developed (without Oversize Area) **0**

Difference of GSF developed from GSF allowable **0**

Worksheet Summary Notes	
Number	**Notes:**
	Existing Gross Square Feet taken from master facility plan.
	Oversize Area also taken from master facility plan.
*	The Existing SF column is used in projects where there are to be building additions or renovations.

Sample School District, SAMPLE HIGH SCHOOL
ACADEMIC CORE SPACES
H-AC

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	450 Students			800 Students			1200 Students			1600 Students			2400 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-AC-1 High School Classroom	12	900	10,800	20	900	18,000	32	900	28,800	40	900	36,000	56	900	50,400	
H-AC-2 Science Classroom - General/Physics	1	1,200	1,200	2	1,200	2,400	4	1,200	4,800	6	1,200	7,200	8	1,200	9,600	
H-AC-3 Science Classroom - Chemistry	1	1,200	1,200	1	1,200	1,200	2	1,200	2,400	3	1,200	3,600	8	1,200	9,600	
H-AC-4 Science Classroom - Biology	1	1,200	1,200	2	1,200	2,400	3	1,200	3,600	3	1,200	3,600	4	1,200	4,800	
H-AC-5 Science Prep	1	300	300	2	300	600	4	400	1,600	6	400	2,400	8	400	3,200	See Note 1
H-AC-6 Teacher Prep Area/Workroom	4	300	1,200	4	300	1,200	4	400	1,600	5	600	3,000	4	600	2,400	See Note 2
H-AC-7 Individual Restroom	2	60	120	2	60	120	5	60	300	5	60	300	4	60	240	
H-AC-8 Project/Classroom	1	1,100	1,100	2	1,100	2,200	3	1,100	3,300	3	1,100	3,300	4	1,100	4,400	
H-AC-9 Small Group Room	3	150	450	4	150	600	5	150	750	6	150	900	8	150	1,200	
H-AC-10 Instructional Material Storage	2	50	100	3	100	300	4	150	600	5	200	1,000	6	250	1,500	See Note 3
H-AC-11 Multi-use Room	0	1,500	0	1	1,500	1,500	1	1,500	1,500	2	1,500	3,000	2	1,500	3,000	
H-AC-12 Science Laboratory	0	1,000	0	0	1,000	0	0	1,000	0	0	1,000	0	0	1,000	0	
H-AC-9a Small Group Room	***0***	***150***	***0***	***4***	***150***	***600***	***5***	***150***	***750***	***0***	***150***	***0***	***6***	***150***	***900***	***See Note 4***
H-AC-13 Multi-use Studio	***0***	***1,500***	***0***	***0***	***1,500***	***0***	***0***	***1,500***	***0***	***1***	***1,400***	***1,400***	***1***	***1,610***	***1,610***	***See Note 4***
H-AC-14 Kinesthetic Learning Studio	***1***	***1,200***	***1,200***	***1***	***1,520***	***1,520***	***1***	***2,072***	***2,072***	***1***	***2,200***	***2,200***	***1***	***2,400***	***2,400***	***See Note 4***
Academic Core Total			***18,870***			***32,640***			***52,072***			***67,899***			***95,250***	

Academic Core Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-AC-1	High School Classroom	0	900	0	0	0	0	0	varies	0	
H-AC-2	Science Classroom - General/Physics	0	1,200	0	0	0	0	0	varies	0	
H-AC-3	Science Classroom - Chemistry	0	1,200	0	0	0	0	0	varies	0	
H-AC-4	Science Classroom - Biology	0	1,200	0	0	0	0	0	varies	0	
H-AC-5	Science Prep	0	300	0	0	0	0	0	varies	0	See Note 1
H-AC-6	Teacher Prep Area/Workroom	0	300	0	0	0	0	0	varies	0	See Note 2
H-AC-7	Individual Restroom	0	60	0	0	0	0	0	varies	0	
H-AC-8	Project/Classroom	0	1,100	0	0	0	0	0	varies	0	
H-AC-9	Small Group Room	0	150	0	0	0	0	0	varies	0	
H-AC-10	Instructional Material Storage	0	50	0	0	0	0	0	varies	0	See Note 3
H-AC-11	Multi-use Room	0	1,500	0	0	0	0	0	varies	0	
H-AC-12	Science Laboratory	0	1,000	0	0	0	0	0	varies	0	
H-AC-9a	***Small Group Room***	***0***	***150***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 4***
H-AC-13	***Multi-use Studio***	***0***	***1,500***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 4***
H-AC-14	***Kinesthetic Learning Studio***	***0***	***1,200***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 4***
Academic Core Total				***0***			***0***			***0***	

Square Footage Allowance Notes

Student Enrollment	1	2	3
350-450 Students	300	300	50
451-800 Students	300	300	100
801-1200 Students	400	400	150
1201-1600 Students	400	600	200
1601-2400 Students	400	600	250
Enrollment Determines SF Allowed			

Academic Core Notes

Number	*Notes:*
4	***Additional H-AC-9a, H-AC-13 and H-AC-14 spaces are provided to encourage the development of student centered learning environments as found in Section 1020. Minimum sizes are H-AC-9a=150 SF, H-AC-13=1500 SF, H-AC-14=1200 SF. Use H-AC-9 space plate for H-AC-9a.***

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	450 Students			800 Students			1200 Students			1600 Students			2400 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-SE-1 Self-contained Classroom	1	900	900	2	900	1,800	2	900	1,800	2	900	1,800	3	900	2,700	See Note 1
H-SE-2 Workroom/Conference	2	150	300	2	150	300	2	150	300	2	150	300	3	150	450	See Note 2
H-SE-3 Restroom/Shower	1	100	100	1	100	100	2	100	200	2	100	200	3	100	300	
H-SE-4 Special Education/Resource	1	900	900	1	900	900	1	900	900	2	900	1,800	3	900	2,700	See Note 3
H-SE-5 Small Self-contained Classroo	0	600	0	0	600	0	2	600	1,200	3	600	1,800	3	600	1,800	
Special Education Total			**2,200**			**3,100**			**4,400**			**5,900**			**7,950**	

Special Education Worksheet

	New SF			Existing SF			TOTAL SF			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-SE-1 Self-contained Classroom	0	900	0	0	0	0	0	varies	0	See Note 1
H-SE-2 Workroom/Conference	0	150	0	0	0	0	0	varies	0	See Note 2
H-SE-3 Restroom/Shower	0	100	0	0	0	0	0	varies	0	
H-SE-4 Special Education/Resource	0	900	0	0	0	0	0	varies	0	See Note 3
H-SE-5 Small Self-contained Classroo	0	600	0	0	0	0	0	varies	0	
Special Education Total			**0**			**0**			**0**	

Special Education Notes

Number	Notes:
	Self-contained classroom(s) could 'house' various special education programs including, but not limited to, cognitive disability, emotional disturbance, multiple disabilities, etc.
	Workroom/Conference could 'house' orthopedic impairment, autism, speech therapy, occupational therapy, and physical therapy.
	Special Education/Resource could 'house' cognitive disability, hearing impairment, visual impairment, emotional disturbance, orthopedic impairment, autistic, traumatic, brain injury, learning disability, deaf/blindness, etc. See Chapter 1, Section 1110 for more information.

Sample School District, SAMPLE HIGH SCHOOL

ADMINISTRATIVE SPACES

H-AD

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	450 Students			800 Students			1200 Students			1600 Students			2400 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-AD-1 Reception Area	1	200	200	1	400	400	1	500	500	1	600	600	1	1,000	1,000	See Note 1
H-AD-2 Secretarial Area	1	200	200	1	400	400	1	500	500	1	600	600	1	1,000	1,000	See Note 2
H-AD-3 Principal's Office	1	150	150	1	150	150	1	150	150	1	150	150	1	150	150	
H-AD-4 Assistant Principal's Office	0	120	0	0	120	0	2	120	240	3	120	360	6	120	720	
H-AD-5 Conference Room	1	250	250	1	250	250	2	250	500	3	250	750	3	250	750	
H-AD-6 Mail/Work/Copy Room	1	200	200	1	300	300	1	400	400	1	500	500	1	800	800	See Note 3
H-AD-7 Administrative Storage	1	150	150	1	150	150	1	200	200	1	200	200	1	400	400	See Note 4
H-AD-8 Vault/Records Storage	1	85	85	1	115	115	1	145	145	1	175	175	1	200	200	See Note 5
H-AD-9 In-school Suspension	1	200	200	1	325	325	1	450	450	1	575	575	1	600	600	See Note 6
H-AD-1 Restroom	2	60	120	2	60	120	2	60	120	2	60	120	2	60	120	
H-AD-1 Guidance Counselor's Office	2	120	240	3	120	360	4	120	480	5	120	600	8	120	960	
H-AD-1 Guidance Records/Storage	1	100	100	1	100	100	1	200	200	1	200	200	1	300	300	See Note 7
H-AD-1 Guidance Conference Room	1	150	150	2	200	400	3	250	750	4	250	1,000	4	250	1,000	See Note 8
H-AD-1 Parent/Volunteer Room	1	200	200	1	300	300	1	400	400	1	400	400	2	400	800	See Note 9
H-AD-1 Health Clinic (incl. RR)	1	400	400	1	450	450	1	500	500	1	550	550	1	600	600	See Note 10
H-AD-1 Itinerant Personnel Office	2	120	240	2	120	240	3	120	360	2	120	240	3	120	360	
H-AD-1 Career Center	1	300	300	1	335	335	1	527	527	1	628	628	1	715	715	See Note 11
Administrative Total			**3,185**			**4,395**			**6,422**			**7,648**			**10,475**	

Administration Worksheet

	New SF			Existing SF			TOTAL SF			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-AD-1 Reception Area	0	200	0	0	0	0	0	varies	0	See Note 1
H-AD-2 Secretarial Area	0	200	0	0	0	0	0	varies	0	See Note 2
H-AD-3 Principal's Office	0	150	0	0	0	0	0	varies	0	
H-AD-4 Assistant Principal's Office	0	120	0	0	0	0	0	varies	0	
H-AD-5 Conference Room	0	250	0	0	0	0	0	varies	0	
H-AD-6 Mail/Work/Copy Room	0	200	0	0	0	0	0	varies	0	See Note 3
H-AD-7 Administrative Storage	0	150	0	0	0	0	0	varies	0	See Note 4
H-AD-8 Vault/Records Storage	0	85	0	0	0	0	0	varies	0	See Note 5
H-AD-9 In-school Suspension	0	200	0	0	0	0	0	varies	0	See Note 6
H-AD-1 Restroom	0	60	0	0	0	0	0	varies	0	
H-AD-1 Guidance Counselor's Office	0	120	0	0	0	0	0	varies	0	
H-AD-1 Guidance Records/Storage	0	100	0	0	0	0	0	varies	0	See Note 7
H-AD-1 Guidance Conference Room	0	150	0	0	0	0	0	varies	0	See Note 8
H-AD-1 Parent/Volunteer Room	0	200	0	0	0	0	0	varies	0	See Note 9
H-AD-1 Health Clinic (incl. RR)	0	400	0	0	0	0	0	varies	0	See Note 10
H-AD-1 Itinerant Personnel Office	0	120	0	0	0	0	0	varies	0	
H-AD-1 Career Center	0	300	0	0	0	0	0	varies	0	See Note 11
Administrative Total			**0**			**0**			**0**	

Square Footage Allowance Notes

Student Enrollment	1	2	3	4	5	6	7	8	9	10	11
350-450 Students	200	200	200	150	85	200	100	150	200	400	300
451-800 Students	400	400	300	150	115	325	100	200	300	450	335
801-1200 Students	500	500	400	200	145	450	200	250	400	500	527
1201-1600 Students	600	600	500	200	175	575	200	250	400	550	628
1601-2000 Students	800	800	800	400	200	600	300	250	400	600	715
2001-2400 Students	1000	1000	800	400	200	600	300	250	400	600	715
Enrollment Determines SF Allowed											

The following school size example illustrates the suggested instructional and support spaces
The example is intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE	450 Students			800 Students			1200 Students			1600 Students			2400 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-MC-1 Reading Room/Circulation	1	1,575	1,575	1	2,800	2,800	1	4,200	4,200	1	5,600	5,600	1	8,400	8,400	See Note 1
H-MC-2 Media Specialist Office	1	120	120	1	120	120	2	120	240	2	120	240	2	120	240	
H-MC-3 Workroom/Storage	1	300	300	1	400	400	1	500	500	1	600	600	1	700	700	See Note 2
H-MC-4 Main Control/Equipment Rm	1	300	300	1	300	300	1	300	300	1	300	300	1	400	400	
H-MC-5 Conference Room	1	250	250	1	250	250	2	250	500	3	250	750	4	250	1,000	
H-MC-6 Multimedia Production Roo	0	500	0	1	500	500	1	500	500	1	500	500	1	800	800	
H-MC-7 Document Storage	1	200	200	1	300	300	1	300	300	1	400	400	1	500	500	See Note 3
H-AC-9 Small Group Room	1	160	160	1	260	260	1	280	280	1	330	330	2	245	490	See Note 4
Media Center Total			**2,905**			**4,930**			**6,820**			**8,720**			**12,530**	

Media Center Worksheet

	New SF			Existing SF			TOTAL SF			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-MC-1 Reading Room/Circulation	0	0	0	0	0	0	0	varies	0	See Note 1
H-MC-2 Media Specialist Office	0	120	0	0	0	0	0	varies	0	
H-MC-3 Workroom/Storage	0	***300***	0	0	0	0	0	varies	0	See Note 2
H-MC-4 Main Control/Equipment Rm	0	300	0	0	0	0	0	varies	0	
H-MC-5 Conference Room	0	250	0	0	0	0	0	varies	0	
H-MC-6 Multimedia Production Roo	0	500	0	0	0	0	0	varies	0	
H-MC-7 Document Storage	0	200	0	0	0	0	0	varies	0	See Note 3
H-AC-9 Small Group Room	0	160	0	0	0	0	0	varies	0	See Note 4
Media Center Total			**0**			**0**			**0**	

Media Center Notes	
Number	**Notes:**
1	The size of the Reading Room/Circulation space is equal to 10% of the student enrollment multiplied by 35 SF per student.

Square Footage Allowance Notes			
Student Enrollment	**2**	**3**	**4**
350-450 Students	300	200	160
451-800 Students	400	300	260
801-1200 Students	500	300	280
1201-1600 Students	600	400	330
1601-2400 Students	700	500	245
Enrollment Determines SF Allowed			

Sample School District, SAMPLE HIGH SCHOOL
VISUAL ART SPACES
H-VA

The following school size example illustrates the suggested instructional and support spaces
The example is intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE	450 Students			800 Students			1200 Students			1600 Students			2400 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-VA-1 Art Room	1	1,200	1,200	2	1,200	2,400	2	1,400	2,800	3	1,400	4,200	5	1,400	7,000	See Note 1
H-VA-2 Kiln/Ceramic Storage	1	100	100	1	200	200	2	200	400	2	200	400	3	300	900	See Note 2
H-VA-3 Art Material Storage	1	200	200	1	300	300	1	300	300	3	300	900	3	400	1,200	See Note 3
Visual Arts Total			**1,500**			**2,900**			**3,500**			**5,500**			**9,100**	

Visual Arts Worksheet

	New SF			Existing SF			TOTAL SF			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-VA-1 Art Room	0	1200	0	0	0	0	0	varies	0	See Note 1
H-VA-2 Kiln/Ceramic Storage	0	***100***	0	0	0	0	0	varies	0	See Note 2
H-VA-3 Art Material Storage	0	200	0	0	0	0	0	varies	0	See Note 3
Visual Arts Total			**0**			**0**			**0**	

Square Footage Allowance Notes			
Student Enrollment	**1**	**2**	**3**
350-450 Students	1200	100	200
451-800 Students	1200	200	300
801-1200 Students	1400	200	300
1201-1600 Students	1400	200	300
1601-2400 Students	1400	300	400
Enrollment Determines SF Allowed			

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	450 Students			800 Students			1200 Students			1600 Students			2400 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-MU-1Instrumental Room	1	1,800	1,800	1	2,000	2,000	1	2,500	2,500	2	3,000	6,000	2	3,000	6,000	See Note 1
H-MU-2Instrument Storage	1	400	400	1	500	500	1	600	600	1	700	700	1	800	800	See Note 2
H-MU-3Orchestra Storage	0	200	0	1	250	250	1	250	250	1	350	350	1	500	500	See Note 3
H-MU-4Instrumental Music Library	1	120	120	1	120	120	1	120	120	1	120	120	2	120	240	
H-MU-5Uniform Storage	1	150	150	1	200	200	1	300	300	2	300	600	1	400	400	See Note 4
H-MU-6Vocal Room	0	1,200	0	1	1,200	1,200	1	1,200	1,200	1	1,500	1,500	2	1,500	3,000	See Note 5
H-MU-7Vocal Storage	0	150	0	1	200	200	1	300	300	1	300	300	1	400	400	See Note 6
H-MU-8Vocal Music Library	1	120	120	1	120	120	1	120	120	1	120	120	2	120	240	
H-MU-9Ensemble Room	1	200	200	1	300	300	2	300	600	2	300	600	3	400	1,200	See Note 7
H-MU-1Practice Room	1	80	80	1	80	80	4	80	320	5	80	400	8	80	640	
Music Total			**2,870**			**4,970**			**6,310**			**10,690**			**13,420**	

Music Worksheet

	New SF			Existing SF			TOTAL SF			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-MU-1Instrumental Room	0	1,800	0	0	0	0	0	varies	0	See Note 1
H-MU-2Instrument Storage	0	400	0	0	0	0	0	varies	0	See Note 2
H-MU-3Orchestra Storage	0	200	0	0	0	0	0	varies	0	See Note 3
H-MU-4Instrumental Music Library	0	120	0	0	0	0	0	varies	0	
H-MU-5Uniform Storage	0	***150***	0	0	0	0	0	varies	0	See Note 4
H-MU-6Vocal Room	0	1,200	0	0	0	0	0	varies	0	See Note 5
H-MU-7Vocal Storage	0	150	0	0	0	0	0	varies	0	See Note 6
H-MU-8Vocal Music Library	0	120	0	0	0	0	0	varies	0	
H-MU-9Ensemble Room	0	200	0	0	0	0	0	varies	0	See Note 7
H-MU-1Practice Room	0	80	0	0	0	0	0	varies	0	
Music Total			**0**			**0**			**0**	

Square Footage Allowance Notes							
Student Enrollment	**1**	**2**	**3**	**4**	**5**	**6**	**7**
350-450 Students	1800	400	200	150	1200	150	200
451-800 Students	2000	500	250	200	1200	200	300
801-1200 Students	2500	600	250	300	1200	300	300
1201-1600 Students	3000	700	350	300	1500	300	300
1601-2400 Students	3000	800	500	400	1500	400	400
Enrollment Determines SF Allowed							

Sample School District, SAMPLE HIGH SCHOOL
TECHNOLOGY EDUCATION SPACES
H-TE

The following school size example illustrates the suggested instructional and support spaces
The example is intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE	450 Students			800 Students			1200 Students			1600 Students			2400 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-TE-1 Modular Technology Lab	1	1,800	1,800	1	1,800	1,800	1	1,800	1,800	2	1,800	3,600	3	1,800	5,400	
or																
H-TE-1a Ag-Ed Lab	0	1,800	0	0	1,800	0	0	1,800	0	0	1,800	0	1	1,800	1,800	
H-TE-2 Storage	1	150	150	1	200	200	2	200	400	4	200	800	4	250	1,000	See Note 1
H-TE-3 CADD Lab	0	1,200	0	0	1,200	0	1	1,200	1,200	1	1,200	1,200	2	1,200	2,400	
H-TE-4 Production Lab	0	1,600	0	1	1,600	1,600	1	1,600	1,600	1	1,600	1,600	2	1,600	3,200	
Technology Education Total			**1,950**			**3,600**			**5,000**			**7,200**			**13,800**	

Technology Education Worksheet

	New SF			Existing SF			TOTAL SF			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-TE-1 Modular Technology Lab	0	1,800	0	0	0	0	0	varies	0	
or										
H-TE-1a Ag-Ed Lab	0	1,800	0	0	0	0	0	varies	0	
H-TE-2 Storage	0	150	0	0	0	0	0	varies	0	See Note 1
H-TE-3 CADD Lab	0	1,200	0	0	0	0	0	varies	0	
H-TE-4 Production Lab	0	1,600	0	0	0	0	0	varies	0	
Technology Education Total			**0**			**0**			**0**	

Square Footage Allowance Notes	
Student Enrollment	**1**
350-450 Students	150
451-800 Students	200
801-1200 Students	200
1201-1600 Students	200
1601-2400 Students	250
Enrollment Determines SF Allowed	

The following school size example illustrates the suggested instructional and support spaces
The example is intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE	450 Students			800 Students			1200 Students			1600 Students			2400 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-BE-1 Computer and Business Classroo	1	1,000	1,000	1	1,000	1,000	1	1,000	1,000	2	1,000	2,000	4	1,000	4,000	
H-BE-2 Marketing Classroom	0	900	0	1	900	900	1	900	900	2	900	1,800	2	900	1,800	
H-BE-3 Workroom/Storage	1	100	100	1	200	200	1	250	250	3	300	900	3	400	1,200	See Note 1
Business Education Total			**1,100**			**2,100**			**2,150**			**4,700**			**7,000**	

Business Education Worksheet

Space	New SF Qty	New SF SF	New SF Area	Existing SF Qty	Existing SF SF	Existing SF Area	TOTAL SF Qty	TOTAL SF SF	TOTAL SF Area	
H-BE-1 Computer and Business Classroo	0	1,200	0	0	0	0	0	varies	0	
H-BE-2 Marketing Classroom	0	900	0	0	0	0	0	varies	0	
H-BE-3 Workroom/Storage	0	100	0	0	0	0	0	varies	0	See Note 1
Business Education Total			**0**			**0**			**0**	

Square Footage Allowance Notes	
Student Enrollment	**1**
350-450 Students	100
451-800 Students	200
801-1200 Students	250
1201-1600 Students	300
1601-2400 Students	400
Enrollment Determines SF Allowed	

Sample School District, SAMPLE HIGH SCHOOL
FAMILY AND CONSUMER SCIENCE SPACES
H-FCS

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	450 Students			800 Students			1200 Students			1600 Students			2400 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-FCS-1 Life Skills Lab	1	1,200	1,200	1	1,200	1,200	1	1,200	1,200	2	1,200	2,400	4	1,200	4,800	
H-FCS-2 Life Skills Storage	1	200	200	1	250	250	1	300	300	1	350	350	2	400	800	See Note 1
H-FCS-3 Laundry	1	150	150	1	150	150	1	150	150	1	150	150	1	150	150	
H-FCS-4 Child Development	0	1,200	0	1	1,200	1,200	1	1,200	1,200	1	1,200	1,200	1	1,200	1,200	
Family and Consumer Science Total			**1,550**			**2,800**			**2,850**			**4,100**			**6,950**	

Family And Consumer Science Worksheet

	New SF			Existing SF			TOTAL SF			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-FCS-1 Life Skills Lab	0	1,200	0	0	0	0	0	varies	0	
H-FCS-2 Life Skills Storage	0	200	0	0	0	0	0	varies	0	See Note 1
H-FCS-3 Laundry	0	150	0	0	0	0	0	varies	0	
H-FCS-4 Child Development	0	1,200	0	0	0	0	0	varies	0	
Family and Consumer Science Total			**0**			**0**			**0**	

Square Footage Allowance Notes	
Student Enrollment	1
350-450 Students	200
451-800 Students	250
801-1200 Students	300
1201-1600 Students	350
1601-2400 Students	400
Enrollment Determines SF Allowed	

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	450 Students			800 Students			1200 Students			1600 Students			2400 Students			
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
H-PE-1 Gymnasium	1	***9,300***	9,300	1	***10,700***	10,700	1	***12,400***	12,400	1	***14,000***	14,000	1	***17,400***	17,400	See Note 1
H-PE-2 Auxiliary Gymnasium	0	7,000	0	0	7,000	0	1	7,000	7,000	1	7,000	7,000	1	7,000	7,000	See Note 2
H-PE-3 Student Locker Room	2	550	1,100	2	650	1,300	4	700	2,800	5	850	4,250	8	850	6,800	See Note 3
H-PE-4 Student Restroom/Shower	2	206	411	2	250	500	4	300	1,200	5	350	1,750	8	350	2,800	See Note 4
H-PE-5 Physical Education Storage	1	400	400	1	600	600	1	700	700	1	900	900	2	1,000	2,000	See Note 5
H-PE-6 P.E./Athletic Office	2	75	150	3	75	225	4	75	300	5	75	375	12	75	900	
H-PE-7 Staff Shower	2	75	150	3	75	225	4	75	300	5	75	375	6	75	450	
H-PE-8 Athletic Director's Office	0	120	0	0	120	0	1	120	120	1	120	120	2	120	240	
H-PE-9 Lobby Services	1	100	100	1	200	200	1	250	250	1	300	300	1	500	500	See Note 6
H-PE-10 Training Room	0	200	0	1	300	300	1	400	400	1	600	600	1	900	900	See Note 7
H-PE-11 Physical Health Classroom	0	1,500	0	1	1,500	1,500	1	1,500	1,500	1	1,500	1,500	2	1,500	3,000	
H-PE-12 Multi-use P.E. Room	0	1,400	0	1	1,400	1,400	1	1,600	1,800	1	1,800	1,800	2	2,400	4,800	See Note 8
Physical Education Total			**11,611**			**16,950**			**28,770**			**32,970**			**46,790**	

Physical Education Worksheet

	New SF			Existing SF			TOTAL SF			
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
H-PE-1 Gymnasium	0	***9,300***	0	0	0	0	0	varies	0	See Note 1
H-PE-2 Auxiliary Gymnasium	0	7,000	0	0	0	0	0	varies	0	See Note 2
H-PE-3 Student Locker Room	0	550	0	0	0	0	0	varies	0	See Note 3
H-PE-4 Student Restroom/Shower	0	206	0	0	0	0	0	varies	0	See Note 4
H-PE-5 Physical Education Storage	0	400	0	0	0	0	0	varies	0	See Note 5
H-PE-6 P.E./Athletic Office	0	75	0	0	0	0	0	varies	0	
H-PE-7 Staff Shower	0	75	0	0	0	0	0	varies	0	
H-PE-8 Athletic Director's Office	0	120	0	0	0	0	0	varies	0	
H-PE-9 Lobby Services	0	100	0	0	0	0	0	varies	0	See Note 6
H-PE-10 Training Room	0	200	0	0	0	0	0	varies	0	See Note 7
H-PE-11 Physical Health Classroom	0	1,500	0	0	0	0	0	varies	0	
H-PE-12 Multi-use P.E. Room	0	1,400	0	0	0	0	0	varies	0	See Note 8
Physical Education Total			**0**			**0**			**0**	

Square Footage Allowance Notes								
Student Enrollment	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
350-450 Students	***9300***	7000	550	206	400	100	200	1400
451-800 Students	***10700***	7000	650	250	600	200	300	1400
801-1200 Students	***12400***	7000	700	300	700	250	400	1600
1201-1600 Students	***14000***	7000	850	350	900	300	600	1800
1601-2400 Students	***17400***	7000	850	350	1000	500	900	2400
Enrollment Determines SF Allowed								

Sample School District, SAMPLE HIGH SCHOOL

STUDENT DINING SPACES

H-SD

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	450 Students			800 Students			1200 Students			1600 Students			2400 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-SD-1 Student Dining	1	3,000	3,000	1	4,667	4,667	1	7,000	7,000	1	9,333	9,333	1	14,000	14,000	See Note 1
H-SD-2 Stage	1	1,000	1,000	1	1,600	1,600	1	2,400	2,400	1	3,200	3,200	1	4,800	4,800	
H-SD-3 Scene Shop and Stora	1	400	400	1	450	450	1	500	500	1	600	600	1	1,000	1,000	See Note 2
H-SD-4 Make-up/Dressing Roo	2	200	400	2	250	500	2	250	500	2	300	600	2	400	800	See Note 3
H-SD-5 Theatrical Control Roo	0	200	0	1	200	200	1	200	200	1	200	200	2	200	400	
H-SD-6 Drama Storage	1	200	200	1	400	400	1	500	500	1	600	600	1	1,000	1,000	See Note 4
H-SD-7 Staff Dining	0	450	0	1	600	600	1	750	750	1	900	900	1	1,200	1,200	See Note 5
H-SD-8 Table Storage	1	400	400	1	500	500	1	600	600	1	700	700	0	700	0	See Note 6
H-SD-9 Family Restroom	1	80	80	1	80	80	1	80	80	1	80	80	2	80	160	
Student Dining Total			**5,480**			**8,997**			**12,530**			**16,213**			**23,360**	

Student Dining Worksheet

	New SF			Existing SF			TOTAL SF			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-SD-1 Student Dining	0	3,000	0	0	0	0	0	varies	0	See Note 1
H-SD-2 Stage	0	0	0	0	0	0	0	varies	0	
H-SD-3 Scene Shop and Stora	0	400	0	0	0	0	0	varies	0	See Note 2
H-SD-4 Make-up/Dressing Roo	0	200	0	0	0	0	0	varies	0	See Note 3
H-SD-5 Theatrical Control Roo	0	200	0	0	0	0	0	varies	0	
H-SD-6 Drama Storage	0	200	0	0	0	0	0	varies	0	See Note 4
H-SD-7 Staff Dining	0	450	0	0	0	0	0	varies	0	See Note 5
H-SD-8 Table Storage	0	400	0	0	0	0	0	varies	0	See Note 6
H-SD-9 Family Restroom	0	80	0	0	0	0	0	varies	0	
Student Dining Total			**0**			**0**			**0**	

Student Dining Notes	
Number	**Notes:**
1	The size of the Student Dining space is equal to one-third of the student enrollment multiplied by 17.5 SF per student or 3,000 SF, whichever is greater.

Square Footage Allowance Notes					
Student Enrollment	**2**	**3**	**4**	**5**	**6**
350-450 Students	400	200	200	450	400
451-800 Students	450	250	400	600	500
801-1200 Students	500	250	500	750	600
1201-1600 Students	600	300	600	900	700
1601-2400 Students	1000	400	1000	1200	700
Enrollment Determines SF Allowed					

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	450 Students			800 Students			1200 Students			1600 Students			2400 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-FS-0 Warming Kitchen	0	900	0	0	1,600	0	0	2,400	0	0	3,200	0	0	4,800	0	See Note 1
H-FS-1 Kitchen (total)	1		1,575	1		2,800	1		4,200	1		5,600	1		8,400	See Note 1 & 2
H-FS-1a Preparation Area		567			1,008			1,512			2,016			3,024		See Kitchen Area Notes
H-FS-1b Serving Area		536			952			1,428			1,904			2,856		See Kitchen Area Notes
H-FS-1c Dry Food Storage		173			308			462			616			924		See Kitchen Area Notes
H-FS-1d Cooler/Freezer		158			280			420			560			840		See Kitchen Area Notes
H-FS-1e Ware Washing		142			252			378			504			756		See Kitchen Area Notes
H-FS-2 Dietician Office	1	75	75	1	75	75	1	75	75	1	75	75	1	150	150	
H-FS-3 Restroom/Locker Rm	1	140	140	1	140	140	1	140	140	1	140	140	2	140	280	
Food Service Total			**1,790**			**3,015**			**4,415**			**5,815**			**8,830**	

Food Service Worksheet

	New SF			Existing SF			TOTAL SF			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-FS-0 Warming Kitchen	0	0	0	0	0	0	0	varies	0	See Note 1
H-FS-1 Kitchen (total)	0		0	0		0	0		0	See Note 1 & 2
H-FS-1a Preparation Area		0			0			varies		See Kitchen Area Notes
H-FS-1b Serving Area		0			0			varies		See Kitchen Area Notes
H-FS-1c Dry Food Storage		0			0			varies		See Kitchen Area Notes
H-FS-1d Cooler/Freezer		0			0			varies		See Kitchen Area Notes
H-FS-1e Ware Washing		0			0			varies		See Kitchen Area Notes
H-FS-2 Dietician Office	0	75	0	0	0	0	0	varies	0	
H-FS-3 Restroom/Locker Rm	0	140	0	0	0	0	0	varies	0	
Food Service Total			**0**			**0**			**0**	

Food Service Notes	
Number	**Notes:**
	Only one of the two Kitchens is to be used - either H-FS-0 OR H-FS-1 - not both.
	The size of the kitchen is equal to the sum of preparation area, serving area, dry food storage area, cooler/freezer area, and ware washing area.

Kitchen Area Sizes					
Food Service Area	**Enrol**	**X**	**SF/Student**	**x**	**%**
Preparation Area	Enrol	x	3.5	x	36%
Serving Areas	Enrol	x	3.5	x	34%
Dry Food Storage	Enrol	x	3.5	x	11%
Cooler/	Enrol	x	3.5	x	10%
Ware Washing Area	Enrol	x	3.5	x	9%
Warming Kitchen	Enrol	x	2.0		
Multiply Enrollment x SF/Student x % to achieve size of area					

Sample School District, SAMPLE HIGH SCHOOL

CUSTODIAL SPACES

H-CU

The following school size example illustrates the suggested instructional and support spaces
The example is intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE	450 Students			800 Students			1200 Students			1600 Students			2400 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-CU-1 Workroom	1	200	200	1	400	400	1	400	400	1	400	400	1	800	800	See Note 1
H-CU-2 Custodial Office	1	100	100	1	100	100	1	100	100	1	100	100	1	400	400	
Custodial Total			**300**			**500**			**500**			**500**			**1,200**	

Custodial Worksheet

	New SF			Existing SF			TOTAL SF			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-CU-1 Workroom	0	200	0	0	0	0	0	varies	0	See Note 1
H-CU-2 Custodial Office	0	100	0	0	0	0	0	varies	0	
Custodial Total			**0**			**0**			**0**	

Square Footage Allowance Notes	
Student Enrollment	**1**
350-450 Students	200
451-800 Students	400
801-1200 Students	400
1201-1600 Students	400
1601-2400 Students	800
Enrollment Determines SF Allowed	

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	450 Students			800 Students			1200 Students			1600 Students			2400 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-BS-1 Large Group Restrooms	-	1,936	1,936	-	3,181	3,181	-	4,751	4,751	-	6,225	6,225	-	8,983	8,983	See Build Svc Sizes
H-BS-2 Custodial Closet	2	50	100	3	50	150	4	50	200	5	50	250	6	50	300	
H-BS-3 Electrical Closet	2	50	100	3	50	150	4	50	200	5	50	250	6	50	300	
H-BS-4 Telecommunications Room (TR)	2	64	128	3	64	192	4	64	256	5	64	320	5	64	320	See Note 1
H-BS-5 Corridors	-	11,062	11,062	-	18,179	18,179	-	27,148	27,148	-	35,571	35,571	-	51,331	51,331	See Build Svc Sizes
H-BS-6 Mechanical/Electrical Space/Decks	-	3,816	3,816	-	6,272	6,272	-	9,366	9,366	-	12,272	12,272	-	17,709	17,709	See Note 2
H-BS-7 Storage Area	1	150	150	1	200	200	1	250	250	1	250	250	1	500	500	See Build Svc Sizes
H-BS-8 Central Storage Area	1	***170***	170	1	***200***	200	1	***220***	220	1	***240***	240	1	***590***	590	See SF Allowance
H-BS-9 Loading/Receiving Area	1	120	120	1	120	120	1	120	120	1	120	120	1	400	400	See SF Allowance
H-BS-10 Restroom	0	60	0	0	60	0	0	60	0	0	60	0	0	60	0	
H-BS-11 Recycling Room	***1***	***80***	***80***	***1***	***100***	***100***	***1***	***130***	***130***	***1***	***160***	***160***	***1***	***210***	***210***	***See SF Allowance***
Building Services Total			**17,662**			**28,744**			**42,640**			**55,658**			**80,643**	

Building Services Worksheet

Space	New SF Qty	New SF SF	New SF Area	Existing SF Qty	Existing SF SF	Existing SF Area	TOTAL SF Qty SF	TOTAL SF Area	
H-BS-1 Large Group Restrooms	-	0	0	-	0	0	- varies	0	See Build Svc Sizes
H-BS-2 Custodial Closet	0	50	0	0	0	0	0 varies	0	
H-BS-3 Electrical Closet	0	50	0	0	0	0	0 varies	0	
H-BS-4 Telecommunications Room (TR)	0	64	0	0	0	0	0 varies	0	See Note 1
H-BS-5 Corridors	-	0	0	-	0	0	- varies	0	See Build Svc Sizes
Vertical Circulation	-	0	0	-	0	0	- varies	0	See Note 2
H-BS-6 Mechanical/Electrical Space/Decks	-	0	0	-	0	0	- varies	0	See Build Svc Sizes
H-BS-7 Storage Area	0	150	0	0	0	0	0 varies	0	See SF Allowance
H-BS-8 Central Storage Area	0	**170**	0	0	0	0	0 varies	0	See SF Allowance
H-BS-9 Loading/Receiving Area	0	120	0	0	0	0	0 varies	0	
H-BS-10 Restroom	0	60	0	0	0	0	0 varies	0	
H-BS-11 Recycle Room	***0***	***80***	***0***	***0***	***0***	***0***	***0 varies***	***0***	***See SF Allowance***
Building Services Total			**0**			**0**		**0**	

Building Services Notes	
Number	**Notes:**
	Size of Telecommunications Room varies with size of high school. See page 6114-***4***.
	Vertical Circulation refers only to the following: Stairways/staitowers, monumental stairs, elevators and elevator equipment room.

Building Services Area Sizes			
Building Services Areas	**Prog**	**X**	**%**
Large Group Restrooms	Prog	x	3.5
Corridors	Prog	x	20.0
Mechanical/Electrical Space/Decks	Prog	x	6.9
Multiply Sum of Program Areas - Building Services x % to achieve size of area			

Square Footage Allowance Notes			
Student Enrollment	**Stor**	**Ctl Stor**	**Recycle**
350-450 Students	150	***170***	***80***
451-800 Students	200	***200***	***100***
801-1200 Students	250	***220***	***130***
1201-1600 Students	250	***240***	***160***
1601-2400 Students	500	***590***	***210***
Enrollment Determines SF Allowed			

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Previously, changes or additions made during the annual update of the Design Manual have been ***"bolded and italicized"*** for easy identification. Changes have been made to the formulas on this sheet which have not been bolded and italicized. The user is advised to carefully review all information.

EXAMPLE-650 Students			
Grade Configuration:		**K-12**	Area
Student *Enrollment*			
	Enter number of Elementary School students	300	
	Enter number of Middle School students	150	
	Enter number of High School students	200	
	Total Student Capacity	**650**	
SF per student			
	SF per Elementary School student	134	40,255
	SF per Middle School student	162	24,314
	SF per High School student	193	38,645
	Total Gross Square Feet Funded		**103,215**
C-AC	Academic Core Spaces		23,800
C-SE	Special Education Spaces		2,650
C-AD	Administrative Spaces		2,990
C-MC	Media Center Spaces		3,275
C-VA	Visual Arts Spaces		2,800
C-MU	Music Spaces		3,955
C-PE	Physical Education Spaces		15,800
C-SD	Student Dining Spaces		6,322
C-FCS	Family and Consumer Science Spaces		2,650
C-TE	Technology Education Spaces		3,350
E	Business Education Spaces C-FS		0
	Food Service Spaces		2,490
U	Custodial Spaces		500
	Facility Subtotal:		**70,582**
C-BS	Building Services		22,405
	Facility Total:		**92,986**
Construction Factor (11% multiplied by the facility total)			0.11
	Total Gross Square Feet Developed:		**103,215**
Difference of GSF developed from GSF allowable			(0)

Sample School District, SAMPLE K-12 SCHOOL

SUMMARY OF SPACES WORKSHEET

Previously, changes or additions made during the annual update of the Design Manual have been ***"bolded and italicized"*** for easy identification. Changes have been made to the formulas on this sheet which have not been bolded and italicized. The user is advised to carefully review all information.

WORKSHEET				
Grade Configuration:			**Area**	
Student Enrollment		**K-12**		
	Enter number of Elementary School students			
	Enter number of Middle School students			
	Enter number of High School students			
	Total Student Enrollment	-		
SF per student				
	SF per Elementary School student		-	
	SF per Middle School student		-	
	SF per High School student		-	
	Total Gross Square Feet Funded		-	
SELECT ONE	(●) Single or Two Story Build ( ) 3 Stories or greater			See note 1
	Vert. Cir. Area Allowance (3 Stories or greater)		0	
	Total Adjusted POR Gross Square Footage		**0**	

	Program Area	New SF	Exst. SF*	TOTAL SF	
C-AC	Academic Core Spaces	0	0	0	
C-SE	Special Education Spaces	0	0	0	
C-AD	Administrative Spaces	0	0	0	
C-MC	Media Center Spaces	0	0	0	
C-VA	Visual Arts Spaces	0	0	0	
C-MU	Music Spaces	0	0	0	
C-PE	Physical Education Spaces	0	0	0	
C-SD	Student Dining Spaces	0	0	0	
C-FCS	Family and Consumer Science Spaces	0	0	0	
C-TE	Technology Education Spaces	0	0	0	
C-BE	Business Education Spaces	0	0	0	
C-FS	Food Service Spaces	0	0	0	
C-CU	Custodial Spaces	0	0	0	
	Facility Subtotal:	**0**	**0**	**0**	
C-BS	Building Services	0	0	0	
Facility Total		**0**	**0**	**0**	
Construction Factor (11% multiplied by the facility total)		0.11	na	na	
Actual Gross Square Feet Developed		**0**	0	**0**	See note 2
Minus existing co-funded Oversize Area from Master Plan			0	-	See note 3
Adjusted Existing Area			**0**	-	
Total Adjusted Gross Square Footage Developed (without Oversize Area)				**0**	
Difference of GSF developed from GSF allowable				**0**	

Worksheet Summary Notes	
Number	**Notes:**
Special	Individual spaces are taken from the space plates which are located throughout Chapters 4, 5, and 6. Please see these particular chapters for specific requirements for each space.
	Vertical Circulation (3 Stories or greater) refers only to the following: Stairways/stairtowers, monumental stairs, elevators, and elevator equipment room.
	Existing Gross Square Feet taken from master facility plan.
	Oversize Area also taken from master facility plan.
*	The Existing SF column is used in projects where there are to be building additions or renovations.

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS				
Space	Qty	SF	Area	
E-AC-1 Pre-Kindergarten Classroom	1	1,200	1,200	
E-AC-1 Kindergarten Classroom	1	1,200	1,200	
E-AC-2 Pre-Kindergarten Restroom	1	60	60	
E-AC-2 Kindergarten Restroom	1	60	60	
E-AC-3 Elementary Classroom	10	900	9,000	
E-AC-4 Science/Computer Lab	0	1,000	0	
E-AC-5 Teacher Prep Area/Workroom	1	300	300	See Note 2 - E - 300 students
E-AC-6 Individual Restroom	1	60	60	
E-AC-7 Instructional Material Storage	1	200	200	See Note 3 - E - 300 students
E-AC-8 Small Group Room	***0***	***150***	***0***	***See Note 4***
E-AC-9 Multi-use Studio	***0***	***1,500***	***0***	***See Note 4***
E-AC-10 Kinesthetic Learning Studio	***1***	***1,200***	***1,200***	***See Note 4***
M-AC-1 Middle School Classroom	3	900	2,700	
M-AC-2 Project Laboratory	1	1,000	1,000	
M-AC-3 Sci/Tech/Eng/Math/Computer Lab	0	1,000	0	
M-AC-4 Teacher Prep Area/Workroom	1	300	300	See Note 2 - M - 150 students
M-AC-5 Individual Restroom	1	60	60	
M-AC-6 Instructional Material Storage	1	200	200	See Note 3 - M - 150 students
M-AC-7 Small Group Room	***0***	***150***	***0***	
M-AC-7a Small Group Room	***0***	***150***	***0***	***See Note 4***
M-AC-8 Multi-use Studio	***0***	***1,500***	***0***	***See Note 4***
M-AC-9 Kinesthetic Learning Studio	***0***	***1,200***	***0***	***See Note 4***
H-AC-1 High School Classroom	4	900	3,600	
H-AC-2 Science Classroom - General Phys	1	1,000	1,000	Requires a variance
H-AC-3 Science Classroom - Chemistry	1	1,000	1,000	Requires a variance
H-AC-4 Science Classroom - Biology	0	1,200	0	
H-AC-5 Science Prep	1	300	300	See Note 1 - H - 200 students
H-AC-6 Teacher Prep Area/Workroom	1	300	300	See Note 2 - H - 200 students
H-AC-7 Individual Restroom	1	60	60	
H-AC-8 Project/Classroom	0	1,100	0	
H-AC-9 Small Group Room	0	150	0	
H-AC-10 Instructional Material Storage	0	50	0	See Note 3 - H - 200 students
H-AC-11 Multi-Use Room	0	1,500	0	
H-AC-12 Science Laboratory	0	1,000	0	
H-AC-9a Small Group Room	***0***	***150***	***0***	***See Note 4***
H-AC-13 Multi-use Studio	***0***	***1,500***	***0***	***See Note 4***
H-AC-14 Kinesthetic Learning Studio	***0***	***1,200***	***0***	***See Note 4***
Academic Core Total			***23,800***	

Square Footage Allowance Notes			
Enroll	1	2	3
350-450	300	300	50
451-800	300	300	100
801-1200	400	400	150
1201-1600	400	600	200
Enrollment Determines SF Allowed			

Academic Core Notes	
Number	*Notes:*
4	*These spaces are provided to encourage the development of student centered learning environments as found in Section 1020. Minimum sizes are: E-AC-8, M-AC-7a, H-AC-9a=150 SF. E/M/H Multi-use Studio=1500 SF. E/M/H Kinesthetic Studio=1200 SF.*

Core Academic Worksheet

	New SF			Existing SF			TOTAL SF			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-AC-1 Pre-Kindergarten Classroom	0	1,200	0	0	0	0	0	varies	0	
E-AC-1 Kindergarten Classroom	0	1,200	0	0	0	0	0	varies	0	
E-AC-2 Pre-Kindergarten Restroom	0	60	0	0	0	0	0	varies	0	
E-AC-2 Kindergarten Restroom	0	60	0	0	0	0	0	varies	0	
E-AC-3 Elementary Classroom	0	900	0	0	0	0	0	varies	0	
E-AC-4 Science/Computer Lab	0	1,000	0	0	0	0	0	varies	**0**	
E-AC-5 Teacher Prep Area/Workroom	0	300	0	0	0	0	0	varies	0	See Note 2 - E - 300 students
E-AC-6 Individual Restroom	0	60	0	0	0	0	0	varies	0	
E-AC-7 Instructional Material Storage	0	50	0	0	0	0	0	varies	0	See Note 3 - E - 300 students
E-AC-8 Small Group Room	***0***	***150***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 4***
E-AC-9 Multi-use Studio	***0***	***1,500***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 4***
E-AC-10 Kinesthetic Learning Studio	***0***	***1,200***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 4***
M-AC-1 Middle School Classroom	0	900	0	0	0	0	0	varies	0	
M-AC-2 Project Laboratory	0	1,100	0	0	0	0	0	varies	0	
M-AC-3 Sci/Tech/Eng/Math/Computer Lab	0	1,000	0	0	0	0	0	varies	**0**	
M-AC-4 Teacher Prep Area/Workroom	0	300	0	0	0	0	0	varies	0	See Note 2 - M - 150 students
M-AC-5 Individual Restroom	0	60	0	0	0	0	0	varies	0	
M-AC-6 Instructional Material Storage	0	50	0	0	0	0	0	varies	0	See Note 3 - M - 150 students
M-AC-7 Small Group Room	***0***	***150***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	
M-AC-7a Small Group Room	***0***	***150***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 4***
M-AC-8 Multi-use Studio	***0***	***1,500***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 4***
M-AC-9 Kinesthetic Learning Studio	***0***	***1,200***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 4***
H-AC-1 High School Classroom	0	900	0	0	0	0	0	varies	0	
H-AC-2 Science Classroom - General/Phys	0	1,200	0	0	0	0	0	varies	0	Requires a variance
H-AC-3 Science Classroom - Chemistry	0	1,200	0	0	0	0	0	varies	0	Requires a variance
H-AC-4 Science Classroom - Biology	0	1,200	0	0	0	0	0	varies	0	
H-AC-5 Science Prep	0	300	0	0	0	0	0	varies	0	See Note 1 - H - 200 students
H-AC-6 Teacher Prep Area/Workroom	0	300	0	0	0	0	0	varies	0	See Note 2 - H - 200 students
H-AC-7 Individual Restroom	0	**60**	0	0	0	0	0	varies	0	
H-AC-8 Project/Classroom	0	1,100	0	0	0	0	0	varies	0	
H-AC-9 Small Group Room	0	150	0	0	0	0	0	varies	0	
H-AC-10 Instructional Material Storage	0	50	0	0	0	0	0	varies	0	See Note 3 - H - 200 students
H-AC-11 Multi-Use Room	0	1,500	0	0	0	0	0	varies	0	
H-AC-12 Science Laboratory	0	1,000	0	0	0	0	0	varies	0	
H-AC-9a Small Group Room	***0***	***150***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 4***
H-AC-13 Multi-use Studio	***0***	***1,500***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 4***
H-AC-14 Kinesthetic Learning Studio	***0***	***1,200***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 4***
Academic Core Total			***0***			***0***			***0***	

Sample School District, SAMPLE K-12 SCHOOL

SPECIAL EDUCATION SPACES

C-SE *CHAPTER 2: BRACKETING*

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS				
Space	**Qty**	**SF**	**Area**	
E/M/H-SE-1 Self-contained Classroom	1	900	900	See Note 1
E/M/H-SE-2 Workroom/Conference	1	150	150	See Note 2
E/M/H-SE-3 Restroom/Shower	1	100	100	
E/M/H-SE-4 Special Education/Resource	1	900	900	See Note 3
E/M/H-SE-5 Small Self-contained Classroom	1	600	600	
Special Education Total			**2,650**	

Special Education Worksheet

	New SF			Existing SF			TOTAL SF			
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
E/M/H-SE-1 Self-contained Classroom	0	900	0	0	0	0	0	varies	0	***See Note 1***
E/M/H-SE-2 Workroom/Conference	0	150	0	0	0	0	0	varies	0	***See Note 2***
E/M/H-SE-3 Restroom/Shower	0	100	0	0	0	0	0	varies	0	
E/M/H-SE-4 Special Education/Resource	0	900	0	0	0	0	0	varies	0	***See Note 3***
E/M/H-SE-5 Small Self-contained Classroom	0	600	0	0	0	0	0	varies	0	
Special Education Total			**0**			**0**			**0**	

Special Education Notes	
Number	**Notes:**
	Self-contained classroom(s) could 'house' various special education programs including, but not limited to, cognitive disability, emotional disturbance, multiple disabilities, etc.
	Workroom/Conference could 'house' orthopedic impairment, autism, speech therapy, occupational therapy, and physical therapy.
	Special Education/Resource could 'house' cognitive disability, hearing impairment, visual impairment, emotional disturbance, orthopedic impairment, autistic, traumatic, brain injury, learning disability, deaf/blindness, etc. See Chapter 1, Section 1110 for more information.

The following school size example illustrates the suggested instructional and support spaces. The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS				
Space	**Qty**	**SF**	**Area**	
E/M/H-AD-1 Reception Area	1	300	300	See Notes 1, 2, 3
E/M/H-AD-2 Secretarial Area	1	250	250	See Notes 4, 5, 6
E/M/H-AD-3 Principal's Office	1	150	150	
E/M/H-AD-4 Assistant Principal's Office	1	120	120	
E/M/H-AD-5 Conference Room	1	250	250	
E/M/H-AD-6 Mail/Work/Copy Room	1	200	200	See Notes 7, 8, 9
E/M/H-AD-7 Administrative Storage	1	75	75	See Note 10
E/M/H-AD-8 Vault/Records Storage	1	100	100	See Notes 11, 12, 13
E/M/H-AD-9 In-school Suspension	1	300	300	See Notes 14, 15, 16
E/M/H-AD-10 Restroom	**2**	**60**	120	
E/M/H-AD-11 Guidance Counselor's Office	2	120	240	
E/M/H-AD-12 Guidance Records/Storage	1	75	75	See Note 17
E/M/H-AD-13 Guidance Conference Room	1	200	200	See Note 18
E/M/H-AD-14 Parent/Volunteer Room	0	225	0	See Note 19
E/M/H-AD-15 Health Clinic (incl. RR)	1	350	350	See Notes 20, 21, 22
E/M/H-AD-16 Itinerant Personnel Office	1	120	120	
E/M/H-AD-17 Guidance Conf. & Career Ctr.	1	140	140	See Note 23
Administrative Total			**2,990**	

Administration Worksheet

	New SF			Existing SF			TOTAL SF			
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
E/M/H-AD-1 Reception Area	0	200	0	0	0	0	0	varies	0	See Notes 1, 2, 3
E/M/H-AD-2 Secretarial Area	0	200	0	0	0	0	0	varies	0	See Notes 4, 5, 6
E/M/H-AD-3 Principal's Office	0	150	0	0	0	0	0	varies	0	
E/M/H-AD-4 Assistant Principal's Office	0	120	0	0	0	0	0	varies	0	
E/M/H-AD-5 Conference Room	0	250	0	0	0	0	0	varies	0	
E/M/H-AD-6 Mail/Work/Copy Room	0	200	0	0	0	0	0	varies	0	See Notes 7, 8, 9
E/M/H-AD-7 Administrative Storage	0	150	0	0	0	0	0	varies	0	See Note 10
E/M/H-AD-8 Vault/Records Storage	0	***85***	0	0	0	0	0	varies	0	See Notes 11, 12, 13
E/M/H-AD-9 In-school Suspension	0	200	0	0	0	0	0	varies	0	See Notes 14, 15, 16
E/M/H-AD-10 Restroom	0	60	0	0	0	0	0	varies	0	
E/M/H-AD-11 Guidance Counselor's Office	0	120	0	0	0	0	0	varies	0	
E/M/H-AD-12 Guidance Records/Storage	0	100	0	0	0	0	0	varies	0	See Note 17
E/M/H-AD-13 Guidance Conference Room	0	***150***	0	0	0	0	0	varies	0	See Note 18
E/M/H-AD-14 Parent/Volunteer Room	0	***200***	0	0	0	0	0	varies	0	See Note 19
E/M/H-AD-15 Health Clinic (incl. RR)	0	400	0	0	0	0	0	varies	0	See Notes 20, 21, 22
E/M/H-AD-16 Itinerant Personnel Office	0	120	0	0	0	0	0	varies	0	
E/M/H-AD-17 Guidance Conf. & Career Ctr.	0	300	0	0	0	0	0	varies	0	See Note 23
Administrative Total			**0**			**0**			**0**	

Refer to SF Allowance Notes on next page

Sample School District, SAMPLE K-12 SCHOOL

ADMINISTRATIVE SPACES

C-AD CHAPTER 2: BRACKETING

Elementary School Square Footage Allowance Notes						
Student Enrollment	**1**	**4**	**7**	**11**	**14**	**20**
350-400 Students	200	200	200	50	***225***	300
401-550 Students	300	300	250	65	250	350
551-700 Students	400	400	300	80	***300***	450
Enrollment Determines SF Allowed						

Middle School or K-6 Square Footage Allowance Notes						
Student Enrollment	**2**	**5**	**8**	**12**	**15**	**21**
350-450 Students	200	200	200	50	200	350
451-600 Students	300	300	250	65	250	***400***
601-750 Students	400	400	300	80	325	450
Enrollment Determines SF Allowed						

High School or K-12 or 6-12 Square Footage Allowance Notes						
Student Enrollment	**3**	**6**	**9**	**13**	**16**	**22**
350-450 Students	200	200	200	***85***	200	400
451-800 Students	400	400	300	***115***	325	450
801-1200 Students	500	500	400	***145***	450	500
1201-1600 Students	600	600	500	***175***	575	550
Enrollment Determines SF Allowed						

All Grade Level Square Footage Allowance Notes					
Student Enrollment	**10**	**17**	**18**	**19**	**23**
350-450 Students	150	100	150	200	300
451-800 Students	150	100	200	300	400
801-1200 Students	200	200	250	400	500
1201-1600 Students	200	200	250	400	700
Enrollment Determines SF Allowed					

The following school size example illustrates the suggested instructional and support spaces. The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
E-MC-1	Reading Room/Circulation	1	900	900	See Note 1
E-MC-2	Media Specialist Office	0	120	0	
E-MC-3	Workroom/Storage	0	***190***	0	See Note 2
E-MC-4	Main Control/Equipment Rm	0	300	0	E - 300 students
E-MC-5	Conference Room	0	200	0	
M-MC-1	Reading Room/Circulation	1	525	525	See Note 3
M-MC-2	Media Specialist Office	0	120	0	
M-MC-3	Workroom/Storage	0	***150***	0	See Note 4
M-MC-4	Main Control/Equipment Rm	0	300	0	M - 150 students
M-MC-5	Conference Room	0	210	0	See Note 5
M-MC-6	Multimedia Production Room	0	***400***	0	See Note 6
H-MC-1	Reading Room/Circulation	1	700	700	See Note 7
H-MC-2	Media Specialist Office	1	120	120	
H-MC-3	Workroom/Storage	1	210	210	See Note 8
H-MC-4	Main Control/Equipment Rm	1	300	300	
H-MC-5	Conference Room	1	120	120	
H-MC-6	Multimedia Production Room	1	300	300	
H-MC-7	Document Storage	1	100	100	See Note 9
H-AC-9	Small Group Room		150	0	***See Note 10***
		0			
Media Center Total				**0**	

Media Center Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-MC-1	Reading Room/Circulation	0	0	0	0	0	0	0	varies	0	See Note 1
E-MC-2	Media Specialist Office	0	120	0	0	0	0	0	varies	0	
E-MC-3	Workroom/Storage	0	***190***	0	0	0	0	0	varies	0	See Note 2
E-MC-4	Main Control/Equipment Rm	0	300	0	0	0	0	0	varies	0	E - 300 students
E-MC-5	Conference Room	0	200	0	0	0	0	0	varies	0	
M-MC-1	Reading Room/Circulation	0	0	0	0	0	0	0	varies	0	See Note 3
M-MC-2	Media Specialist Office	0	120	0	0	0	0	0	varies	0	
M-MC-3	Workroom/Storage	0	***150***	0	0	0	0	0	varies	0	See Note 4
M-MC-4	Main Control/Equipment Rm	0	300	0	0	0	0	0	varies	0	M - 150 students
M-MC-5	Conference Room	0	210	0	0	0	0	0	varies	0	See Note 5
M-MC-6	Multimedia Production Room	0	***400***	0	0	0	0	0	varies	0	See Note 6
H-MC-1	Reading Room/Circulation	0	0	0	0	0	0	0	varies	0	See Note 7
H-MC-2	Media Specialist Office	0	120	0	0	0	0	0	varies	0	
H-MC-3	Workroom/Storage	0	300	0	0	0	0	0	varies	0	See Note 8
H-MC-4	Main Control/Equipment Rm	0	300	0	0	0	0	0	varies	0	
H-MC-5	Conference Room	0	250	0	0	0	0	0	varies	0	
H-MC-6	Multimedia Production Room	0	400	0	0	0	0	0	varies	0	
H-MC-7	Document Storage	0	200	0	0	0	0	0	varies	0	See Note 9
H-AC-9	Small Group Room	0	***160***	0	0	0	0	0	varies	0	***See Note 10***
Media Center Total				**0**			**0**			**0**	

Refer to SF Allowance Notes on next page.

Sample School District, SAMPLE K-12 SCHOOL

MEDIA CENTER SPACES

C-MC

Media Center Notes	
Number	**Notes:**
1	The size of the reading room/circulation space is equal to 10% of the elementary student enrollment multiplied by 30 SF per student.
3	The size of the reading room/circulation space is equal to 10% of the middle school student student enrollment multiplied by 35 SF per student.
7	The size of the reading room/circulation space is equal to 10% of the high school student enrollment multiplied by 35 SF per student.

Elementary School Square Footage Allowance	Note
Student Enrollment	**2**
350-400 Students	***190***
401-550 Students	***250***
551-700 Students	***340***
Enrollment Determines SF Allowed	

Middle School or K-6 Square Footage Allowance Notes			
Student Enrollment	**4**	**5**	**6**
350-450 Students	150	210	***400***
451-600 Students	***233***	280	400
601-750 Students	***350***	310	***400***
Enrollment Determines SF Allowed			

High School or K-12 or 6-12 Square Footage Allowance Notes			
Student Enrollment	**8**	**9**	***10***
350-450 Students	300	200	***160***
451-800 Students	400	300	***260***
801-1200 Students	500	300	***280***
1201-1600 Students	600	400	***330***
Enrollment Determines SF Allowed			

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE - 650 STUDENTS				
Space	**Qty**	**SF**	**Area**	
E-VA-1 Elementary Art Room	1	1,200	1,200	See Note 1
E-VA-2 Kiln/Ceramic Storage	1	100	100	See Note 2
E-VA-3 Art Material Storage	0	100	0	See Note 3
M-VA-1 Middle School Art Room	0	1,200	0	See Note 1
M-VA-2 Kiln/Ceramic Storage	0	100	0	See Note 2
M-VA-3 Art Material Storage	0	100	0	See Note 4
H-VA-1 High School Art Room	1	1,200	1,200	See Note 1
H-VA-2 Kiln/Ceramic Storage	1	100	100	See Note 2
H-VA-3 Art Material Storage	1	200	200	See Note 5
Visual Arts Total			**2,800**	

Visual Arts Worksheet

	New SF			Existing SF			TOTAL SF			
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
E-VA-1 Elementary Art Room	0	1,200	0	0	0	0	0	varies	0	See Note 1
E-VA-2 Kiln/Ceramic Storage	0	100	0	0	0	0	0	varies	0	See Note 2
E-VA-3 Art Material Storage	0	100	0	0	0	0	0	varies	0	See Note 3
M-VA-1 Middle School Art Room	0	1,200	0	0	0	0	0	varies	0	See Note 1
M-VA-2 Kiln/Ceramic Storage	0	100	0	0	0	0	0	varies	0	See Note 2
M-VA-3 Art Material Storage	0	100	0	0	0	0	0	varies	0	See Note 4
H-VA-1 High School Art Room	0	1,200	0	0	0	0	0	varies	0	See Note 1
H-VA-2 Kiln/Ceramic Storage	0	100	0	0	0	0	0	varies	0	See Note 2
H-VA-3 Art Material Storage	0	200	0	0	0	0	0	varies	0	See Note 5
Visual Arts Total			**0**			**0**			**0**	

All Grade Level Square Footage Allowance Notes		
Student Enrollment	**1**	**2**
350-450 Students	1200	100
451-800 Students	1200	200
801-1200 Students	1400	200
1201-1600 Students	1400	200
Enrollment Determines SF Allowed. Note 1: 1400 for HS only.		

Elem. School Sq.Ft. Allowance Notes	
Student Enrollment	**3**
350-400 Students	100
401-550 Students	125
551-700 Students	150
Enrollment Determines SF Allowed	

Mid. School & K-6 Sq. Ft. Allowance Notes	
Student Enrollment	**4**
350-450 Students	100
451-600 Students	150
601-750 Students	200
Enrollment Determines SF Allowed	

High School & K-12 or 6-12 Sq. Ft. Allowance Notes	
Student Enrollment	**5**
350-450 Students	200
451-800 Students	300
801-1200 Students	300
1201-1600 Students	300
Enrollment Determines SF Allowed	

Sample School District, SAMPLE K-12 SCHOOL

MUSIC SPACES

C-MU CHAPTER 2: BRACKETING

The following school size example illustrates the suggested instructional and support spaces
The example is intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE - 650 STUDENTS				
Space	**Qty**	**SF**	**Area**	
E-MU-1 Music Room	1	1,200	1,200	E - 300 students
M-MU-1 Instrumental Room	0	1,400	0	See Note 1
M-MU-2 Vocal Room	0	1,200	0	
M-MU-3 Music Library	1	200	200	M - 150 students
H-MU-1 Instrumental Room	1	1,800	1,800	See Note 2
H-MU-2 Instrument Storage	1	325	325	See Note 3
H-MU-3 Orchestra Storage	0	200	0	See Note 4
H-MU-4 Instrumental Music Office/Library	0	120	0	
H-MU-5 Uniform Storage	1	150	150	HS - 200 Students See Note 5
H-MU-6 Vocal Room	0	1,200	0	See Note 6
H-MU-7 Vocal Storage	0	150	0	See Note 7
H-MU-8 Vocal Music Office/Library	0	120	0	
H-MU-9 Ensemble Room	1	200	200	See Note 8
H-MU-10 Practice Room	1	80	80	
Music Total			**3,955**	

Music Worksheet										
	New SF			Existing SF			TOTAL SF			
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
E-MU-1 Music Room	0	1,200	0	0	0	0	0	varies	0	
M-MU-1 Instrumental Room	0	1,400	0	0	0	0	0	varies	0	See Note 1
M-MU-2 Vocal Room	0	1,200	0	0	0	0	0	varies	0	
M-MU-3 Music Library	0	200	0	0	0	0	0	varies	0	
H-MU-1 Instrumental Room	0	1,800	0	0	0	0	0	varies	0	See Note 2
H-MU-2 Instrument Storage	0	400	0	0	0	0	0	varies	0	See Note 3
H-MU-3 Orchestra Storage	0	200	0	0	0	0	0	varies	0	See Note 4
H-MU-4 Instrumental Music Library	0	120	0	0	0	0	0	varies	0	
H-MU-5 Uniform Storage	0	150	0	0	0	0	0	varies	0	See Note 5
H-MU-6 Vocal Room	0	1,200	0	0	0	0	0	varies	0	See Note 6
H-MU-7 Vocal Storage	0	150	0	0	0	0	0	varies	0	See Note 7
H-MU-8 Vocal Music Library	0	120	0	0	0	0	0	varies	0	
H-MU-9 Ensemble Room	0	200	0	0	0	0	0	varies	0	See Note 8
H-MU-10 Practice Room	0	80	0	0	0	0	0	varies	0	
Music Total			**0**			**0**			**0**	

Mid. School or K-6 Sq. Ft. Allowance Notes	
Student Enrollment	**1**
350-450 Students	1400
451-600 Students	1500
601-750 Students	1600
Enrollment Determines SF Allowed	

High School or 6-12 Square Footage Allowance Notes							
Student Enrollment	**2**	**3**	**4**	**5**	**6**	**7**	**8**
350-450 Students	1800	400	200	150	1200	150	200
451-800 Students	2000	500	250	200	1200	200	300
801-1200 Students	2500	600	250	300	1200	300	300
1201-1600 Students	3000	700	350	300	1500	300	300
Enrollment Determines SF Allowed							

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
E-PE-1	Gymnasium	0	0	0	See Note 1
E-PE-2	P. E. Workroom/Storage	0	0	0	See Note 2 - E - 300 students
M-PE-1	Gymnasium	1	***4,000***	4,000	See Note 3
M-PE-2	***Auxilary Gym***	***0***	***0***	***0***	***See Note 15***
M-PE-3	P.E./Athletic Office	0	75	0	
M-PE-4	Staff Shower	0	75	0	
M-PE-5	Student Locker Room	0	0	0	See Note 4 - M - 150 students
M-PE-6	Student Restroom/Shower	0	250	0	
M-PE-7	Physical Education Storage	0	0	0	See Note 5
H-PE-1	Gymnasium	1	***9,300***	9,300	See Note 6
H-PE-2	Auxiliary Gymnasium	0	0	0	See Note 7
H-PE-3	Student Locker Room	2	550	1,100	See Note 8
H-PE-4	Student Restroom/Shower	2	200	400	See Note 9
H-PE-5	Physical Education Storage	1	400	400	See Note 10 - H - 200 students
H-PE-6	P.E./Athletic Office	2	75	150	
H-PE-7	Staff Shower	2	75	150	
H-PE-8	Athletic Director's Office	0	120	0	
H-PE-9	Lobby Services	1	100	100	See Note 11
H-PE-10	Training Room	1	200	200	See Note 12
H-PE-11	Physical Health Classroom	0	0	0	See Note 13
H-PE-12	Multi-use P.E. Room	0	1,200	0	See Note 14
Physical Education Total				**15,800**	

Physical Education Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-PE-1	Gymnasium	0	***3,500***	0	0	0	0	0	varies	0	See Note 1
E-PE-2	P. E. Workroom/Storage	0	200	0	0	0	0	0	varies	0	See Note 2 - E - 300 students
M-PE-1	Gymnasium	0	***7,000***	0	0	0	0	0	varies	0	See Note 3
M-PE-2	***Auxilary Gym***	***0***	***0***	0	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 15***
M-PE-3	P.E./Athletic Office	0	75	0	0	0	0	0	varies	0	
M-PE-4	Staff Shower	0	75	0	0	0	0	0	varies	0	
M-PE-5	Student Locker Room	0	***600***	0	0	0	0	0	varies	0	See Note 4 - M - 150 students
M-PE-6	Student Restroom/Shower	0	250	0	0	0	0	0	varies	0	
M-PE-7	Physical Education Storage	0	***300***	0	0	0	0	0	varies	0	See Note 5
H-PE-1	Gymnasium	0	***9,300***	0	0	0	0	0	varies	0	See Note 6
H-PE-2	Auxiliary Gymnasium	0	7,000	0	0	0	0	0	varies	0	See Note 7
H-PE-3	Student Locker Room	0	550	0	0	0	0	0	varies	0	See Note 8
H-PE-4	Student Restroom/Shower	0	200	0	0	0	0	0	varies	0	See Note 9
H-PE-5	Physical Education Storage	0	400	0	0	0	0	0	varies	0	See Note 10 - H - 200 students
H-PE-6	P.E./Athletic Office	0	75	0	0	0	0	0	varies	0	
H-PE-7	Staff Shower	0	75	0	0	0	0	0	varies	0	
H-PE-8	Athletic Director's Office	0	120	0	0	0	0	0	varies	0	
H-PE-9	Lobby Services	0	100	0	0	0	0	0	varies	0	See Note 11
H-PE-10	Training Room	0	200	0	0	0	0	0	varies	0	See Note 12
H-PE-11	Physical Health Classroom	0	750	0	0	0	0	0	varies	0	See Note 13
H-PE-12	Multi-use P.E. Room	0	***1,400***	0	0	0	0	0	varies	0	See Note 14
Physical Education Total				**0**			**0**			**0**	

Refer to Square Footage Allowance Notes on next page.

Sample School District, SAMPLE K-12 SCHOOL

PHYSICAL EDUCATION SPACES

C-PE CHAPTER 2: BRACKETING

Elementary School Square Footage Allowance	Notes	
Student Enrollment	**1**	**2**
350-400 Students	3500	200
401-550 Students	***4000***	300
551-700 Students	***4700***	400
Enrollment Determines SF Allowed		

Middle School or K-6 Square Footage Allowance	Notes		
Student Enrollment	**3**	**4**	**5**
350-450 Students	7000	***600***	***300***
451-600 Students	***7500***	600	***325***
601-750 Students	***8000***	650	500
Enrollment Determines SF Allowed			

Physical Education Notes	
Number	***Notes:***
15	***Auxilary Gym may be selected for student enrollments above 1000 MS students.***

High School or K-12 or 6-12 Square Footage Allowance Notes									
Student Enrollment	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
350-450 Students	***9300***	7000	550	200	400	100	200	750	***1400***
451-800 Students	***10700***	7000	650	250	600	200	300	1500	***1400***
801-1200 Students	***12400***	7000	700	300	800	200	400	1500	***1600***
1201-1600 Students	***14000***	7000	850	350	1000	200	500	2000	***1800***
Enrollment Determines SF Allowed									

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
E/M/H-SD-1	Student Dining	1	3,792	3,792	See Note 1
E/M/H-SD-2	Stage	1	1,000	1,000	
E&M-SD-3/H-SD-7	Staff Dining	0		0	See Note 2
E&M-SD-4/H-SD-8	Table Storage	1	400	400	See Note 3
H-SD-3	Scene Shop and Storage	1	350	350	See Note 4
H-SD-4	Make-up/Dressing Rooms	2	200	400	See Note 5
H-SD-5	Theatrical Control Room	1	150	150	
H-SD-6	Drama Storage	1	150	150	See Note 6
H-SD-9	Family Restroom	1	80	80	
H.S. Student Dining Total				**6,322**	

Student Dining Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E/M/H-SD-1	Student Dining	0	3,000	0	0	0	0	0	varies	0	See Note 1
E/M/H-SD-2	Stage	0	0	0	0	0	0	0	varies	0	
E&M-SD-3/H-SD-7	Staff Dining	0	250	0	0	0	0	0	varies	0	See Note 2
E&M-SD-4/H-SD-8	Table Storage	0	300	0	0	0	0	0	varies	0	See Note 3
H-SD-3	Scene Shop and Storage	0	400	0	0	0	0	0	varies	0	See Note 4
H-SD-4	Make-up/Dressing Rooms	0	200	0	0	0	0	0	varies	0	See Note 5
H-SD-5	Theatrical Control Room	0	200	0	0	0	0	0	varies	0	
H-SD-6	Drama Storage	0	200	0	0	0	0	0	varies	0	See Note 6
H-SD-9	Family Restroom	0	80	0	0	0	0	0	varies	0	
Student Dining Total				**0**			**0**			**0**	

Student Dining Notes	
Number	Notes:
1	The size of the Student Dining space is equal to one-third of the student enrollment multiplied by 17.5 SF per student or 3,000 SF, whichever is greater.

All Grade Level Square Footage Allowance Notes		
Student Enrollment	2	3
350-500 Students	250	300
501-700 Students	400	400
701-900 Students	550	500
901-Larger Students	700	600
Enrollment Determines SF Allowed		

High School & K-12 or 6-12 Square Footage Allowance Notes			
Student Enrollment	4	5	6
350-450 Students	400	200	200
451-800 Students	450	250	400
801-1200 Students	500	250	500
1201-1600 Students	600	300	600
Enrollment Determines SF Allowed			

Sample School District, SAMPLE K-12 SCHOOL
FAMILY AND COMSUMER SCIENCE SPACES
C-FCS

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS				
Space	**Qty**	**SF**	**Area**	
M-FCS-1 Life Skills Lab	1	1,100	1,100	
M-FCS-2 Life Skills Storage	0	100	0	
H-FCS-1 Life Skills Lab	1	1,200	1,200	
H-FCS-2 Life Skills Storage	1	200	200	See Note 1
H-FCS-3 Laundry	1	150	150	
H-FCS-4 Child Development	0	1,200	0	
Family and Consumer Science Total			**2,650**	

Family And Consumer Science Worksheet

	New SF			Existing SF			TOTAL SF			
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
M-FCS-1 Life Skills Lab	0	1,100	0	0	0	0	0	varies	0	
M-FCS-2 Life Skills Storage	0	100	0	0	0	0	0	varies	0	
H-FCS-1 Life Skills Lab	0	1,200	0	0	0	0	0	varies	0	
H-FCS-2 Life Skills Storage	0	200	0	0	0	0	0	varies	0	See Note 1
H-FCS-3 Laundry	0	150	0	0	0	0	0	varies	0	
H-FCS-4 Child Development	0	1,200	0	0	0	0	0	varies	0	
Family and Consumer Science Total			**0**			**0**			**0**	

High School or 6-12 Sq. Ft. Allowance Notes	
Student Enrollment	**1**
350-450 Students	200
451-800 Students	250
801-1200 Students	300
1201-1600 Students	350
Enrollment Determines SF Allowed	

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS				
Space	**Qty**	**SF**	**Area**	
M-TE-1a Modular Technology Lab	1	1,300	1,300	
M-TE-1b Production Lab	0	1,300	0	
M-TE-2 Storage	1	150	150	See Note 1
H-TE-1 Modular Technology Lab	1	1,800	1,800	
H-TE-1a Ag-Ed Lab	0	1,800	0	
H-TE-2 Storage	1	100	100	See Note 1
H-TE-3 CAD Lab	0	1,200	0	
H-TE-4 Production Lab	0	1,600	0	
Technology Education Total			**3,350**	

Technology Education Worksheet										
	New SF			Existing SF			TOTAL SF			
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
M-TE-1a Modular Technology Lab	0	1,300	0	0	0	0	0	varies	0	
M-TE-1b Production Lab	0	1,300	0	0	0	0	0	varies	0	
M-TE-2 Storage	0	150	0	0	0	0	0	varies	0	See Note 1
H-TE-1 Modular Technology Lab	0	1,800	0	0	0	0	0	varies	0	
H-TE-1a Ag-Ed Lab	0	1,800	0	0	0	0	0	varies	0	
H-TE-2 Storage	0	150	0	0	0	0	0	varies	0	See Note 1
H-TE-3 CAD Lab	0	1,200	0	0	0	0	0	varies	0	
H-TE-4 Production Lab	0	1,600	0	0	0	0	0	varies	0	
Technology Education Total			**0**			**0**			**0**	

High School or 6-12 Sq. Ft. Allowance Notes	
Student Enrollment	**1**
350-450 Students	150
451-800 Students	200
801-1200 Students	200
1201-1600 Students	200
Enrollment Determines SF Allowed	

Sample School District, SAMPLE K-12 SCHOOL

BUSINESS EDUCATION SPACES

E CHAPTER 2: BRACKETING

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS				
Space	**Qty**	**SF**	**Area**	
H-BE-1 Computer and Business Classroom	0	1,200	0	
H-BE-2 Marketing Classroom	0	900	0	
H-BE-3 Workroom/Storage	0	100	0	See Note 1
Business Education Total			0	

Business Education Worksheet

	New SF			Existing SF			TOTAL SF			
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
H-BE-1 Computer and Business Classroom	0	1,200	0	0	0	0	0	varies	0	
H-BE-2 Marketing Classroom	0	900	0	0	0	0	0	varies	0	
H-BE-3 Workroom/Storage	0	100	0	0	0	0	0	varies	0	See Note 1
Business Education Total			**0**			**0**			**0**	

High School Sq. Ft. Allowance Notes	
Student Enrollment	**1**
350-450 Students	100
451-800 Students	200
801-1200 Students	250
1201-1600 Students	300
Enrollment Determines SF Allowed	

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
E/M/H-FS-0	Warming Kitchen	0	1,300	0	See Note 1
E/M/H-FS-1	Kitchen (total)	1		2,275	See Note 1 & 2
E/M/H-FS-1a	Preparation Area	1	819		See Kitchen Area Notes
E/M/H-FS-1b	Serving Area	1	774		See Kitchen Area Notes
E/M/H-FS-1c	Dry Food Storage	1	250		See Kitchen Area Notes
E/M/H-FS-1d	Cooler/Freezer	1	228		See Kitchen Area Notes
E/M/H-FS-1e	Ware Washing	1	205		See Kitchen Area Notes
E/M/H-FS-2	Dietician Office	1	75	75	
E/M/H-FS-3	RestroomLocker Rm	1	140	140	
Food Service Total				**2,490**	

Food Services Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E/M/H-FS-0	Warming Kitchen	0	0	0	0	0	0	0	varies	0	See Note 1
E/M/H-FS-1	Kitchen (total)	0		0	0		0	0		0	See Note 1 & 2
E/M/H-FS-1a	Preparation Area		0			0			varies		See Kitchen Area Notes
E/M/H-FS-1b	Serving Area		0			0			varies		See Kitchen Area Notes
E/M/H-FS-1c	Dry Food Storage		0			0			varies		See Kitchen Area Notes
E/M/H-FS-1d	Cooler/Freezer		0			0			varies		See Kitchen Area Notes
E/M/H-FS-1e	Ware Washing		0			0			varies		See Kitchen Area Notes
E/M/H-FS-2	Dietician Office	0	75	0	0	0	0	0	varies	0	
E/M/H-FS-3	RestroomLocker Rm	0	140	0	0	0	0	0	varies	0	
Food Service Total				**0**			**0**			**0**	

Food Service Notes	
Number	**Notes:**
	Only one of the two Kitchens is to be used - either E/M/H-FS-0 OR E/M/H-FS-1 - not both.
	The size of the kitchen is equal to the sum of preparation area, serving area, dry food storage area, cooler/freezer area, and ware washing area.

Kitchen Area Sizes					
Food Service Area	**Enrol**	**X**	**SF/Student**	**x**	**%**
Preparation Area	Enroll	x	3.5	x	36%
Serving Areas	Enroll	x	3.5	x	34%
Dry Food Storage	Enroll	x	3.5	x	11%
Cooler/	Enroll	x	3.5	x	10%
Ware Washing Area	Enroll	x	3.5	x	9%
Warming Kitchen	Enroll	x	2.0		
Multiply Enrollment x SF/Student x % to achieve size of area					

Sample School District, SAMPLE K-12 SCHOOL

CUSTODIAL SPACES

U CHAPTER 2: BRACKETING

The following school size example illustrates the suggested instructional and support spaces. The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS				
Space	**Qty**	**SF**	**Area**	
E/M/H-CU-1 Workroom	1	400	400	See Note 1
E/M/H-CU-2 Custodial Office	1	100	100	
Custodial Total			**500**	

Custodial Worksheet										
	New SF			Existing SF			TOTAL SF			
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
E/M/H-CU-1 Workroom	0	200	0	0	0	0	0	varies	0	See Note 1
E/M/H-CU-2 Custodial Office	0	100	0	0	0	0	0	varies	0	
Custodial Total			**0**			**0**			**0**	

All Grade Level Square Footage Allowance Notes	
Student Enrollment	**1**
350-450 Students	200
451-800 Students	400
801-1200 Students	400
1201-1600 Students	400
Enrollment Determines SF Allowed	

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS				
Space	**Qty**	**SF**	**Area**	
E/M/H-BS-1 Large Group Restrooms		2,470	2,470	See Build Svc Sizes
E/M/H-BS-2 Custodial Closet	2	50	100	
E/M/H-BS-3 Electrical Closet	2	50	100	
E/M/H-BS-4 Telecommunications Room (TR)	2	64	128	See Note 1
E/M/H-BS-5 Corridors		14,116	14,116	See Build Svc Sizes
E/M/H-BS-6 Mechanical Rooms/Decks		4,870	4,870	See Build Svc Sizes
E/M/H-BS-7 Storage Area	1	200	200	See SF Allowance
E/M/H-BS-8 Central Storage Area	1	***200***	200	See SF Allowance
E/M/H-BS-9 Loading/Receiving Area	1	120	120	
E/M/H-BS-10 Restroom	0	60	0	
E/M/H-BS-11Recycling Room	***1***	***100***	***100***	***See SF Allowance***
Building Services Total			**22,405**	

Building Services Worksheet

	New SF			Existing SF			TOTAL SF			
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
E/M/H-BS-1 Large Group Restrooms	-	0	0	-	0	0	-	varies	0	See Build Svc Sizes
E/M/H-BS-2 Custodial Closet	0	50	0	0	0	0	0	varies	0	
E/M/H-BS-3 Electrical Closet	0	50	0	0	0	0	0	varies	0	
E/M/H-BS-4 Telecommunications Room (TR)	0	64	0	0	0	0	0	varies	0	See Note 1
E/M/H-BS-5 Corridors	-	0	0	-	0	0	-	varies	0	See Build Svc Sizes
Vertical Circulation	-	0	0	-	0	0	-	varies	0	See Note 2
E/M/H-BS-6 Mechanical/Electrical Space/Decks	-	0	0	-	0	0	-	varies	0	See Build Svc Sizes
E/M/H-BS-7 Storage Area	0	150	0	0	0	0	0	varies	0	See SF Allowance
E/M/H-BS-8 Central Storage Area	0	***170***	0	0	0	0	0	varies	0	See SF Allowance
E/M/H-BS-9 Loading/Receiving Area	0	120	0	0	0	0	0	varies	0	
E/M/H-BS-10 Restroom	0	60	0	0	0	0	0	varies	0	
E/M/H-BS-11Recycling Room	***0***	***80***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See SF Allowance***
Building Services Total			***0***			***0***			***0***	

Building Services Notes	
Number	**Notes:**
	Size of Telecommunications Room varies with size of school. See page***4111-4, 5113-4 &*** 6114-***4*** .
	Vertical Circulation refers only to the following: Stairways/staitowers, monumental stairs, elevators and elevator equipment room.

Building Services Area Sizes			
Building Services Areas	**Prog**	**X**	**%**
Large Group Restrooms	Prog	x	3.5
Corridors	Prog	x	20.0
Mechanical/Electrical Space/Decks	Prog	x	6.9
Multiply Sum of Program Areas - Building Services x % to achieve size of area			

Square Footage Allowance Notes			
Student Enrollment	**Stor**	**Ctl Stor**	***Recycle***
350-450 Students	150	***170***	***80***
451-800 Students	200	***200***	***100***
801-1200 Students	250	***220***	***130***
1201-1600 Students	250	***240***	***160***
Enrollment Determines SF Allowed			

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Previously, changes or additions made during the annual update of the Design Manual have been ***"bolded and italicized"*** for easy identification. Changes have been made to the formulas on this sheet which have not been bolded and italicized. The user is advised to carefully review all information.

EXAMPLE-690 Students			
Grade Configuration:		**K-12**	Area
Student *Enrollment*		**K - 8**	
	Enter number of Elementary School students	462	
	Enter number of Middle School students	228	
	Total Student ***Enrollment***	**690**	
SF per student			
	SF per Elementary School student	118	54,692
	SF per Middle School student	147	33,623
	Total Gross Square Feet Funded		**88,315**
C-AC	Academic Core Spaces		22,530
C-SE	Special Education Spaces		2,650
C-AD	Administrative Spaces		3,534
C-MC	Media Center Spaces		3,737
C-VA	Visual Arts Spaces		2,725
C-MU	Music Spaces		2,800
C-PE	Physical Education Spaces		11,525
C-SD	Student Dining Spaces		4,930
C-FCS	Family and Consumer Science Spaces		1,200
C-TE	Technology Education Spaces		1,450
C-FS	Food Service Spaces		2,630
C-CU	Custodial Spaces		500
	Facility Subtotal:		**60,211**
C-BS	Building Services		19,352
	Facility Total:		**79,563**
Construction Factor (11% multiplied by the facility total)			0.11
	Gross Square Feet Developed:		**88,315**
Difference of GSF developed from GSF allowable			(0)

Sample School District, SAMPLE K-8 SCHOOL

SUMMARY OF SPACES WORKSHEET

Previously, changes or additions made during the annual update of the Design Manual have been ***"bolded and italicized"*** for easy identification. Changes have been made to the formulas on this sheet which have not been bolded and italicized. The user is advised to carefully review all information.

WORKSHEET				
Grade Configuration:			**Area**	
Student Enrollment		***K-8***		
	Enter number of Elementary School students			
	Enter number of Middle School students			
	Total Student Enrollment		-	
SF per student				
	SF per Elementary School student		***0***	-
	SF per Middle School student		***0***	-
	Total Gross Square Feet Funded			-
SELECT ON	○ Single or Two Story Build ◉ 3 Stories or greater			See Note 1
	Vert. Cir. Area Allowance (3 Stories or greater)			0
	Total Adjusted POR Gross Square Footage			**0**

	Program Area	New SF	Existing SF*	TOTAL SF	
C-AC	Academic Core Spaces	***0***	0	0	
C-SE	Special Education Spaces	***0***	0	0	
C-AD	Administrative Spaces	***0***	0	0	
C-MC	Media Center Spaces	***0***	0	0	
C-VA	Visual Arts Spaces	***0***	0	0	
C-MU	Music Spaces	***0***	0	0	
C-PE	Physical Education Spaces	***0***	0	0	
C-SD	Student Dining Spaces	***0***	0	0	
C-FCS	Family and Consumer Science Spaces	***0***	0	0	
C-TE	Technology Education Spaces	***0***	0	0	
C-FS	Food Service Spaces	***0***	0	0	
C-CU	Custodial Spaces	***0***	0	0	
	Facility Subtotal:	***0***	**0**	**0**	
C-BS	Building Services	***0***	0	0	
Facility Total		***0***	**0**	**0**	
Construction Factor (11% multiplied by the facility total)		***0.11***	na	na	
Actual Gross Square Feet Developed		***0***	0	**0**	See Note 2
Minus existing ***co-funded*** Oversize Area from Master Plan			0	-	See Note 3
Adjusted Existing Area			**0**	-	
Total Adjusted Gross Square Footage Developed (without Oversize Area)				**0**	
Difference of GSF developed from GSF allowable				**0**	

Worksheet Summary Notes	
Number	**Notes:**
Special	Individual spaces are taken from the space plates which are located throughout Chapters 4, 5, and 6. Please see these particular chapters for specific requirements for each space.
	Vertical Circulation (3 Stories or greater) refers only to the following: Stairways/stairtowers, monumental stairs, elevators, and elevator equipment room.
	Existing Gross Square Feet taken from master facility plan.
	Oversize Area also taken from master facility plan.
*	The Existing SF column is used in projects where there are to be building additions or renovations.

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 690 STUDENTS				
Space		Qty	SF	Area
E-AC-1	Pre-Kindergarten Classroom	1	1,200	1,200
E-AC-1	Kindergarten Classroom	1	1,200	1,200
E-AC-2	Pre-Kindergarten Restroom	1	60	60
E-AC-2	Kindergarten Restroom	1	60	60
E-AC-3	Elementary Classroom	16	900	14,400
E-AC-4	Science/Computer Lab	0	***1,000***	***0***
E-AC-5	Teacher Prep Area/Workroom	1	300	300
E-AC-6	Individual Restroom	1	60	60
E-AC-7	Instructional Material Storage	1	200	200
E-AC-8	***Small Group Room***	***0***	***150***	***0***
E-AC-9	***Multi-use Studio***	***0***	***1,500***	***0***
E-AC-10	***Kinesthetic Learning Studio***	***0***	***1,200***	***0***
M-AC-1	Middle School Classroom	4	900	3,600
M-AC-2	Project Laboratory	1	1,000	1,000
M-AC-3	Sci/Tech/Eng/Math/Computer Lab	0	***1,000***	***0***
M-AC-4	Teacher Prep Area/Workroom	1	250	250
M-AC-5	Individual Restroom	0	60	0
M-AC-6	Instructional Material Storage	1	200	200
M-AC-7	***Small Group Room***	***0***	***150***	***0***
M-AC-7a	***Small Group Room***	***0***	***150***	***0***
M-AC-8	***Multi-use Studio***	***0***	***1,500***	***0***
M-AC-9	***Kinesthetic Learning Studio***	***0***	***1,200***	***0***
Academic Core Total				***22,530***

See Note 1 - E - 462 students	
See Note 2	
See Note 3	
See Note 3	
See Note 3	
See Note 1 - M - 228 students	
See Note 2	
See Note 3	
See Note 3	
See Note 3	

Square Footage Allowance Note		
Enroll	1	2
350-450	300	50
451-800	300	100
801-1200	400	150
1201-1600	600	200
Enrollment Determines SF Allowed		

Core Academic Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-AC-1	Pre-Kindergarten Classroom	0	1,200	0	0	0	0	0	varies	0	
E-AC-1	Kindergarten Classroom	0	1,200	0	0	0	0	0	varies	0	
E-AC-2	Pre-Kindergarten Restroom	0	60	0	0	0	0	0	varies	0	
E-AC-2	Kindergarten Restroom	0	60	0	0	0	0	0	varies	0	
E-AC-3	Elementary Classroom	0	900	0	0	0	0	0	varies	0	
E-AC-4	Science/Computer Lab	0	1,000	0	0	0	0	0	varies	**0**	
E-AC-5	Teacher Prep Area/Workroom	0	***300***	0	0	0	0	0	varies	0	***See Note 1 - E - 462 students***
E-AC-6	Individual Restroom	0	60	0	0	0	0	0	varies	0	
E-AC-7	Instructional Material Storage	0	***50***	0	0	0	0	0	varies	0	***See Note 2***
E-AC-8	***Small Group Room***	***0***	***150***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 3***
E-AC-9	***Multi-use Studio***	***0***	***1,500***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 3***
E-AC-10	***Kinesthetic Learning Studio***	***0***	***1,200***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 3***
M-AC-1	Middle School Classroom	0	900	0	0	0	0	0	varies	0	
M-AC-2	Project Laboratory	0	1,100	0	0	0	0	0	varies	0	
M-AC-3	Sci/Tech/Eng/Math/Computer Lab	0	1,000	0	0	0	0	0	varies	**0**	
M-AC-4	Teacher Prep Area/Workroom	0	***300***	0	0	0	0	0	varies	0	***See Note 1 - M - 228 students***
M-AC-5	Individual Restroom	0	60	0	0	0	0	0	varies	0	
M-AC-6	Instructional Material Storage	0	***50***	0	0	0	0	0	varies	0	***See Note 2***
M-AC-7	***Small Group Room***	***0***	***150***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	
M-AC-7a	***Small Group Room***	***0***	***150***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 3***
M-AC-8	***Multi-use Studio***	***0***	***1,500***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 3***
M-AC-9	***Kinesthetic Learning Studio***	***0***	***1,200***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 3***
Academic Core Total				***0***			***0***			***0***	

Academic Core Notes	
Number	***Notes:***
3	***These spaces are provided to encourage the development of student centered learning environments as found in Section 1020. Minimum sizes are: E-AC-8, M-AC-7a = 150 SF, E/M Multi-use Studio=1500 SF. E/M Kinesthetic Studio=1200 SF.***

Sample School District, SAMPLE K-8 SCHOOL

SPECIAL EDUCATION SPACES

C-SE

The following school size example illustrates the suggested instructional and support spaces
The example is intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE - 690 STUDENTS					
Space		Qty	SF	Area	
E/M-SE-1	Self-contained Classroom	1	900	900	See Note 1
E/M-SE-2	Workroom/Conference	1	150	150	See Note 2
E/M-SE-3	Restroom/Shower	1	100	100	
E/M-SE-4	Special Education/Resource	1	900	900	See Note 3
E/M-SE-5	Small Self-contained Classroo	1	600	600	
Special Education Total				**2,650**	

Special Education Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E/M-SE-1	Self-contained Classroom	0	900	0	0	0	0	0	varies	0	See Note 1
E/M-SE-2	Workroom/Conference	0	150	0	0	0	0	0	varies	0	See Note 2
E/M-SE-3	Restroom/Shower	0	100	0	0	0	0	0	varies	0	
E/M-SE-4	Special Education/Resource	0	900	0	0	0	0	0	varies	0	See Note 3
E/M-SE-5	Small Self-contained Classroo	0	600	0	0	0	0	0	varies	0	
Special Education Total				**0**			**0**			**0**	

Special Education Notes	
Number	**Notes:**
	Self-contained classroom(s) could 'house' various special education programs including, but not limited to, cognitive disability, emotional disturbance, multiple disabilities, etc.
	Workroom/Conference could 'house' orthopedic impairment, autism, speech therapy, occupational therapy, and physical therapy.
	Special Education/Resource could 'house' cognitive disability, hearing impairment, visual impairment, emotional disturbance, orthopedic impairment, autistic, traumatic, brain injury, learning disability, deaf/blindness, etc. See Chapter 1, Section 1110 for more information.

The following school size example illustrates the suggested instructional and support spaces. The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 690 STUDENTS					
Space		Qty	SF	Area	
E/M-AD-1	Reception Area	1	500	500	See Notes 1, 2
E/M-AD-2	Secretarial Area	1	500	500	See Notes 3,4
E/M-AD-3	Principal's Office	1	150	150	
E/M-AD-4	Assistant Principal's Office	1	120	120	
E/M-AD-5	Conference Room	1	250	250	
E/M-AD-6	Mail/Work/Copy Room	1	300	300	See Notes 5,6
E/M-AD-7	Administrative Storage	1	125	125	See Note 7
E/M-AD-8	Vault/Records Storage	1	115	115	See Notes 8,9
E/M-AD-9	In-school Suspension	1	300	300	See Notes 10,11
E/M-AD-10	Restroom	2	60	120	
E/M-AD-11	Guidance Counselor's Office	2	120	240	
E/M-AD-12	Guidance Records/Storage	1	110	110	See Note 12
E/M-AD-13	Guidance Conference Room	0	200	0	See Note 13
E/M-AD-14	Parent/Volunteer Room	1	234	234	See Note 14
E/M-AD-15	Health Clinic (incl. RR)	1	350	350	See Notes 15,16
E/M-AD-16	Itinerant Personnel Office	1	120	120	
E/M-AD-17	Guidance Conf. & Career Ctr.	0	300	0	See Note 17
Administrative Total				**3,534**	

Administration Worksheet											
		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E/M-AD-1	Reception Area	0	200	0	0	0	0	0	varies	0	See Notes 1, 2
E/M-AD-2	Secretarial Area	0	200	0	0	0	0	0	varies	0	See Notes 3,4
E/M-AD-3	Principal's Office	0	150	0	0	0	0	0	varies	0	
E/M-AD-4	Assistant Principal's Office	0	120	0	0	0	0	0	varies	0	
E/M-AD-5	Conference Room	0	250	0	0	0	0	0	varies	0	
E/M-AD-6	Mail/Work/Copy Room	0	200	0	0	0	0	0	varies	0	See Notes 5,6
E/M-AD-7	Administrative Storage	0	150	0	0	0	0	0	varies	0	See Note 7
E/M-AD-8	Vault/Records Storage	0	50	0	0	0	0	0	varies	0	See Notes 8,9
E/M-AD-9	In-school Suspension	0	200	0	0	0	0	0	varies	0	See Notes 10,11
E/M-AD-10	Restroom	0	60	0	0	0	0	0	varies	0	
E/M-AD-11	Guidance Counselor's Office	0	120	0	0	0	0	0	varies	0	
E/M-AD-12	Guidance Records/Storage	0	100	0	0	0	0	0	varies	0	See Note 12
E/M-AD-13	Guidance Conference Room	0	150	0	0	0	0	0	varies	0	See Note 13
E/M-AD-14	Parent/Volunteer Room	0	***200***	0	0	0	0	0	varies	0	See Note 14
E/M-AD-15	Health Clinic (incl. RR)	0	***350***	0	0	0	0	0	varies	0	See Notes 15,16
E/M-AD-16	Itinerant Personnel Office	0	120	0	0	0	0	0	varies	0	
E/M-AD-17	Guidance Conf. & Career Ctr.	0	300	0	0	0	0	0	varies	0	See Note 17
Administrative Total				**0**			**0**			**0**	

Refer to SF Allowance Notes on next page

Sample School District, SAMPLE K-8 SCHOOL

ADMINISTRATIVE SPACES

C-AD CHAPTER 2: BRACKETING

Elementary School Square Footage Allowance Notes						
Student Enrollment	**1**	**3**	**5**	**8**	**10**	**15**
350-400 Students	200	200	200	50	***225***	300
401-550 Students	300	300	250	65	250	350
551-700 Students	400	400	300	80	***300***	450
Enrollment Determines SF Allowed						

Middle School or K-8 Square Footage Allowance Notes						
Student Enrollment	**2**	**4**	**6**	**9**	**11**	**16**
350-450 Students	200	200	200	50	200	350
451-600 Students	300	300	250	65	250	***400***
601-750 Students	400	400	300	80	325	450
Enrollment Determines SF Allowed						

All Grade Level Square Footage Allowance Notes					
Student Enrollment	**7**	**12**	**13**	**14**	**17**
350-450 Students	150	100	150	200	300
451-800 Students	150	100	200	300	400
801-1200 Students	200	200	250	400	500
1201-1600 Students	200	200	250	400	700
Enrollment Determines SF Allowed					

The following school size example illustrates the suggested instructional and support spaces
The example is intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE - 690 STUDENTS				
Space	Qty	SF	Area	
E-MC-1 Reading Room/Circulation	1	1,350	1,350	See Note 1
E-MC-2 Media Specialist Office	0	120	0	
E-MC-3 Workroom/Storage	1	260	260	See Note 2
E-MC-4 Main Control/Equipment Room	1	300	300	E - 462 students
E-MC-5 Conference Room	1	200	200	
M-MC-1 Reading Room/Circulation	1	727	727	See Note 3
M-MC-2 Media Specialist Office	1	120	120	
M-MC-3 Workroom/Storage	0	250	0	See Note 4
M-MC-4 Main Control/Equipment Room	0	300	0	M - 228 students
M-MC-5 Conference Room	1	380	380	See Note 5
M-MC-6 Multimedia Production Room	1	400	400	See Note 6
Media Center Total			**3,737**	

Media Center Worksheet

	New SF			Existing SF			TOTAL SF			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-MC-1 Reading Room/Circulation	0	0	0	0	0	0	0	varies	0	See Note 1
E-MC-2 Media Specialist Office	0	120	0	0	0	0	0	varies	0	
E-MC-3 Workroom/Storage	0	***190***	0	0	0	0	0	varies	0	See Note 2
E-MC-4 Main Control/Equipment Room	0	300	0	0	0	0	0	varies	0	E - 462 students
E-MC-5 Conference Room	0	200	0	0	0	0	0	varies	0	
M-MC-1 Reading Room/Circulation	0	0	0	0	0	0	0	varies	0	See Note 3
M-MC-2 Media Specialist Office	0	120	0	0	0	0	0	varies	0	
M-MC-3 Workroom/Storage	0	***150***	0	0	0	0	0	varies	0	See Note 4
M-MC-4 Main Control/Equipment Room	0	300	0	0	0	0	0	varies	0	M - 228 students
M-MC-5 Conference Room	0	210	0	0	0	0	0	varies	0	See Note 5
M-MC-6 Multimedia Production Room	0	400	0	0	0	0	0	varies	0	See Note 6
Media Center Total			**0**			**0**			**0**	

Media Center Notes	
Number	Notes:
1	The size of the reading room/circulation space is equal to 10% of the elementary (or K-8) student enrollment multiplied by 30 SF per student.
3	The size of the reading room/circulation space is equal to 10% of the middle school (or K-8) student enrollment multiplied by 35 SF per student.

Elementary School Square Footage Allowance Notes	
Student Enrollment	2
350-400 Students	***190***
401-550 Students	***250***
551-700 Students	***340***
Enrollment Determines SF Allowed	

Middle School or K-8 Square Footage Allowance Notes			
Student Enrollment	4	5	6
350-450 Students	150	210	400
451-600 Students	***233***	280	400
601-750 Students	***350***	310	400
Enrollment Determines SF Allowed			

The following school size example illustrates the suggested instructional and support spaces. The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 690 STUDENTS					
Space		Qty	SF	Area	
E-VA-1	Elementary Art Room	1	1,200	1,200	See Note 1
E-VA-2	Kiln/Ceramic Storage	0	200	0	See Note 2
E-VA-3	Art Material Storage	1	125	125	See Note 3
M-VA-1	Middle School Art Room	1	1,200	1,200	See Note 1
M-VA-2	Kiln/Ceramic Storage	1	100	100	See Note 2
M-VA-3	Art Material Storage	1	100	100	See Note 4
Visual Arts Total				**2,725**	

Visual Arts Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-VA-1	Elementary Art Room	0	1,200	0	0	0	0	0	varies	0	See Note 1
E-VA-2	Kiln/Ceramic Storage	0	100	0	0	0	0	0	varies	0	See Note 2
E-VA-3	Art Material Storage	0	100	0	0	0	0	0	varies	0	See Note 3
M-VA-1	Middle School Art Room	0	1,200	0	0	0	0	0	varies	0	See Note 1
M-VA-2	Kiln/Ceramic Storage	0	100	0	0	0	0	0	varies	0	See Note 2
M-VA-3	Art Material Storage	0	100	0	0	0	0	0	varies	0	See Note 4
Visual Arts Total				**0**			**0**			**0**	

All Grade Level Square Footage Allowance Notes		
Student Enrollment	**1**	**2**
350-450 Students	1200	100
451-800 Students	1200	200
801-1200 Students	1400	200
1201-1600 Students	1400	200
Enrollment Determines SF Allowed		

Elem. School Sq.Ft. Allowance Notes	
Student Enrollment	**3**
350-400 Students	100
401-550 Students	125
551-700 Students	150
Enrollment Determines SF Allowed	

Mid. School or K-8 Sq. Ft. Allowance Notes	
Student Enrollment	**4**
350-450 Students	100
451-600 Students	150
601-750 Students	200
Enrollment Determines SF Allowed	

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 690 STUDENTS					
Space		Qty	SF	Area	
E-MU-1	Music Room	1	1,200	1,200	E - 462 students
M-MU-1	Instrumental Room	1	1,400	1,400	See Note 1
M-MU-2	Vocal Room	0	1,200	0	
M-MU-3	Music Library	1	200	200	M - 228 students
Music Total				**2,800**	

Music Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-MU-1	Music Room	0	1,200	0	0	0	0	0	varies	0	E - 462 students
M-MU-1	Instrumental Room	0	***1,400***	0	0	0	0	0	varies	0	See Note 1
M-MU-2	Vocal Room	0	1,200	0	0	0	0	0	varies	0	
M-MU-3	Music Library	0	200	0	0	0	0	0	varies	0	M - 228 students
Music Total				**0**			**0**			**0**	

Mid. School or K-8 Sq. Ft. Allowance Notes	
Student Enrollment	**1**
350-450 Students	1400
451-600 Students	1500
601-750 Students	1600
Enrollment Determines SF Allowed	

Sample School District, SAMPLE K-8 SCHOOL

PHYSICAL EDUCATION SPACES

C-PE CHAPTER 2: BRACKETING

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE - 690 STUDENTS				
Space	**Qty**	**SF**	**Area**	
E-PE-1 Gymnasium	1	2,500	2,500	See Note 1
E-PE-2 P. E. Workroom/Storage	1	300	300	See Note 2 - E - 462 Students
M-PE-1 Gymnasium	1	7,000	7,000	See Note 3
M-PE-2 Auxiliary Gym	***0***	***0***	***0***	***See Note 6***
M-PE-3 P.E./Athletic Office	2	75	150	
M-PE-4 Staff Shower	1	75	75	
M-PE-5 Student Locker Room	2	325	650	See Note 4 - M - 228 Students
M-PE-6 Student Restroom/Shower	2	200	400	
M-PE-7 Physical Education Storage	1	450	450	See Note 5
Physical Education Total			**11,525**	

Physical Education Worksheet

	New SF			Existing SF			TOTAL SF			
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
E-PE-1 Gymnasium	0	***3,500***	0	0	0	0	0	varies	0	See Note 1
E-PE-2 P. E. Workroom/Storage	0	200	0	0	0	0	0	varies	0	See Note 2 - E - 462 Students
M-PE-1 Gymnasium	0	***7,000***	0	0	0	0	0	varies	0	See Note 3
M-PE-2 Auxiliary Gym	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 6***
M-PE-3 P.E./Athletic Office	0	75	0	0	0	0	0	varies	0	
M-PE-4 Staff Shower	0	75	0	0	0	0	0	varies	0	
M-PE-5 Student Locker Room	0	***600***	0	0	0	0	0	varies	0	See Note 4 - M - 228 Students
M-PE-6 Student Restroom/Shower	0	250	0	0	0	0	0	varies	0	
M-PE-7 Physical Education Storage	0	***300***	0	0	0	0	0	varies	0	See Note 5
Physical Education Total			**0**			**0**			**0**	

Elementary School Square Footage Allowance Notes		
Student Enrollment	**1**	**2**
350-400 Students	3500	200
401-550 Students	***4000***	300
551-700 Students	***4700***	400
Enrollment Determines SF Allowed		

Middle School or K-8 Square Footage Allowance Notes			
Student Enrollment	**3**	**4**	**5**
350-450 Students	7000	***600***	***300***
451-600 Students	***7500***	600	***325***
601-750 Students	***8000***	650	500
Enrollment Determines SF Allowed			

Physical Education Notes	
Number	***Notes:***
6	***Auxilary Gym may be selected for student enrollments above 1000 MS students.***

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 690 STUDENTS					
Space		Qty	SF	Area	
E/M-SD-1	Student Dining	1	3,450	3,450	See Note 1
E/M-SD-2	Stage	1	1,000	1,000	
E/M-SD-3	Staff Dining	0	400	0	See Note 2
E/M-SD-4	Table Storage	1	400	400	See Note 3
E/M-SD-5	Family Restroom	1	80	80	
Student Dining Total				**4,930**	

Student Dining Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E/M-SD-1	Student Dining	0	3,000	0	0	0	0	0	varies	0	See Note 1
E/M-SD-2	Stage	0	0	0	0	0	0	0	varies	0	
E/M-SD-3	Staff Dining	0	250	0	0	0	0	0	varies	0	See Note 2
E/M-SD-4	Table Storage	0	300	0	0	0	0	0	varies	0	See Note 3
E/M-SD-5	Family Restroom	0	80	0	0	0	0	0	varies	0	
Student Dining Total				**0**			**0**			**0**	

Student Dining Notes	
Number	**Notes:**
1	The size of the Student Dining space is equal to one-third of the student enrollment multiplied by 15 SF per student or 3,000 SF, whichever is greater.

All Grade Level Square Footage Allowance Notes		
Student Enrollment	**2**	**3**
350-500 Students	250	300
501-700 Students	400	400
701-900 Students	550	500
901-Larger Students	700	600
Enrollment Determines SF Allowed		

Sample School District, SAMPLE K-8 SCHOOL

FAMILY AND COMSUMER SCIENCE SPACES

C-SD

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 690 STUDENTS			
Space	**Qty**	**SF**	**Area**
M-FCS-1 Life Skills Lab	1	1,100	1,100
M-FCS-2 Life Skills Storage	1	100	100
Family and Consumer Science Total			**1,200**

Family and Consumer Science Worksheet									
	New SF			Existing SF			TOTAL SF		
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**
M-FCS-1 Life Skills Lab	0	1,100	0	0	0	0	0	varies	0
M-FCS-2 Life Skills Storage	0	100	0	0	0	0	0	varies	0
Family and Consumer Science Total			**0**			**0**			**0**

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 690 STUDENTS				
Space	**Qty**	**SF**	**Area**	
M-TE-1a Modular Technology Lab	1	1,300	1,300	
M-TE-1b Production Lab	0	1,300	0	
M-TE-2 Storage	1	150	150	See Note 1
Technology Education Total			**1,450**	

Technology Education Worksheet

	New SF			Existing SF			TOTAL SF			
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
M-TE-1a Modular Technology Lab	0	1,300	0	0	0	0	0	varies	0	
M-TE-1b Production Lab	0	1,300	0	0	0	0	0	varies	0	
M-TE-2 Storage	0	150	0	0	0	0	0	varies	0	See Note 1
Technology Education Total			**0**			**0**			**0**	

Middle School or K-8 Square Footage Allowance Notes	
Student Enrollment	**1**
350-450 Students	150
451-800 Students	200
801-1200 Students	200
1201-1600 Students	200
Enrollment Determines SF Allowed	

Sample School District, SAMPLE K-8 SCHOOL
FOOD SERVICES SPACES
C-FS

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 690 STUDENTS					
Space		Qty	SF	Area	
E/M-FS-0	Warming Kitchen	0	1,380	0	See Note 1
E/M-FS-1	Kitchen (total)	1		2,415	See Note 1 & 2
E/M-FS-1a	Preparation Area	1	869		See Kitchen Area Notes
E/M-FS-1b	Serving Area	1	821		See Kitchen Area Notes
E/M-FS-1c	Dry Food Storage	1	266		See Kitchen Area Notes
E/M-FS-1d	Cooler/Freezer	1	242		See Kitchen Area Notes
E/M-FS-1e	Ware Washing	1	217		See Kitchen Area Notes
E/M-FS-2	Dietician Office	1	75	75	
E/M-FS-3	Restroom/Locker Rm	1	140	140	
Food Service Total				**2,630**	

Food Servicess Worksheet										
		New SF			Existing SF			TOTAL SF		
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
E/M-FS-0	Warming Kitchen	U	0	0	U	U	0	0	varies	0
E/M-FS-1	Kitchen (total)	U		0	U		0	0		0
E/M-FS-1a	Preparation Area		0			U			varies	
E/M-FS-1b	Serving Area		0			U			varies	
E/M-FS-1c	Dry Food Storage		0			U			varies	
E/M-FS-1d	Cooler/Freezer		0			U			varies	
E/M-FS-1e	Ware Washing		0			U			varies	
E/M-FS-2	Dietician Office	U	75	0	U	U	0	0	varies	0
E/M-FS-3	Restroom/Locker Rm	U	140	0	U	U	0	0	varies	0
Food Service Total				**0**			**0**			**0**

Food Service Notes	
Number	Notes:
1	Only one of the two Kitchens is to be used - either E/M-FS-0 OR E/M-FS-1 - not both.
2	The size of the kitchen is equal to the sum of preparation area, serving area, dry food storage area, cooler/freezer area, and ware washing area.

Kitchen Area Sizes					
Food Service Area	Enrol	X	SF/Studen	x	%
Preparation Area	Enrol	x	3.5	x	36%
Serving Areas	Enrol	x	3.5	x	34%
Dry Food Storage	Enrol	x	3.5	x	11%
Cooler/	Enrol	x	3.5	x	10%
Ware Washing Area	Enrol	x	3.5	x	9%
Warming Kitchen	Enrol	x	2.0		
Multiply Enrollment x SF/Student x % to achieve size of area					

The following school size example illustrates the suggested instructional and support spaces
The example is intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE - 690 STUDENTS					
Space		Qty	SF	Area	
E/M-CU-1	Workroom	1	400	400	See Note 1
E/M-CU-2	Custodial Office	1	100	100	
Custodial Total				**500**	

Custodial Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E/M-CU-1	Workroom	0	200	0	0	0	0	0	varies	0	See Note 1
E/M-CU-2	Custodial Office	0	100	0	0	0	0	0	varies	0	
Custodial Total				**0**			**0**			**0**	

All Grade Level Square Footage Allowance Notes	
Student Enrollment	**1**
350-450 Students	200
451-800 Students	400
801-1200 Students	400
1201-1600 Students	400
Enrollment Determines SF Allowed	

Sample School District, SAMPLE K-8 SCHOOL

BUILDING SERVICES SPACES

C-BS

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 690 STUDENTS					
Space		Qty	SF	Area	
E/M-BS-1	Large Group Restrooms		2,107	2,107	See Build Svc Sizes
E/M-BS-2	Custodial Closet	3	50	150	
E/M-BS-3	Electrical Closet	3	50	150	
E/M-BS-4	Telecommunications Room (TR)	2	64	128	See Note 1
E/M-BS-5	Corridors		12,042	12,042	See Build Svc Sizes
E/M-BS-6	Mechanical Rooms/Decks		4,155	4,155	See Note 2
E/M-BS-7	Storage Area	1	200	200	See Build Svc Sizes
E/M-BS-8	Central Storage Area	1	***200***	200	See SF Allowance
E/M-BS-9	Loading/Receiving Area	1	120	120	See SF Allowance
E/M-BS-10	Restroom	0	60	0	
E/M-BS-11	***Recycling Room***	***1***	***100***	***100***	***See SF Allowance***
Building Services Total				***19,352***	

Building Services Worksheet

		New SF			Existing SF			TOTAL SF		
Space		Qty	SF	Area	Qty	SF	Area	Qty SF	Area	
E/M-BS-1	Large Group Restrooms	-	0	0	-	0	0	- varies	0	See Build Svc Sizes
E/M-BS-2	Custodial Closet	0	50	0	0	0	0	0 varies	0	
E/M-BS-3	Electrical Closet	0	50	0	0	0	0	0 varies	0	
E/M-BS-4	Telecommunications Room (TR)	0	64	0	0	0	0	0 varies	0	See Note 1
E/M-BS-5	Corridors	-	0	0	-	0	0	varies	0	See Build Svc Sizes
	Vertical Circulation	-	0	0	-	0	0	varies	0	See Note 2
E/M-BS-6	Mechanical/Electrical Space/Decks	-	0	0	-	0	0	varies	0	See Build Svc Sizes
E/M-BS-7	Storage Area	0	150	0	0	0	0	0 varies	0	See SF Allowance
E/M-BS-8	Central Storage Area	0	***170***	0	0	0	0	0 varies	0	See SF Allowance
E/M-BS-9	Loading/Receiving Area	0	120	0	0	0	0	0 varies	0	
E/M-BS-10	Restroom	0	60	0	0	0	0	0 varies	0	
E/M-BS-11	***Recycling Room***	***0***	***80***	***0***	***0***	***0***	***0***	***0 varies***	***0***	***See SF Allowance***
Building Services Total				***0***			***0***		***0***	

Building Services Notes	
Number	**Notes:**
1	Size of Telecommunications Room varies with size of school. See page ***4111-4 &*** 5113-***4*** .
2	Vertical Circulation refers only to the following: Stairways/stairtowers, monumental stairs, elevators and elevator equipment room.

Building Services Area Sizes			
Building Services Areas	**Prog**	**X**	**%**
Large Group Restrooms	Prog	x	3.5
Corridors	Prog	x	20.0
Mechanical/Electrical Space/Decks	Prog	x	6.9
Multiply Sum of Program Areas - Building Services x % to achieve size of area			

Square Footage Allowance Notes			
Student Enrollment	**Stor**	**Ctl Stor**	***Recycle***
350-450 Students	150	***170***	***80***
451-800 Students	200	***200***	***100***
801-1200 Students	250	***220***	***130***
1201-1600 Students	250	***240***	***160***
Enrollment Determines SF Allowed			

SUMMARY OF SPACES EXAMPLE

Previously, changes or additions made during the annual update of the Design Manual have been ***"bolded and italicized"*** for easy identification. Changes have been made to the formulas on this sheet which have not been bolded and italicized. The user is advised to carefully review all information.

EXAMPLE-650 Students			
Grade Configuration:		**K-12**	Area
Student *Enrollment*		**6 - 12**	
	Enter number of Middle School students	278	
	Enter number of High School students	372	
	Total Student Enrollment	**650**	
SF per student			
	SF per Middle School student	145	40,220
	SF per High School student	173	64,155
	Total Gross Square Feet Funded		**104,375**
C-AC	Academic Core Spaces		20,120
C-SE	Special Education Spaces		2,650
C-AD	Administrative Spaces		3,057
C-MC	Media Center Spaces		3,725
C-VA	Visual Arts Spaces		2,800
C-MU	Music Spaces		4,020
C-PE	Physical Education Spaces		19,550
C-SD	Student Dining Spaces		6,472
C-FCS	Family and Consumer Science Spaces		2,650
C-TE	Technology Education Spaces		3,350
C-BE	Business Education Spaces		0
C-FS	Food Service Spaces		2,490
C-CU	Custodial Spaces		500
	Facility Subtotal:		**71,383**
C-BS	Building Services		22,648
	Facility Total:		**94,032**
Construction Factor (11% multiplied by the facility total)			0.11
	Gross Square Feet Developed:		**104,375**
Difference of GSF developed from GSF allowable			(0)

Sample School District, SAMPLE 6-12 SCHOOL

SUMMARY OF SPACES WORKSHEET

Previously, changes or additions made during the annual update of the Design Manual have been ***"bolded and italicized"*** for easy identification. Changes have been made to the formulas on this sheet which have not been bolded and italicized. The user is advised to carefully review all information.

WORKSHEET			
Grade Configuration:		**Area**	
Student Enrollment	**6 - 12**		
Enter number of Middle School students			
Enter number of High School students			
Total Student Enrollment	-		
SF per student			
SF per Middle School student		-	
SF per High School student		-	
Total Gross Square Feet Funded		-	
SELECT ONE (●) Single or Two Story Buildi ( ) 3 Stories or greater			See Note 1
Vert. Circ. Area Allowance (3 Stories or greater)		0	
Total Adjusted POR Gross Square Footage		**0**	

	Program Area	New SF	Exst SF*	TOTAL SF	
C-AC	Academic Core Spaces	0	0	0	
C-SE	Special Education Spaces	0	0	0	
C-AD	Administrative Spaces	0	0	0	
C-MC	Media Center Spaces	0	0	0	
C-VA	Visual Arts Spaces	0	0	0	
C-MU	Music Spaces	0	0	0	
C-PE	Physical Education Spaces	0	0	0	
C-SD	Student Dining Spaces	0	0	0	
C-FCS	Family and Consumer Science Spaces	0	0	0	
C-TE	Technology Education Spaces	0	0	0	
C-BE	Business Education Spaces	0	0	0	
C-FS	Food Service Spaces	0	0	0	
C-CU	Custodial Spaces	0	0	0	
	Facility Subtotal:	**0**	**0**	**0**	
C-BS	Building Services	0	0	0	
Facility Total		**0**	**0**	**0**	
Construction Factor (11% multiplied by the facility total)		0.11	na	na	
Actual Gross Square Feet Developed		**0**	0	**0**	See Note 2
Minus existing co-funded Oversize Area from Master Plan			0	-	See Note 3
Adjusted Existing Area			**0**	-	
Total Adjusted Gross Square Footage Developed (without Oversize Area)				**0**	
Difference of GSF developed from GSF allowable				***0***	

Worksheet Summary Notes	
Number	**Notes:**
Special	Individual spaces are taken from the space plates which are located throughout Chapters 4, 5, and 6. Please see these particular chapters for specific requirements for each space.
	Vertical Circulation (3 Stories or greater) refers only to the following: Stairways/stairtowers, monumental stairs, elevators, and elevator equipment room.
	Existing Gross Square Feet taken from master facility plan.
	Oversize Area also taken from master facility plan.
*	The Existing SF column is used in projects where there are to be building additions or renovations.

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE - 650 STUDENTS				
Space		Qty	SF	Area
M-AC-1	Middle School Classroom	7	900	6,300
M-AC-2	Project Laboratory	1	1,100	1,100
M-AC-3	Sci/Tech/Eng/Math/Computer Lab	0	1,000	0
M-AC-4	Teacher Prep Area/Workroom	1	300	300
M-AC-5	Individual Restroom	1	60	60
M-AC-6	Instructional Material Storage	1	200	200
M-AC-7 Small Group Room		***0***	***150***	***0***
M-AC-7a Small Group Room		***0***	***150***	***0***
M-AC-8 Multi-use Studio		***0***	***1,500***	***0***
M-AC-9 Kinesthetic Learning Studio		***1***	***1,200***	***1,200***
H-AC-1	High School Classroom	6	900	5,400
H-AC-2	Science Classroom - General Physics	1	1,200	1,200
H-AC-3	Science Classroom - Chemistry	1	1,200	1,200
H-AC-4	Science Classroom - Biology	1	1,200	1,200
H-AC-5	Science Prep	2	200	400
H-AC-6	Teacher Prep Area/Workroom	1	300	300
H-AC-7	Individual Restroom	1	60	60
H-AC-8	Project Classroom	1	1,000	1,000
H-AC-9	Special Education/Small Group Room	1	150	150
H-AC-10	Instructional Material Storage	1	50	50
H-AC-11	Multi-Use Room	0	1,500	0
H-AC-12	Science Laboratory	0	1,000	0
H-AC-9a Small Group Room		***0***	***150***	***0***
H-AC-13 Multi-use Studio		***0***	***1,500***	***0***
H-AC-14 Kinesthetic Learning Studio		***0***	***1,200***	***0***
Academic Core Total				***20,120***

Core Academic Worksheet										
		New SF			Existing SF			TOTAL SF		
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
M-AC-1	Middle School Classroom	0	900	0	0	0	0	0	varies	0
M-AC-2	Project Laboratory	0	1,100	0	0	0	0	0	varies	0
M-AC-3	Sci/Tech/Eng/Math/Computer Lab	0	1,000	0	0	0	0	0	varies	0
M-AC-4	Teacher Prep Area/Workroom	0	***300***	0	0	0	0	0	varies	0
M-AC-5	Individual Restroom	0	60	0	0	0	0	0	varies	0
M-AC-6	Instructional Material Storage	0	***50***	0	0	0	0	0	varies	0
M-AC-7 Small Group Room		***0***	***150***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***
M-AC-7a Small Group Room		***0***	***150***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***
M-AC-8 Multi-use Studio		***0***	***1,500***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***
M-AC-9 Kinesthetic Learning Studio		***0***	***1,200***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***
H-AC-1	High School Classroom	0	900	0	0	0	0	0	varies	0
H-AC-2	Science Classroom - General/Physics	0	1,200	0	0	0	0	0	varies	0
H-AC-3	Science Classroom - Chemistry	0	1,200	0	0	0	0	0	varies	0
H-AC-4	Science Classroom - Biology	0	1,200	0	0	0	0	0	varies	0
H-AC-5	Science Prep	0	300	0	0	0	0	0	varies	0
H-AC-6	Teacher Prep Area/Workroom	0	300	0	0	0	0	0	varies	0
H-AC-7	Individual Restroom	0	60	0	0	0	0	0	varies	0
H-AC-8	Project/Classroom	0	1,100	0	0	0	0	0	varies	0
H-AC-9	Small Group Room	0	150	0	0	0	0	0	varies	0
H-AC-10	Instructional Material Storage	0	50	0	0	0	0	0	varies	0
H-AC-11	Multi-use Room	0	1,500	0	0	0	0	0	varies	0
H-AC-12	Science Laboratory	0	1,000	0	0	0	0	0	varies	0
H-AC-9a Small Group Room		***0***	***150***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***
H-AC-13 Multi-use Studio		***0***	***1,500***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***
H-AC-14 Kinesthetic Learning Studio		***0***	***1,200***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***
Academic Core Total				***0***			***0***			***0***

Square Footage Allowance Notes			
Student Enrollment	**1**	**2**	**3**
350-450 Students	300	300	50
451-800 Students	300	300	100
801-1200 Students	400	400	150
1201-1600 Students	400	600	200
Enrollment Determines SF Allowed			

Academic Core Notes	
Number	*Notes:*
4	*These spaces are provided to encourage the development of student centered learning environments as found in Section 1020. Minimum sizes are: M-AC-7a & H-AC-9a=150 SF M/H Multi-use Studio=1500 SF. M/H Kinesthetic Studio=1200 SF.*

Sample School District, SAMPLE 6-12 SCHOOL

SPECIAL EDUCATION SPACES

C-SE

The following school size example illustrates the suggested instructional and support spaces. The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
M/H-SE-1	Self-contained Classroom	1	900	900	See Note 1
M/H-SE-2	Workroom/Conference	1	150	150	See Note 2
M/H-SE-3	Restroom/Shower	1	100	100	
M/H-SE-4	Special Education/Resource	1	900	900	See Note 3
M/H-SE-5	Small Self-contained Classroom	1	600	600	
Special Education Total				**2,650**	

Special Education Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M/H-SE-1	Self-contained Classroom	0	900	0	0	0	0	0	varies	0	See Note 1
M/H-SE-2	Workroom/Conference	0	150	0	0	0	0	0	varies	0	See Note 2
M/H-SE-3	Restroom/Shower	0	100	0	0	0	0	0	varies	0	
M/H-SE-4	Special Education/Resource	0	900	0	0	0	0	0	varies	0	See Note 3
M/H-SE-5	Small Self-contained Classroom	0	600	0	0	0	0	0	varies	0	
Special Education Total				**0**			**0**			**0**	

Special Education Notes	
Number	**Notes:**
	Self-contained classroom(s) could 'house' various special education programs including, but not limited to, cognitive disability, emotional disturbance, multiple disabilities, etc.
	Workroom/Conference could 'house' orthopedic impairment, autism, speech therapy, occupational therapy, and physical therapy.
	Special Education/Resource could 'house' cognitive disability, hearing impairment, visual impairment, emotional disturbance, orthopedic impairment, autistic, traumatic, brain injury, learning disability, deaf/blindness, etc. See Chapter 1, Section 1110 for more information.

The following school size example illustrates the suggested instructional and support spaces. The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
M/H-AD-1	Reception Area	1	300	300	See Notes 1,2
M/H-AD-2	Secretarial Area	1	250	250	See Notes 3,4
M/H-AD-3	Principal's Office	1	150	150	
M/H-AD-4	Assistant Principal's Office	1	120	120	
M/H-AD-5	Conference Room	1	250	250	
M/H-AD-6	Mail/Work/Copy Room	1	200	200	See Notes 5,6
M/H-AD-7	Administrative Storage	1	82	82	See Note 7
M/H-AD-8	Vault/Records Storage	1	100	100	See Notes 8,9
M/H-AD-9	In-school Suspension	1	300	300	See Notes 10,11
M/H-AD-10	Restroom	2	60	120	
M/H-AD-11	Guidance Counselor's Office	2	120	240	
M/H-AD-12	Guidance Records/Storage	1	75	75	See Note 12
M/H-AD-13	Guidance Conference Room	1	200	200	See Note 13
M/H-AD-14	Parent/Volunteer Room	0	150	0	See Note 14
M/H-AD-15	Health Clinic (incl. RR)	1	350	350	See Notes 15,16
M/H-AD-16	Itinerant Personnel Office	1	120	120	
M/H-AD-17	Guidance Conf. & Career Ctr.	1	200	200	See Note 17
Administrative Total				**3,057**	

Administration Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M/H-AD-1	Reception Area	0	200	0	0	0	0	0	varies	0	See Notes 1,2
M/H-AD-2	Secretarial Area	0	200	0	0	0	0	0	varies	0	See Notes 3,4
M/H-AD-3	Principal's Office	0	150	0	0	0	0	0	varies	0	
M/H-AD-4	Assistant Principal's Office	0	120	0	0	0	0	0	varies	0	
M/H-AD-5	Conference Room	0	250	0	0	0	0	0	varies	0	
M/H-AD-6	Mail/Work/Copy Room	0	200	0	0	0	0	0	varies	0	See Notes 5,6
M/H-AD-7	Administrative Storage	0	150	0	0	0	0	0	varies	0	See Note 7
M/H-AD-8	Vault/Records Storage	0	***85***	0	0	0	0	0	varies	0	See Notes 8,9
M/H-AD-9	In-school Suspension	0	200	0	0	0	0	0	varies	0	See Notes 10,11
M/H-AD-10	Restroom	0	60	0	0	0	0	0	varies	0	
M/H-AD-11	Guidance Counselor's Office	0	120	0	0	0	0	0	varies	0	
M/H-AD-12	Guidance Records/Storage	0	100	0	0	0	0	0	varies	0	See Note 12
M/H-AD-13	Guidance Conference Room	0	***150***	0	0	0	0	0	varies	0	See Note 13
M/H-AD-14	Parent/Volunteer Room	0	***200***	0	0	0	0	0	varies	0	See Note 14
M/H-AD-15	Health Clinic (incl. RR)	0	400	0	0	0	0	0	varies	0	See Notes 15,16
M/H-AD-16	Itinerant Personnel Office	0	120	0	0	0	0	0	varies	0	
M/H-AD-17	Guidance Conf. & Career Ctr.	0	300	0	0	0	0	0	varies	0	See Note 17
Administrative Total				**0**			**0**			**0**	

Refer to SF Allowance Notes on next page

Middle School Square Footage Allowance Notes						
Student Enrollment	**1**	**3**	**5**	**8**	**10**	**15**
350-450 Students	200	200	200	50	200	350
451-600 Students	300	300	250	65	250	***400***
601-750 Students	400	400	300	80	325	450
Enrollment Determines SF Allowed						

High School or K-12 or 6-12 Square Footage Allowance Notes											
Student Enrollment	**2**	**4**	**6**	**7**	**9**	**11**	**12**	**13**	**14**	**16**	**17**
350-450 Students	200	200	200	150	***85***	200	100	150	200	400	300
451-800 Students	400	400	300	150	***115***	325	100	200	300	450	400
801-1200 Students	500	500	400	200	***145***	450	200	250	400	500	500
1201-1600 Students	600	600	500	200	***175***	575	200	250	400	550	700
Enrollment Determines SF Allowed											

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
M-MC-1	Reading Room/Circulation	1	973	973	See Note 1
M-MC-2	Media Specialist Office	0	120	0	
M-MC-3	Workroom/Storage	1	150	150	See Note 2
M-MC-4	Main Control/Equipment Room	0	300	0	M - 307 students
M-MC-5	Conference Room	0	100	0	***See Note 3***
M-MC-6	Multimedia Production Room	0	400	0	***See Note 7***
H-MC-1	Reading Room/Circulation	1	1,302	1,302	***See Note 1***
H-MC-2	Media Specialist Office	1	120	120	
H-MC-3	Workroom/Storage	1	200	200	***See Note 4***
H-MC-4	Main Control/Equipment Room	1	300	300	***H - 383 students***
H-MC-5	Conference Room	1	250	250	
H-MC-6	Multimedia Production Room	1	330	330	
H-MC-7	Document Storage	1	100	100	See Note 5
H-AC-9	***Small Group Room***	***0***	***160***	***0***	***See Note 6***
Media Center Total				**3,725**	

Media Center Worksheet

Space		New SF Qty	New SF SF	New SF Area	Existing SF Qty	Existing SF SF	Existing SF Area	TOTAL SF Qty	TOTAL SF SF	TOTAL SF Area	
M-MC-1	Reading Room/Circulation	0	0	0	0	0	0	0	varies	0	See Note 1
M-MC-2	Media Specialist Office	0	120	0	0	0	0	0	varies	0	
M-MC-3	Workroom/Storage	0	***150***	0	0	0	0	0	varies	0	See Note 2
M-MC-4	Main Control/Equipment Room	0	300	0	0	0	0	0	varies	0	M - 307 students
M-MC-5	***Conference Room***	0	***210***	0	0	0	0	0	varies	0	***See Note 3***
M-MC-6	Multimedia Production Room	0	***400***	0	0	0	0	0	varies	0	***See Note 7***
H-MC-1	Reading Room/Circulation	0	0	0	0	0	0	0	varies	0	See Note 1
H-MC-2	Media Specialist Office	0	120	0	0	0	0	0	varies	0	
H-MC-3	Workroom/Storage	0	300	0	0	0	0	0	varies	0	See Note 4
H-MC-4	Main Control/Equipment Room	0	300	0	0	0	0	0	varies	0	H - 383 students
H-MC-5	Conference Room	0	250	0	0	0	0	0	varies	0	
H-MC-6	Multimedia Production Room	0	400	0	0	0	0	0	varies	0	
H-MC-7	Document Storage	0	200	0	0	0	0	0	varies	0	See Note 5
H-AC-9	***Small Group Room***	***0***	***160***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 6***
Media Center Total				**0**			**0**			**0**	

Media Center Notes	
Number	**Notes:**
1	The size of the reading room/circulation space is equal to 10% of the middle/high student enrollment multiplied by 35 SF per student. (MS & HS or 6-12)

Middle School Square Footage Allowance Notes			
Student Enrollment	**2**	***3***	***7***
350-450 Students	150	***210***	***400***
451-600 Students	***233***	***280***	***400***
601-750 Students	***350***	***310***	***400***
Enrollment Determines SF Allowed			

High School or 6-12 Square Footage Allowance Notes			
Student Enrollment	4	5	***6***
350-450 Students	300	200	***160***
451-800 Students	400	300	***260***
801-1200 Students	500	300	***280***
1201-1600 Students	600	400	***330***
Enrollment Determines SF Allowed			

Sample School District, SAMPLE 6-12 SCHOOL

VISUAL ARTS

C-VA

The following school size example illustrates the suggested instructional and support spaces. The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
M-VA-1	Middle School Art Room	1	1,200	1,200	See Note 1
M-VA-2	Kiln/Ceramic Storage	0	100	0	See Note 2
M-VA-3	Art Material Storage	1	100	100	See Note 3
H-VA-1	High School Art Room	1	1,200	1,200	See Note 1
H-VA-2	Kiln/Ceramic Storage	1	150	150	See Note 2
H-VA-3	Art Material Storage	1	150	150	See Note 4
Visual Arts Total				**2,800**	

Visual Arts Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-VA-1	Middle School Art Room	0	1,200	0	0	0	0	0	varies	0	See Note 1
M-VA-2	Kiln/Ceramic Storage	0	100	0	0	0	0	0	varies	0	See Note 2
M-VA-3	Art Material Storage	0	100	0	0	0	0	0	varies	0	See Note 3
H-VA-1	High School Art Room	0	1,200	0	0	0	0	0	varies	0	See Note 1
H-VA-2	Kiln/Ceramic Storage	0	100	0	0	0	0	0	varies	0	See Note 2
H-VA-3	Art Material Storage	0	200	0	0	0	0	0	varies	0	See Note 4
Visual Arts Total				**0**			**0**			**0**	

All Grade Level Square Footage Allowance Notes		
Student Enrollment	**1**	**2**
350-450 Students	1200	100
451-800 Students	1200	200
801-1200 Students	1400	200
1201-1600 Students	1400	200
Enrollment Determines SF Allowed		

Mid. School Sq. Ft. Allowance Notes	
Student Enrollment	**3**
350-450 Students	100
451-600 Students	150
601-750 Students	200
Enrollment Determines SF Allowed	

High School & K-12 or 6-12 Sq. Ft. Allowance Notes	
Student Enrollment	**4**
350-450 Students	200
451-800 Students	300
801-1200 Students	300
1201-1600 Students	300
Enrollment Determines SF Allowed	

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE - 650 STUDENTS				
Space	Qty	SF	Area	
M-MU-1 Instrumental Room	1	1,200	1,200	See Note 1
M-MU-2 Vocal Room	0	1,200	0	
M-MU-3 Music Library	1	150	150	M - 278 students
H-MU-1 Instrumental Room	1	1,800	1,800	See Note 2
H-MU-2 Instrument Storage	1	350	350	See Note 3
H-MU-3 Orchestra Storage	0	250	0	See Note 4
H-MU-4 Instrumental Music Office/Library	1	120	120	
H-MU-5 Uniform Storage	0	200	0	See Note 5 - H - 372 students
H-MU-6 Vocal Room	0	1,150	0	See Note 6
H-MU-7 Vocal Storage	0	200	0	See Note 7
H-MU-8 Vocal Music Office/Library	1	120	120	
H-MU-9 Ensemble Room	1	200	200	See Note 8
H-MU-10 Practice Room	1	80	80	
Music Total			**4,020**	

Music Worksheet

	New SF			Existing SF			TOTAL SF			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-MU-1 Instrumental Room	0	1,400	0	0	0	0	0	varies	0	See Note 1
M-MU-2 Vocal Room	0	1,200	0	0	0	0	0	varies	0	
M-MU-3 Music Library	0	200	0	0	0	0	0	varies	0	M - 278 students
H-MU-1 Instrumental Room	0	***1,800***	0	0	0	0	0	varies	0	See Note 2
H-MU-2 Instrument Storage	0	***400***	0	0	0	0	0	varies	0	See Note 3
H-MU-3 Orchestra Storage	0	200	0	0	0	0	0	varies	0	See Note 4
H-MU-4 Instrumental Music Library	0	120	0	0	0	0	0	varies	0	
H-MU-5 Uniform Storage	0	150	0	0	0	0	0	varies	0	See Note 5 - H - 372 students
H-MU-6 Vocal Room	0	1,200	0	0	0	0	0	varies	0	See Note 6
H-MU-7 Vocal Storage	0	150	0	0	0	0	0	varies	0	See Note 7
H-MU-8 Vocal Music Library	0	120	0	0	0	0	0	varies	0	
H-MU-9 Ensemble Room	0	200	0	0	0	0	0	varies	0	See Note 8
H-MU-10 Practice Room	0	80	0	0	0	0	0	varies	0	
Music Total			**0**			**0**			**0**	

Mid. School or K-6 Sq. Ft. Allowance Notes	
Student Enrollment	**1**
350-450 Students	1400
451-600 Students	1500
601-750 Students	1600
Enrollment Determines SF Allowed	

High School or 6-12 Square Footage Allowance Notes							
Student Enrollment	**2**	**3**	**4**	**5**	**6**	**7**	**8**
350-450 Students	1800	400	200	150	1200	150	200
451-800 Students	2000	500	250	200	1200	200	300
801-1200 Students	2500	600	250	300	1200	300	300
1201-1600 Students	3000	700	350	300	1500	300	300
Enrollment Determines SF Allowed							

Sample School District, SAMPLE 6-12 SCHOOL

PHYSICAL EDUCATION SPACES

C-PE

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS				
Space	**Qty**	**SF**	**Area**	
M-PE-1 Gymnasium	1	***5,500***	5,500	See Note 1
M-PE-2 Auxiliary Gymnasium	***0***	***0***	***0***	***See Note 13***
M-PE-3 P.E./Athletic Office	2	75	150	
M-PE-4 Staff Shower	2	75	150	
M-PE-5 Student Locker Room	2	500	1,000	See Note 2 - M - 278 Students
M-PE-6 Student Restroom/Shower	2	250	500	
M-PE-7 Physical Education Storage	1	200	200	See Note 3
H-PE-1 Gymnasium	1	***9,300***	9,300	See Note 4
H-PE-2 Auxiliary Gymnasium	0	0	0	See Note 5
H-PE-3 Student Locker Room	2	550	1,100	See Note 6
H-PE-4 Student Restroom/Shower	2	250	500	See Note 7
H-PE-5 Physical Education Storage	1	400	400	See Note 8 - H - 372 Students
H-PE-6 P.E./Athletic Office	2	75	150	
H-PE-7 Staff Shower	2	75	150	
H-PE-8 Athletic Director's Office	0	120	0	
H-PE-9 Lobby Services	1	200	200	See Note 9
H-PE-10 Training Room	1	250	250	See Note 10
H-PE-11 Physical Health Classroom	0	0	0	See Note 11
H-PE-12 Multi-use P.E. Room	0	1,000	0	See Note 12
Physical Education Total			**19,550**	

Physical Education Worksheet

	New SF			Existing SF			TOTAL SF			
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
M-PE-1 Gymnasium	0	***7,000***	0	0	0	0	0	varies	0	See Note 1
M-PE-2 Auxiliary Gymnasium	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***varies***	***0***	***See Note 13***
M-PE-3 P.E./Athletic Office	0	75	0	0	0	0	0	varies	0	
M-PE-4 Staff Shower	0	75	0	0	0	0	0	varies	0	
M-PE-5 Student Locker Room	0	***600***	0	0	0	0	0	varies	0	See Note 2 - M - 278 Students
M-PE-6 Student Restroom/Shower	0	250	0	0	0	0	0	varies	0	
M-PE-7 Physical Education Storage	0	***300***	0	0	0	0	0	varies	0	See Note 3
H-PE-1 Gymnasium	0	***9,300***	0	0	0	0	0	varies	0	See Note 4
H-PE-2 Auxiliary Gymnasium	0	7,000	0	0	0	0	0	varies	0	See Note 5
H-PE-3 Student Locker Room	0	550	0	0	0	0	0	varies	0	See Note 6
H-PE-4 Student Restroom/Shower	0	200	0	0	0	0	0	varies	0	See Note 7
H-PE-5 Physical Education Storage	0	400	0	0	0	0	0	varies	0	See Note 8 - H - 372 Students
H-PE-6 P.E./Athletic Office	0	75	0	0	0	0	0	varies	0	
H-PE-7 Staff Shower	0	75	0	0	0	0	0	varies	0	
H-PE-8 Athletic Director's Office	0	120	0	0	0	0	0	varies	0	
H-PE-9 Lobby Services	0	100	0	0	0	0	0	varies	0	See Note 9
H-PE-10 Training Room	0	200	0	0	0	0	0	varies	0	See Note 10
H-PE-11 Physical Health Classroom	0	750	0	0	0	0	0	varies	0	See Note 11
H-PE-12 Multi-use P.E. Room	0	***1,400***	0	0	0	0	0	varies	0	See Note 12
Physical Education Total			**0**			**0**			**0**	

Refer to Square Footage Allowance Notes on next page.

Middle School Square Footage Allowance Notes			
Student Enrollment	**1**	**2**	**3**
350-450 Students	7000	***600***	***300***
451-600 Students	***7500***	600	***325***
601-750 Students	***8000***	650	500
Enrollment Determines SF Allowed			

Physical Education Notes	
Number	***Notes:***
13	***Auxilary Gym may be selected for student enrollments above 1000 MS students.***

High School Square Footage Allowance Notes									
Student Enrollment	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
350-450 Students	***9300***	7000	550	200	400	100	200	750	***1400***
451-800 Students	***10700***	7000	650	250	600	200	300	1500	***1400***
801-1200 Students	***12400***	7000	700	300	800	200	400	1500	***1600***
1201-1600 Students	***14000***	7000	850	350	1000	200	500	2000	***1800***
Enrollment Determines SF Allowed									

Sample School District, SAMPLE 6-12 SCHOOL

STUDENT DINING SPACES

The following school size example illustrates the suggested instructional and support spaces. The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
M/H-SD-1	Student Dining	1	3,792	3,792	See Note 1
M/H-SD-2	Stage	1	1,000	1,000	
M-SD-3/H-SD-7	Staff Dining	0	400	0	See Note 2
M-SD-4/H-SD-8	Table Storage	1	400	400	See Note 3
H-SD-3	Scene Shop and Storage	1	350	350	See Note 4
H-SD-4	Make-up/Dressing Rooms	2	200	400	See Note 5
H-SD-5	Theatrical Control Room	1	150	150	
H-SD-6	Drama Storage	1	300	300	See Note 6
H-SD-9	Family Restroom	1	80	80	
Student Dining Total				**6,472**	

Student Dining Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M/H-SD-1	Student Dining	0	3,000	0	0	0	0	0	varies	0	See Note 1
M/H-SD-2	Stage	0	0	0	0	0	0	0	varies	0	
M-SD-3/H-SD-7	Staff Dining	0	250	0	0	0	0	0	varies	0	See Note 2
M-SD-4/H-SD-8	Table Storage	0	300	0	0	0	0	0	varies	0	See Note 3
H-SD-3	Scene Shop and Storage	0	400	0	0	0	0	0	varies	0	See Note 4
H-SD-4	Make-up/Dressing Rooms	0	200	0	0	0	0	0	varies	0	See Note 5
H-SD-5	Theatrical Control Room	0	200	0	0	0	0	0	varies	0	
H-SD-6	Drama Storage	0	200	0	0	0	0	0	varies	0	See Note 6
H-SD-9	Family Restroom	0	80	0	0	0	0	0	varies	0	
Student Dining Total				**0**			**0**			**0**	

Student Dining Notes	
Number	Notes:
1	The size of the Student Dining space is equal to one-third of the student enrollment multiplied by 17.5 SF per student or 3,000 SF, whichever is greater.

All Grade Level Square Footage Allowance Notes		
Student Enrollment	2	3
350-500 Students	250	300
501-700 Students	400	400
701-900 Students	550	500
901-Larger Students	700	600
Enrollment Determines SF Allowed		

High School Square Footage Allowance Notes			
Student Enrollment	4	5	6
350-450 Students	400	200	200
451-800 Students	450	250	400
801-1200 Students	500	250	500
1201-1600 Students	600	300	600
Enrollment Determines SF Allowed			

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS				
Space	**Qty**	**SF**	**Area**	
M-FCS-1 Life Skills Lab	1	1,100	1,100	
M-FCS-2 Life Skills Storage	0	100	0	
H-FCS-1 Life Skills Lab	1	1,200	1,200	
H-FCS-2 Life Skills Storage	1	200	200	See Note 1
H-FCS-3 Laundry	1	150	150	
H-FCS-4 Child Development	0	1,200	0	
Family and Consumer Science Total			**2,650**	

Family and Consumer Science Worksheet

	New SF			Existing SF			TOTAL SF		
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**
M-FCS-1 Life Skills Lab	0	1,100	0	0	0	0	0	varies	0
M-FCS-2 Life Skills Storage	0	100	0	0	0	0	0	varies	0
H-FCS-1 Life Skills Lab	0	1,200	0	0	0	0	0	varies	0
H-FCS-2 Life Skills Storage	0	200	0	0	0	0	0	varies	0
H-FCS-3 Laundry	0	150	0	0	0	0	0	varies	0
H-FCS-4 Child Development	0	1,200	0	0	0	0	0	varies	0
Family and Consumer Science Total			**0**			**0**			**0**

High School or 6-12 Sq. Ft. Allowance Notes	
Student Enrollment	**1**
350-450 Students	200
451-800 Students	250
801-1200 Students	300
1201-1600 Students	350
Enrollment Determines SF Allowed	

Sample School District, SAMPLE 6-12 SCHOOL

TECHNOLOGY EDUCATION SPACES

E CHAPTER 2: BRACKETING

The following school size example illustrates the suggested instructional and support spaces. The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS				
Space	**Qty**	**SF**	**Area**	
M-TE-1a Modular Technology Lab	1	1,300	1,300	
M-TE-1b Production Lab	0	1,300	0	
M-TE-2 Storage	1	150	150	See Note 1
H-TE-1 Modular Technology Lab	1	1,800	1,800	
H-TE-1a Ag-Ed Lab	0	1,800	0	
H-TE-2 Storage	1	100	100	See Note 1
H-TE-3 CAD Lab	0	1,200	0	
H-TE-4 Production Lab	0	1,600	0	
Technology Education Total			**3,350**	

Technology Education Worksheet

	New SF			Existing SF			TOTAL SF			
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
M-TE-1a Modular Technology Lab	0	1,300	0	0	0	0	0	varies	0	
M-TE-1b Production Lab	0	1,300	0	0	0	0	0	varies	0	
M-TE-2 Storage	0	150	0	0	0	0	0	varies	0	See Note 1
H-TE-1 Modular Technology Lab	0	1,800	0	0	0	0	0	varies	0	
H-TE-1a Ag-Ed Lab	0	1,800	0	0	0	0	0	varies	0	
H-TE-2 Storage	0	150	0	0	0	0	0	varies	0	See Note 1
H-TE-3 CAD Lab	0	1,200	0	0	0	0	0	varies	0	
H-TE-4 Production Lab	0	1,600	0	0	0	0	0	varies	0	
Technology Education Total			**0**			**0**			**0**	

High School or 6-12 Sq. Ft. Allowance Notes	
Student Enrollment	**1**
350-450 Students	150
451-800 Students	200
801-1200 Students	200
1201-1600 Students	200
Enrollment Determines SF Allowed	

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS				
Space	**Qty**	**SF**	**Area**	
H-BE-1 Computer and Business Classroom	0	***1,200***	0	
H-BE-2 Marketing Classroom	0	900	0	
H-BE-3 Workroom/Storage	0	100	0	See Note 1
Business Education Total			**0**	

Business Education Worksheet

	New SF			Existing SF			TOTAL SF			
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
H-BE-1 Computer and Business Classroom	0	1,200	0	0	0	0	0	varies	0	
H-BE-2 Marketing Classroom	0	900	0	0	0	0	0	varies	0	
H-BE-3 Workroom/Storage	0	100	0	0	0	0	0	varies	0	See Note 1
Business Education Total			**0**			**0**			**0**	

High School Sq. Ft. Allowance Notes	
Student Enrollment	**1**
350-450 Students	100
451-800 Students	200
801-1200 Students	250
1201-1600 Students	300
Enrollment Determines SF Allowed	

Sample School District, SAMPLE 6-12 SCHOOL
FOOD SERVICES SPACES
C-FS

The following school size example illustrates the suggested instructional and support spaces
The example is intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
M/H-FS-0	Warming Kitchen	0	1,300	0	See Note 1
M/H-FS-1	Kitchen (total)	1		2,275	See Note 1 & 2
M/H-FS-1a	Preparation Area	1	819		See Kitchen Area Notes
M/H-FS-1b	Serving Area	1	774		See Kitchen Area Notes
M/H-FS-1c	Dry Food Storage	1	250		See Kitchen Area Notes
M/H-FS-1d	Cooler/Freezer	1	228		See Kitchen Area Notes
M/H-FS-1e	Ware Washing	1	205		See Kitchen Area Notes
M/H-FS-2	Dietician Office	1	75	75	
M/H-FS-3	Restroom/Locker Rm	1	140	140	
Food Service Total				**2,490**	

Food Service Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M/H-FS-0	Warming Kitchen	0	0	0	0	0	0	0	varies	0	See Note 1
M/H-FS-1	Kitchen (total)	0		0	0		0	0		0	See Note 1 & 2
M/H-FS-1a	Preparation Area		0			0			varies		See Kitchen Area Notes
M/H-FS-1b	Serving Area		0			0			varies		See Kitchen Area Notes
M/H-FS-1c	Dry Food Storage		0			0			varies		See Kitchen Area Notes
M/H-FS-1d	Cooler/Freezer		0			0			varies		See Kitchen Area Notes
M/H-FS-1e	Ware Washing		0			0			varies		See Kitchen Area Notes
M/H-FS-2	Dietician Office	0	75	0	0	0	0	0	varies	0	
M/H-FS-3	Restroom/Locker Rm	0	140	0	0	0	0	0	varies	0	
Food Service Total				**0**			**0**			**0**	

Food Service Notes	
Number	**Notes:**
1	Only one of the two Kitchens is to be used - either M/H-FS-0 OR M/H-FS-1 - not both.
2	The size of the kitchen is equal to the sum of preparation area, serving area, dry food storage area, cooler/freezer area, and ware washing area.

Kitchen Area Sizes					
Food Service Area	**Enroll**	**X**	**SF/Stnt**	**x**	**%**
Preparation Area	Enroll	x	3.5	x	36%
Serving Areas	Enroll	x	3.5	x	34%
Dry Food Storage	Enroll	x	3.5	x	11%
Cooler/	Enroll	x	3.5	x	10%
Ware Washing Area	Enroll	x	3.5	x	9%
Warming Kitchen	Enroll	x	2.0		
Multiply Enrollment x SF/Student x % to achieve size of area					

The following school size example illustrates the suggested instructional and support spaces
The example is intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
M/H-CU-1	Workroom	1	400	400	See Note 1
M/H-CU-2	Custodial Office	1	100	100	
Custodial Total				**500**	

Custodial Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M/H-CU-1	Workroom	0	200	0	0	0	0	0	varies	0	See Note 1
M/H-CU-2	Custodial Office	0	100	0	0	0	0	0	varies	0	
Custodial Total				**0**			**0**			**0**	

All Grade Level Square Footage Allowance Notes	
Student Enrollment	**1**
350-450 Students	200
451-800 Students	400
801-1200 Students	400
1201-1600 Students	400
Enrollment Determines SF Allowed	

Sample School District, SAMPLE 6-12 SCHOOL

BUILDING SERVICES SPACES

C-BS CHAPTER 2: BRACKETING

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
M/H-BS-1	Large Group Restrooms		2,498	2,498	See Build Svc Sizes
M/H-BS-2	Custodial Closet	2	50	100	
M/H-BS-3	Electrical Closet	2	50	100	
M/H-BS-4	Telecommunications Room (TR)	2	64	128	See Note 1
M/H-BS-5	Corridors		14,277	14,277	See Build Svc Sizes
M/H-BS-6	Mechanical Rooms/Decks		4,925	4,925	See Note 2
M/H-BS-7	Storage Area	1	200	200	See Build Svc Sizes
M/H-BS-8	Central Storage Area	1	***200***	200	See SF Allowance
M/H-BS-9	Loading/Receiving Area	1	120	120	See SF Allowance
M/H-BS-10	Restroom	0	60	0	
M/H-BS-11	***Recycling Room***	***1***	***100***	***100***	***See SF Allowance***
Building Services Total				***22,648***	

Building Services Worksheet

		New SF			Existing SF			TOTAL SF			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M/H-BS-1	Large Group Restrooms	-	0	0	-	0	0	- varies		0	See Build Svc Sizes
M/H-BS-2	Custodial Closet	0	50	0	0	0	0	0 varies		0	
M/H-BS-3	Electrical Closet	0	50	0	0	0	0	0 varies		0	
M/H-BS-4	Telecommunications Room (TR)	0	64	0	0	0	0	0 varies		0	See Note 1
M/H-BS-5	Corridors	-	0	0	-	0	0	varies		0	See Build Svc Sizes
	Vertical Circulation	-	0	0	-	0	0	varies		0	See Note 2
M/H-BS-6	Mechanical/Electrical Space/Decks	-	0	0	-	0	0	varies		0	See Build Svc Sizes
M/H-BS-7	Storage Area	0	150	0	0	0	0	0 varies		0	See SF Allowance
M/H-BS-8	Central Storage Area	0	***170***	0	0	0	0	0 varies		0	See SF Allowance
M/H-BS-9	Loading/Receiving Area	0	120	0	0	0	0	0 varies		0	
M/H-BS-10	Restroom	0	60	0	0	0	0	0 varies		0	
M/H-BS-11	***Recycling Room***	***0***	***80***	***0***	***0***	***0***	***0***	***0 varies***		***0***	***See SF Allowance***
Building Services Total				***0***			***0***			***0***	

Building Services Notes	
Number	**Notes:**
	Size of Telecommunications Room varies with size of school. See page ***5113-4 &*** 6114-***4*** .
	Vertical Circulation refers only to the following: Stairways/stairtowers, monumental stairs, elevators and elevator equipment room.

Building Services Area Sizes			
Building Services Areas	**Prog**	**X**	**%**
Large Group Restrooms	Prog	x	3.5
Corridors	Prog	x	20.0
Mechanical/Electrical Space/Decks	Prog	x	6.9
Multiply Sum of Program Areas - Building Services x % to achieve size of area			

Square Footage Allowance Notes			
Student Enrollment	**Stor**	**Ctl Stor**	***Recycle***
350-450 Students	150	***170***	***80***
451-800 Students	200	***200***	***100***
801-1200 Students	250	***220***	***130***
1201-1600 Students	250	***240***	***160***
Enrollment Determines SF Allowed			

The following worksheet provides a summary of the four major POR categories defined in a "Student Centered Learning Environment" project.

Entering the grade configuration, student enrollment, and both "Net" and "Gross" square footage totals from the educational specifications and schematic diagrams (based upon the traditional POR categories) this worksheet summarizes the ALLOWABLE and ACTUAL areas in a STUDENT CENTERED LEARNING ENVIRONMENT (SCLE). This worksheet is part of the required submittal for any SCLE project.

ELEMENTARY SCHOOL

SCLE Worksheet ALLOWABLE

				ACTUAL
Enter Grade Configuration	K-5		See Note 1.	K-5
Enter Student Enrollment	550		See Note 2.	550
Square Feet Per Student	117.31			
Total Gross Square Feet Funded from MASTER PLAN	64,520			
Vert. Cir. Area Allowable (●) Single Story Building ( ) Multistory Building	0			
Total Adjusted POR Gross Square Footage	64,520			
SCLE POR SUMMARY	**SF**			
Academic / Special Education Spaces / Media / Visual Arts / Music / Student Dining	34,825	MINIMUM	See Note 3.	0
Administrative Spaces	2,569		See Note 4.	0
Physical Education Spaces	4,300	MAXIMUM	See Note 5.	0
Food Service Spaces / Custodial Spaces / Building Services	16,961		See Note 6.	0
Facility Total (NET SF)	58,655			0
Construction Factor (10% multiplied by the facility total)	0.10			
Gross Square Feet (GSF) Developed	64,520			0

Note 1. Enter grade configuration.
Note 2. Enter Student Enrollment.

Difference of GSF developed from GSF allowable (64,520)

Note 3. **MINIMUM SQUARE FOOTAGE REQUIRED** - Includes E-AC Academic Core Spaces, E-SE Special Education Spaces, E-MC Media Center Spaces, E-VA Visual Arts Spaces, E-MU Music Spaces, and E-SD Student Dining Spaces derived from total areas developed with traditional bracketing program areas including the ADDITIONAL E-AC-8 Small Group Room, E-AC-9 Multi-use Studio, E-AC-10 Kinesthetic Learning Studio included in the 2011 Design Manual Update.

Note 4. Includes all spaces included in traditional bracketing program areas identified under E-AD Administrative Spaces.

Note 5. **MAXIMUM SQUARE FOOTAGE ALLOWED** - Includes all spaces included in traditional bracketing program areas identified under E-PE Physical Education Spaces.

Note 6. Includes all spaces included in traditional bracketing program areas identified under E-FS Food Service Spaces, E-CU Custodial Spaces, E-BS Building Service Spaces.

SCLE Educational Specification Schematic S.F. Summary

PROGRAM AREA		New SF	Exist. SF*	TOTAL SF	
E-AC	Academic Core Spaces	0	0	0	See Note 7.
E-SE	Special Education Spaces	0	0	0	See Note 8.
E-AD	Administrative Spaces	0	0	0	See Note 9.
E-MC	Media Center Spaces	0	0	0	See Note 10.
E-VA	Visual Arts Spaces	0	0	0	See Note 11.
E-MU	Music Spaces	0	0	0	See Note 12.
E-PE	Physical Education Spaces	0	0	0	See Note 13.
E-SD	Student Dining Spaces	0	0	0	See Note 14.
E-FS	Food Service Spaces	0	0	0	See Note 15.
E-CU	Custodial Spaces	0	0	0	See Note 16.
E-BS	Building Services	0	0	0	See Note 17.
Facility Total (NET AREA)		0	0	0	
Facility Total (GROSS AREA)		0	0	0	See Note 18.
Calculated Construction factor		0.00	0.00	0.00	
Minus exist. co-funded Oversize Area from Master Plan			0	-	See Note 19.
Adjusted Existing Area			0	-	
Total Adjusted GSF Developed (without Oversize Area)				0	
Difference of GSF developed from GSF allowable				(64,520)	

Note 7. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **E-AC Academic Core Spaces.**
Note 8. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **E-SE Special Education Spaces.**
Note 9. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **E-AD Administration Spaces.**
Note 10. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **E-MC Media Center Spaces.**
Note 11. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **E-VA Visual Arts Spaces.**
Note 12. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **E-MU Music Spaces.**
Note 13. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **E-PE Physical Education Spaces**.
Note 14. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **E-SD Student Dining Spaces.**
Note 15. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **E-FS Food Service Spaces.**
Note 16. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **E-CU Custodial Spaces.**
Note 17. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **E-BS Building Services.**
Note 18. Enter "New" and "Existing" calculated GROSS AREA totals from schematic diagrams developed.
Note 19. Enter existing co-funded Oversize Area from Master Plan

Sample School District, SAMPLE MIDDLE SCHOOL SCLE

STUDENT CENTERED LEARNING ENVIRONMENT - SUMMARY OF SPACES WORKSHEET

The following worksheet provides a summary of the four major POR categories defined in a "Student Centered Learning Environment" project.

Entering the grade configuration, student enrollment, and both "Net" and "Gross" square footage totals from the educational specifications and schematic diagrams (based upon the traditional POR categories) this worksheet summarizes the ALLOWABLE and ACTUAL areas in a STUDENT CENTERED LEARNING ENVIRONMENT (SCLE). This worksheet is part of the required submittal for any SCLE project.

MIDDLE SCHOOL

SCLE Worksheet ALLOWABLE

				ACTUAL
Enter Grade Configuration	6-8	See Note 1.		6-8
Enter Student Enrollment	450	See Note 2.		450
Square Feet Per Student	151.00			
Total Gross Square Feet Funded from MASTER PLAN	**67,950**			
Vert. Cir. Area Allowable (● Single Story Building ○ Multistory Building)	0			
Total Adjusted POR Gross Square Footage	**67,950**			
SCLE POR SUMMARY	**SF**			
Academic / Special Education / Media / Visual Arts / Music / Technology / Family and Consumer Science / Student Dining	**32,585**	**MINIMUM**	See Note 3.	**0**
Administrative Spaces	**2,282**		See Note 4.	0
Physical Education Spaces	**9,300**	**MAXIMUM**	See Note 5.	0
Food Service Spaces / Custodial Spaces / Building Services	**17,049**		See Note 6.	0
Facility Total (NET SF)	**61,216**			**0**
Construction Factor (11% multiplied by the facility total)	0.11			
Gross Square Feet (GSF) Developed	**67,950**			**0**

Note 1. Enter grade configuration.
Note 2. Enter Student Enrollment.

Difference of GSF developed from GSF allowable (67,950)

Note 3. **MINIMUM SQUARE FOOTAGE REQUIRED** - Includes M-AC Academic Core Spaces, M-SE Special Education Spaces, M-MC Media Center Spaces, M-VA Visual Arts Spaces, M-MU Music Spaces, M-TE Technology Education Spaces, M-FCS Family and Consumer Science Spaces, and M-SD Student Dining Spaces derived from total areas developed with traditional bracketing program areas including the ADDITIONAL M-AC-7a Small Group Room, M-AC-8 Multi-use Studio, M-AC-9 Kinesthetic Learning Studio included in the 2011 Design Manual Update.

Note 4. Includes all spaces included in traditional bracketing program areas identified under M-AD Administrative Spaces.

Note 5. **MAXIMUM SQUARE FOOTAGE ALLOWED** - Includes all spaces included in traditional bracketing program areas identified under M-PE Physical Education Spaces.

Note 6. Includes all spaces included in traditional bracketing program areas identified under M-FS Food Service Spaces, M-CU Custodial Spaces, M-BS Building Service Spaces.

SCLE Educational Specification Schematic S.F. Summary

PROGRAM AREA		New SF	Exist. SF*	TOTAL SF	
M-AC	Academic Core Spaces	0	0	0	See Note 7.
M-SE	Special Education Spaces	0	0	0	See Note 8.
M-AD	Administrative Spaces	0	0	0	See Note 9.
M-MC	Media Center Spaces	0	0	0	See Note 10.
M-VA	Visual Arts Spaces	0	0	0	See Note 11.
M-MU	Music Spaces	0	0	0	See Note 12.
M-TE	Technology Education Spaces	0	0	0	See Note 13.
M-FCS	Family and Consumer Science Spaces	0	0	0	See Note 14.
M-PE	Physical Education Spaces	0	0	0	See Note 15.
M-SD	Student Dining Spaces	0	0	0	See Note 16.
M-FS	Food Service Spaces	0	0	0	See Note 17.
M-CU	Custodial Spaces	0	0	0	See Note 18.
M-BS	Building Services	0	0	0	See Note 19.
Facility Total (NET AREA)		**0**	**0**	**0**	
Facility Total (GROSS AREA)		**0**	**0**	**0**	See Note 20.
Calculated Construction factor		0.00	0.00	0.00	
Minus exist. co-funded Oversize Area from Master Plan			0	-	See Note 21.
Adjusted Existing Area			0	-	
Total Adjusted GSF Developed (without Oversize Area)				**0**	
Difference of GSF developed from GSF allowable				**(67,950)**	

Note 7. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **M-AC Academic Core Spaces.**
Note 8. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **M-SE Special Education Spaces.**
Note 9. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **M-AD Administration Spaces.**
Note 10. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **M-MC Media Center Spaces.**
Note 11. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **M-VA Visual Arts Spaces.**
Note 12. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **M-MU Music Spaces.**
Note 13. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **M-TE Technology Spaces.**
Note 14. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **M-FCS Family and Consumer Science Spaces.**
Note 15. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **M-PE Physical Education Spaces.**
Note 16. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **M-SD Student Dining Spaces.**
Note 17. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **M-FS Food Service Spaces.**
Note 18. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **M-CU Custodial Spaces.**
Note 19. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **M-BS Building Services.**
Note 20. Enter "New" and "Existing" calculated GROSS AREA totals from schematic diagrams developed.
Note 21. Enter existing co-funded Oversize Area from Master Plan

The following worksheet provides a summary of the four major POR categories defined in a "Student Centered Learning Environment" project.

Entering the grade configuration, student enrollment, and both "Net" and "Gross" square footage totals from the educational specifications and schematic diagrams (based upon the traditional POR categories) this worksheet summarizes the ALLOWABLE and ACTUAL areas in a STUDENT CENTERED LEARNING ENVIRONMENT (SCLE). This worksheet is part of the required submittal for any SCLE project.

HIGH SCHOOL

SCLE Worksheet ALLOWABLE

				ACTUAL
Enter Grade Configuration	9-12		See Note 1.	9-12
Enter Student Enrollment	2,400		See Note 2.	2,400
Square Feet Per Student	156.00			
Total Gross Square Feet Funded from MASTER PLAN	**374,400**			
Vert. Cir. Area Allowable (●) Single Story Building ( ) Multistory Building	0			
Total Adjusted POR Gross Square Footage	**374,400**			
SCLE POR SUMMARY	**SF**			
Academic / Special Education / Media / Visual Arts / Music / Technology / Business Education / Family and Consumer Science / Student Dining	**189,360**	**MINIMUM**	See Note 3.	**0**
Administrative Spaces	**10,475**		See Note 4.	0
Physical Education Spaces	**46,790**	**MAXIMUM**	See Note 5.	0
Food Service Spaces / Custodial Spaces / Building Services	**90,673**		See Note 6.	0
Facility Total (NET SF)	**337,297**			**0**
Construction Factor (11% multiplied by the facility total)	0.11			
Gross Square Feet (GSF) Developed	**374,400**			**0**

Note 1. Enter grade configuration.
Note 2. Enter Student Enrollment.

Difference of GSF developed from GSF allowable (374,400)

Note 3. **MINIMUM SQUARE FOOTAGE REQUIRED** - Includes H-AC Academic Core Spaces, H-SE Special Education Spaces, H-MC Media Center Spaces, H-VA Visual Arts Spaces, H-MU Music Spaces, H-TE Technology Spaces, H-BE Business Education Spaces, H-FCS Family and Consumer Science Spaces, and H-SD Student Dining Spaces derived from total areas developed with traditional bracketing program areas including the ADDITIONAL H-AC-9a Small Group Room, H-AC-13 Multi-use Studio, H-AC-14 Kinesthetic Learning Studio included in the 2011 Design Manual Update.

Note 4. Includes all spaces included in traditional bracketing program areas identified under H-AD Administrative Spaces.

Note 5. **MAXIMUM SQUARE FOOTAGE ALLOWED** - Includes all spaces included in traditional bracketing program areas identified under H-PE Physical Education Spaces.

Note 6. Includes all spaces included in traditional bracketing program areas identified under H-FS Food Service Spaces, H-CU Custodial Spaces, H-BS Building Service Spaces.

SCLE Educational Specification Schematic S.F. Summary

PROGRAM AREA		New SF	Exist. SF*	TOTAL SF	
H-AC	Academic Core Spaces	0	0	0	See Note 7.
H-SE	Special Education Spaces	0	0	0	See Note 8.
H-AD	Administrative Spaces	0	0	0	See Note 9.
H-MC	Media Center Spaces	0	0	0	See Note 10.
H-VA	Visual Arts Spaces	0	0	0	See Note 11.
H-MU	Music Spaces	0	0	0	See Note 12.
H-TE	Technology Education Spaces	0	0	0	See Note 13.
H-BE	Business Education Spaces	0	0	0	See Note 14.
H-FCS	Family and Consumer Science Spaces	0	0	0	See Note 15.
H-PE	Physical Education Spaces	0	0	0	See Note 16.
H-SD	Student Dining Spaces	0	0	0	See Note 17.
H-FS	Food Service Spaces	0	0	0	See Note 18.
H-CU	Custodial Spaces	0	0	0	See Note 19.
H-BS	Building Services	0	0	0	See Note 20.
Facility Total (NET AREA)		**0**	**0**	**0**	
Facility Total (GROSS AREA)		**0**	**0**	**0**	See Note 21.
Calculated Construction factor		0.00	0.00	0.00	
Minus exist. co-funded Oversize Area from Master Plan			0	-	See Note 22.
Adjusted Existing Area			0	-	
Total Adjusted GSF Developed (without Oversize Area)				**0**	
Difference of GSF developed from GSF allowable				**(374,400)**	

Note 7. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **H-AC Academic Core Spaces.**
Note 8. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **H-SE Special Education Spaces.**
Note 9. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **H-AD Administration Spaces.**
Note 10. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **H-MC Media Center Spaces.**
Note 11. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **H-VA Visual Arts Spaces.**
Note 12. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **H-MU Music Spaces.**
Note 13. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **H-TE Technology Spaces.**
Note 14. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **H-BE Business Education Spaces.**
Note 15. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **H-FCS Family and Consumer Science Spaces.**
Note 16. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **H-PE Physical Education Spaces**.
Note 17. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **H-SD Student Dining Spaces.**
Note 18. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **H-FS Food Service Spaces.**
Note 19. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **H-CU Custodial Spaces.**
Note 20. Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **H-BS Building Services.**
Note 21. Enter "New" and "Existing" calculated GROSS AREA totals from schematic diagrams developed.
Note 22. Enter existing co-funded Oversize Area from Master Plan

STUDENT CENTERED LEARNING ENVIRONMENT - SUMMARY OF SPACES WORKSHEET

The following worksheet provides a summary of the four major POR categories defined in a "Student Centered Learning Environment" project.

Entering the grade configuration, student enrollment, and both "Net" and "Gross" square footage totals from the educational specifications and schematic diagrams (based upon the traditional POR categories) this worksheet summarizes the ALLOWABLE and ACTUAL areas in a STUDENT CENTERED LEARNING ENVIRONMENT (SCLE). This worksheet is part of the required submittal for any SCLE project.

COMBINATION SCHOOL

SCLE Worksheet ALLOWABLE

			ACTUAL
Enter Grade Configuration	K-12	See Note 1.	K-12
Student Enrollment			
Enter **ELEMENTARY SCHOOL** Student Enrollment	300	See Note 2.	300
Enter **MIDDLE SCHOOL** Student Enrollment	150	See Note 2.	150
Enter **HIGH SCHOOL** Student Enrollment	200	See Note 2.	200
TOTAL Student Enrollment	650		650

SF per student	SF / Student	AREA
SF per **ELEMENTARY SCHOOL** student	134	40,255
SF per **MIDDLE SCHOOL** student	162	24,314
SF per **HIGH SCHOOL** student	193	38,645
Total Gross Square Feet Funded from MASTER PLAN		103,215

Vert. Cir. Area Allowable (●) Single Story Building ( ) Multistory Building 0

Total Adjusted POR Gross Square Footage 103,215

SCLE POR SUMMARY	SF			ACTUAL
Academic / Special Education / Media / Visual Arts / Music / Technology / Business Education / Family and Consumer Science / Student Dining	48,802	MINIMUM	See Note 3.	0
Administrative Spaces	2,990		See Note 4.	0
Physical Education Spaces	15,800	MAXIMUM	See Note 5.	0
Food Service Spaces / Custodial Spaces / Building Services	25,395		See Note 6.	0
Facility Total (NET SF)	92,986			0
Construction Factor (11% multiplied by the facility total)	0.11			
Gross Square Feet (GSF) Developed	103,215			0

Difference of GSF developed from GSF allowable (103,215)

Note 1. Enter grade configuration.

Note 2. Enter Student Enrollments for ES, MS, and HS.

Note 3. **MINIMUM SQUARE FOOTAGE REQUIRED** - Includes C-AC Academic Core Spaces, C-SE Special Education Spaces, C-MC Media Center Spaces, C-VA Visual Arts Spaces, C-MU Music Spaces, C-TE Technology Spaces, C-BE Business Education Spaces, C-FCS Family and Consumer Science Spaces, and C-SD Student Dining Spaces derived from total areas developed with traditional bracketing program areas including the ADDITIONAL C-AC-9a Small Group Room, C-AC-13 Multi-use Studio, C-AC-14 Kinesthetic Learning Studio included in the 2011 Design Manual Update.

Note 4. Includes all spaces included in traditional bracketing program areas identified under C-AD Administrative Spaces.

Note 5. **MAXIMUM SQUARE FOOTAGE ALLOWED** - Includes all spaces included in traditional bracketing program areas identified under C-PE Physical Education Spaces.

Note 6.

Note 7.

Note 8.

Note 9.

Note 10.

Note 11.

Note 12.

Note 13.

Note 14.

Note 15.

Note 16.

Note 17.

Note 18.

Note 19.

Note 20.

Note 21.

Note 22.

Includes all spaces included in traditional bracketing program areas identified under C-FS Food Service Spaces, C-CU Custodial Spaces, C-BS Building Service Spaces.

SCLE Educational Specification Schematic S.F. Summary

PROGRAM AREA		New SF	Exist. SF*	TOTAL SF
C-AC	Academic Core Spaces	0	0	0
C-SE	Special Education Spaces	0	0	0
C-AD	Administrative Spaces	0	0	0
C-MC	Media Center Spaces	0	0	0
C-VA	Visual Arts Spaces	0	0	0
C-MU	Music Spaces	0	0	0
C-TE	Technology Education Spaces	0	0	0
C-BE	Business Education Spaces	0	0	0
C-FCS	Family and Consumer Science Spaces	0	0	0
C-PE	Physical Education Spaces	0	0	0
C-SD	Student Dining Spaces	0	0	0
C-FS	Food Service Spaces	0	0	0
C-CU	Custodial Spaces	0	0	0
	Facility Subtotal:	0	0	0
C-BS	Building Services	0	0	0
	Facility Total:	0	0	0
	Facility Total (GROSS AREA)	0	0	0
	Calculated Construction factor	0.00	0.00	0.00
	Minus exist. co-funded Oversize Area from Master Plan		0	
	Adjusted Existing Area		0	
	Total Adjusted GSF Developed (without Oversize Area)			0
	Difference of GSF developed from GSF allowable			(103,215)

See Note 11.
See Note 12.
See Note 13.
See Note 14.
See Note 15.
See Note 16.
See Note 17.
See Note 18.
See Note 19.
See Note 20.
See Note 21.
See Note 22.

Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **C-AC Academic Core Spaces.**
Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **C-SE Special Education Spaces.**
Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **C-AD Administration Spaces.**
Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **C-MC Media Center Spaces.**
Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **C-VA Visual Arts Spaces.**
Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **C-MU Music Spaces.**
Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **C-TE Technology Spaces.**
Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **C-BE Business Education Spaces.**
Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **C-FCS Family and Consumer Science Spaces.**
Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **C-PE Physical Education Spaces.**
Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **C-SD Student Dining Spaces.**
Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **C-FS Food Service Spaces.**
Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **C-CU Custodial Spaces.**
Enter "New" and "Existing" net square footage totals from schematic diagrams for areas identified in traditional bracketing as **C-BS Building Services.**
Enter "New" and "Existing" calculated GROSS AREA totals from schematic diagrams developed.
Enter existing co-funded Oversize Area from Master Plan

PURPOSE:

The purpose of this chapter is to assist the Career-Technical School in establishing the gross square feet for a new facility or an addition to an existing facility. The size of the facility is based upon the student capacity and the programs offered within the facility which have been approved by the Ohio Department of Education.

ALLOCATING BUILDING SQUARE FEET:

Square feet allocations for spaces in the core areas and the program specific areas have been established. A worksheet for each core area and each program area follows the Summary of Core Spaces. With the aid of the educational specifications, the Vocational School District and its Design Professional can tailor the facility to meet the needs of the district by entering the appropriate quantities for each space.

The spaces of each area are further defined in Chapter 6 (CT). In this chapter are listed spatial relationships, environmental considerations, and representative space plates.

Certain building-related areas are included in the Summary of Spaces. These spaces are directly or indirectly related to the student capacity. These areas will be calculated as the district selects educational spaces. The basis for these calculations is shown on the space plates.

GROSS SQUARE FOOT ALLOWANCE:

CAREER-TECHNICAL SCHOOLS
GROSS SQUARE FOOT MAXIMUM - CORE SPACES CHAPTER 2: BRACKETING

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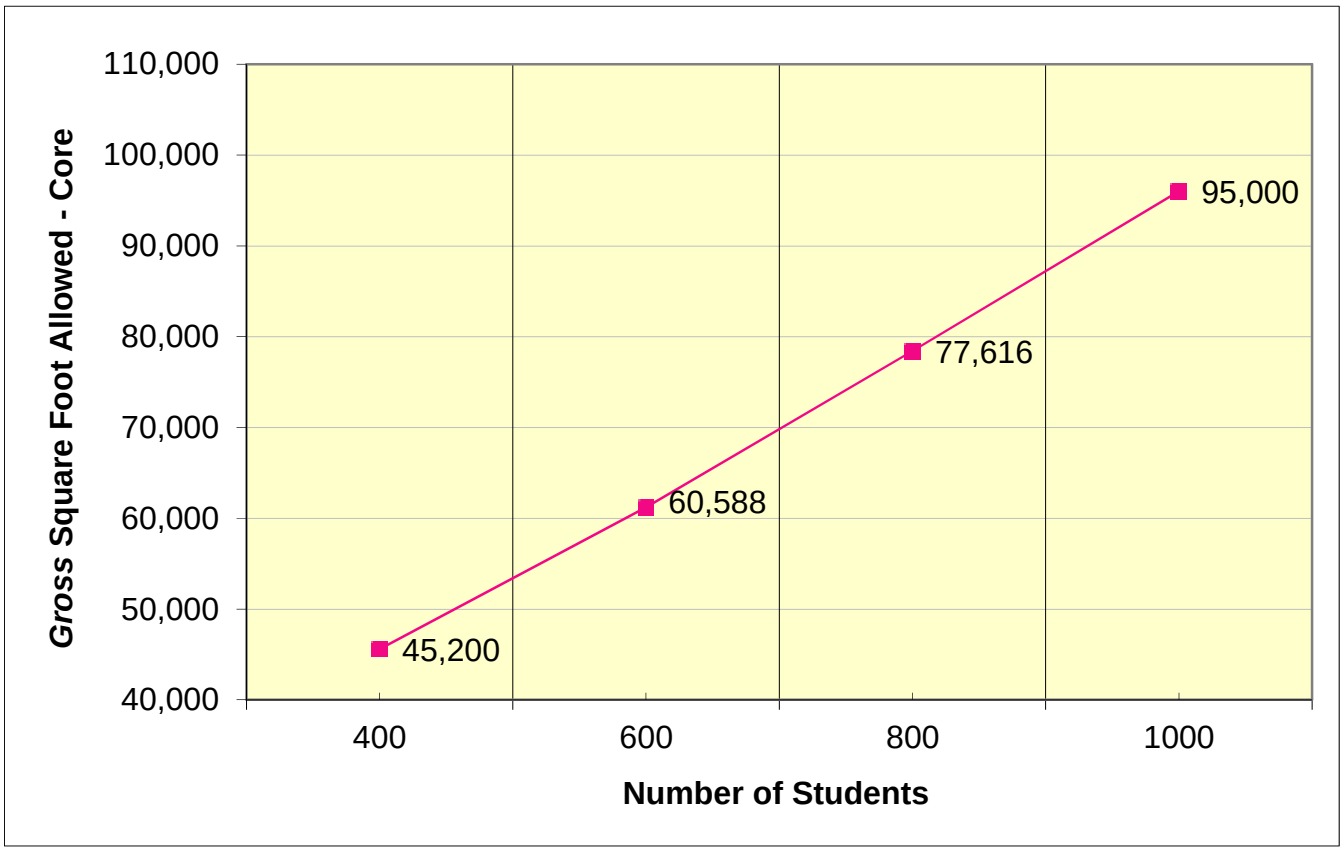
Enter # of Students	900
SF/Student	95.90
Gross SF for Core Spaces	86,308

Career-Technical School
0 - 399 students, 113 SF/student
400 - 599 students, 113–101 SF/student
600 - 799 students, 101–97 SF/student
800 - 999 students, 97–95 SF/student
1000 - 4999 students, 95–95 SF/student
5000+ students, 95 SF/student



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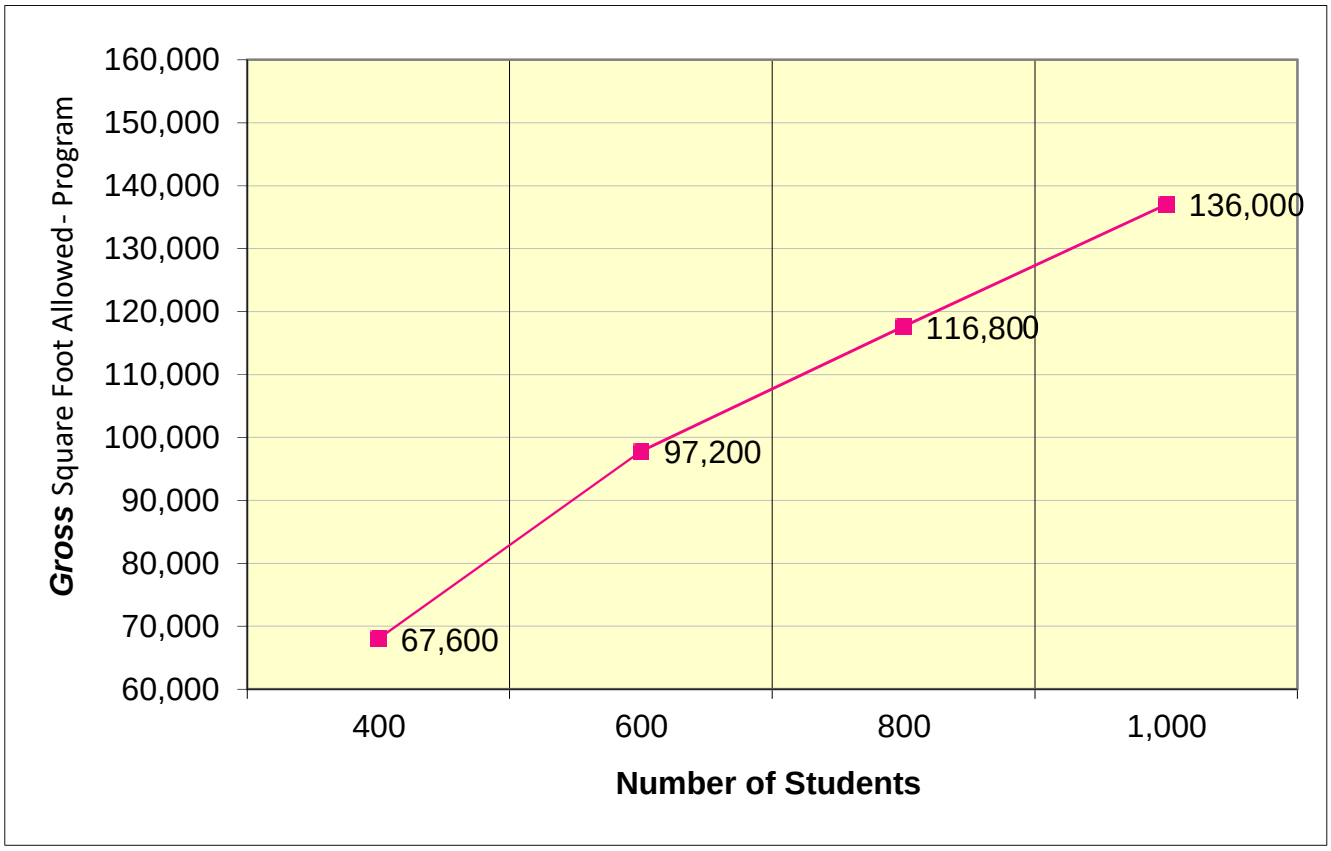
Enter # of Students	900
SF/Student	140.44
Gross SF for Program Spaces	126,400

Career-Technical School

0 - 399 students, 169 SF/student
400 - 599 students, 169–162 SF/student
600 - 799 students, 162–146 SF/student
800 - 999 students, 146–136 SF/student
1000 - 4999 students, 136–136 SF/student
5000+ students, 136 SF/student



CAREER-TECHNICAL SCHOOLS

GROSS SQUARE FOOT MAXIMUM - COMBINED SPACES CHAPTER 2: BRACKETING

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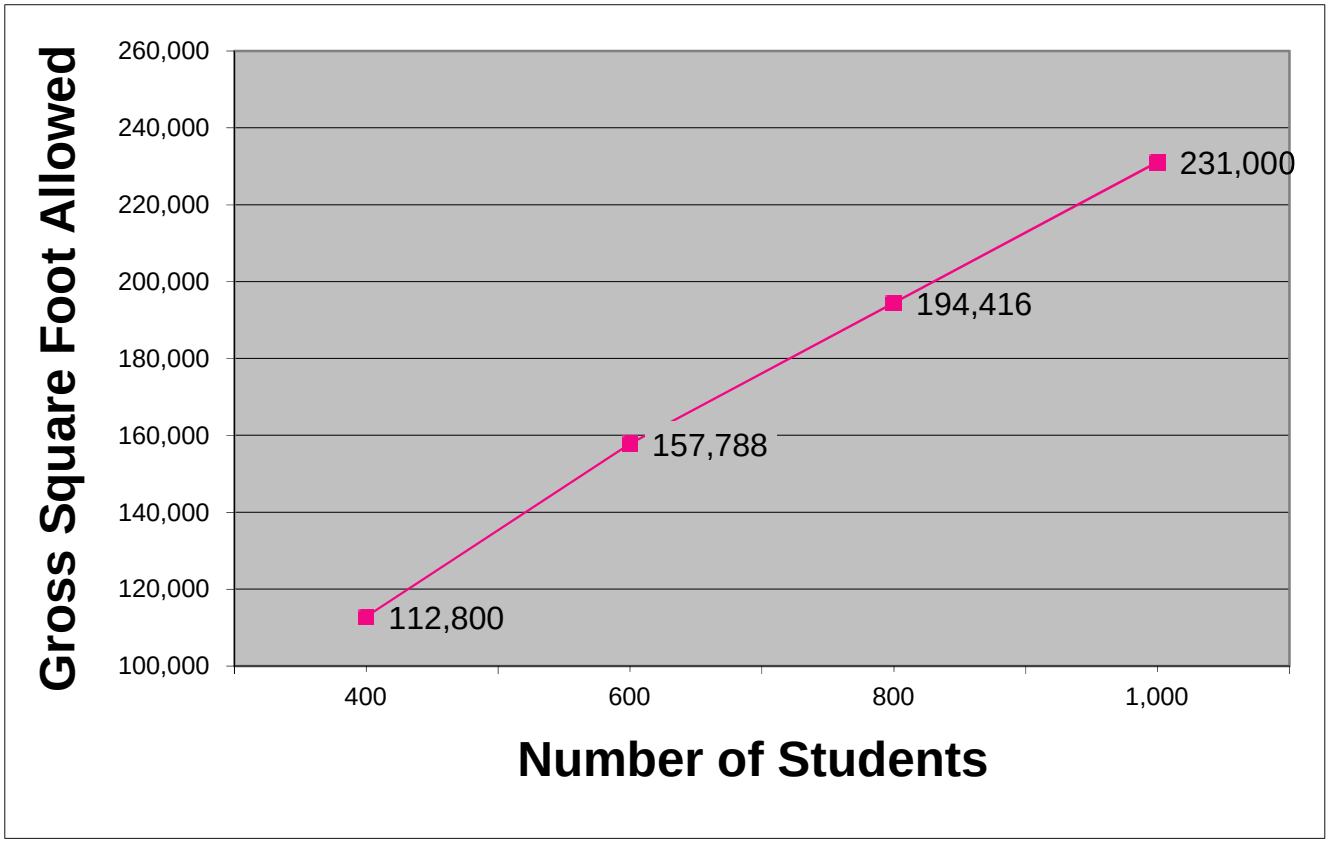
Enter # of Students	900
SF/Student	236.34
Gross SF for Combined Spaces	212,708

Career-Technical School

Add the results of 2700-2 and 2700-3 for the above number of students in each.



Sample School District, Sample School Building
CAREER-TECHNICAL SCHOOL

SUMMARY OF SPACES EXAMPLE

Previously, changes or additions made during the annual update of the Design Manual have been ***"bolded and italicized"*** for easy identification. Changes have been made to the formulas on this sheet which have not been bolded and italicized. The user is advised to carefully review all information.

Number of Students	400	600	800	1,000
Core SF/student Funded	113	101	97	95
Total Core Space Funded	45,200	60,588	77,616	95,000
Program SF/student Funded	169	162	146	136
Total Program Space Funded	67,600	97,200	116,800	136,000
Total Gross SF Funded	**112,800**	**157,788**	**194,416**	**231,000**

Core Spaces				
CT-AC Academic Core	14,420	20,520	26,890	33,370
CT-SE Spec. Ed./Student Svs.	4,000	4,000	5,170	5,290
CT-AD Administration	3,030	3,910	4,910	6,180
CT-MC Media Center	2,790	4,090	4,840	5,980
CT-SD Student Dining	4,480	5,730	7,447	9,504
CT-FS Food Service	1,615	2,315	3,015	3,855
CT-CU Custodial	300	400	500	500
CT-GS General Services	3,091	4,228	5,110	6,376
Net Core Space	**33,726**	**45,193**	**57,882**	**71,055**
Mechanical/Electrical Space (6.9%)	2,327	3,118	3,994	4,903
Corridors (14%)	4,722	6,327	8,103	9,948
Total Core Space	40,775	54,638	69,979	85,906
Construction Factor (11%)	4,485	6,010	7,698	9,450
Gross Core Space Developed	**45,260**	**60,649**	**77,677**	**95,356**
Gross Core Space Co-Funded	45,200	60,588	77,616	95,000

Program Spaces				
CT-P1 Program Type 1	4,860	6,380	7,900	12,460
CT-P2 Program Type 2	4,620	2,310	4,620	4,620
CT-P3 Program Type 3	3,700	6,840	9,070	11,360
CT-P4 Program Type 4	8,355	11,015	14,465	19,335
CT-P5 Program Type 5	10,126	18,752	19,252	15,389
CT-P6 Program Type 6	18,889	23,249	32,475	28,912
CT-P7 Program Type 7	0	0	0	10,000
Net Program Space	**50,550**	**68,546**	**87,782**	**102,076**
Mechanical/Electrical Space (5%)	2,528	3,427	4,389	5,104
Corridors (14%)	7,077	9,596	12,289	14,291
Total Program Space	60,155	81,570	104,461	121,470
Construction Factor (11%)	6,617	8,973	11,491	13,362
Gross Program Space Developed	**66,771**	**90,542**	**115,951**	**134,832**
Gross Program Space Co-Funded	67,600	97,200	116,800	136,000

Total Gross SF Developed	112,031	151,191	193,628	230,188
Total Gross SF Co-Funded	112,800	157,788	194,416	231,000
Difference	**769**	**6,597**	**788**	**812**

School District Name, School Building Name
CAREER-TECHNICAL SCHOOL
SUMMARY OF SPACES WORKSHEET CHAPTER 2: BRACKETING

Previously, changes or additions made during the annual update of the Design Manual have been ***"bolded and italicized"*** for easy identification. Changes have been made to the formulas on this sheet which have not been bolded and italicized. The user is advised to carefully review all information.

Worksheet Summary	
Enter Student Enrollment	
Gross SF per Student Funded	
Total Gross SF Funded	**0**
Core Spaces	
CT-AC Academic Core	0
CT-SE Spec. Ed./Student Svs.	0
CT-AD Administration	0
CT-MC Media Center	0
CT-SD Student Dining	0
CT-FS Food Service	0
CT-CU Custodial	0
CT-GS General Services	0
Net Core Space	**0**
Mech./Electrical Space (6.9%)	0
Corridors (14%)	0
Total Core Space	0
Construction Factor (11%)	0
Gross Core Space Developed	**0**
Maximum Gross Core SF Co-Funded	0
Difference	**0**
Program Spaces	
CT-P1 Program Type 1	0
CT-P2 Program Type 2	0
CT-P3 Program Type 3	0
CT-P4 Program Type 4	0
CT-P5 Program Type 5	0
CT-P6 Program Type 6	0
CT-P7 Program Type 7	0
Net Program Spaces	**0**
Mech./Electrical Space (5%)	0
Corridors (14%)	0
Total Program Space	0
Construction Factor (11%)	**0**
Gross Program Space Developed	**0**
Maximum Gross Program SF Co-Funded	0
Difference	**0**

Total Gross SF Developed	**0**
Total Gross SF Co-Funded	**0**
Difference	

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	400 Students			600 Students			800 Students			1000 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
CT-AC-1 Academic classroom	7	900	6300	13	900	11700	17	900	15300	22	900	19800	
CT-AC-2 Computer room	1	1200	1200	1	1200	1200	2	1200	2400	2	1200	2400	
CT-AC-3 General Science/Physics	1	1200	1200	1	1200	1200	1	1200	1200	2	1200	2400	
CT-AC-4 Biology	1	1200	1200	1	1200	1200	2	1200	2400	2	1200	2400	
CT-AC-5 Chemistry	1	1200	1200	1	1200	1200	1	1200	1200	1	1200	1200	
CT-AC-6 Science Prep	1	300	300	2	300	600	2	300	600	3	300	900	
CT-AC-7 Teacher Prep/workroom	3	300	900	4	300	1200	4	300	1200	4	400	1600	See Note 1
CT-AC-8 Individual restroom	2	60	120	2	60	120	4	60	240	4	60	240	
CT-AC-9 Small group room	2	150	300	2	150	300	3	150	450	3	150	450	
CT-AC-10Material storage	4	50	200	4	75	300	4	100	400	4	120	480	See Note 2
CT-AC-11Multipurpose room	1	1500	1500	1	1500	1500	1	1500	1500	1	1500	1500	
CT-AC-12Science Laboratory	0	1000	0	0	1000	0	0	1000	0	0	1000	0	
Academic Core Total			**14,420**			**20,520**			**26,890**			**33,370**	

Academic Core Worksheet

Space	Qty	SF	Area	
CT-AC-1 Academic classroom		900	0	
CT-AC-2 Computer room		1200	0	
CT-AC-3 General Science/Physics		1200	0	
CT-AC-4 Biology		1200	0	
CT-AC-5 Chemistry		1200	0	
CT-AC-6 Science Prep		300	0	
CT-AC-7 Teacher Prep/workroom		300	0	See Note 1
CT-AC-8 Individual restroom		60	0	
CT-AC-9 Small group room		150	0	See Note 2
CT-AC-10Material storage		50	0	
CT-AC-11Multipurpose room		1500	0	
CT-AC-12Science Laboratory		1000	0	

Square Footage Allowance Notes		
Student Enrollment	1	2
350-450 Students	300	50
451-800 Students	300	100
801-1200 Students	400	150
1201-1600 Students	600	200
Enrollment Determines SF Allowed		

School District Name, School Building Name
SPECIAL EDUCATIONAL/STUDENT SERVICES SPACES
CT-SE CHAPTER 2: BRACKETING

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	400 Students			600 Students			800 Students			1000 Students		
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
CT-SE-1 Classroom	1	900	900	1	900	900	2	900	1800	2	900	1800
CT-SE-2 Workroom/conference	1	150	150	1	150	150	2	150	300	2	150	300
CT-SE-3 Restroom/shower	1	100	100	1	100	100	1	100	100	1	100	100
CT-SE-4 Career Tech. Evaluation	1	1200	1200	1	1200	1200	1	1200	1200	1	1200	1200
CT-SE-5 Career Tech. Office	1	120	120	1	120	120	1	120	120	2	120	240
CT-SE-6 Small group room	1	360	360	1	360	360	1	360	360	1	360	360
CT-SE-7 Job training Office	1	120	120	1	120	120	2	120	240	2	120	240
CT-SE-8 Resource room	1	900	900	1	900	900	1	900	900	1	900	900
CT-SE-9 Storage	1	150	150	1	150	150	1	150	150	1	150	150
Special Education Total			**4,000**			**4,000**			**5,170**			**5,290**

Special Education Worksheet

Space	Qty	SF	Area
CT-SE-1 Classroom		900	0
CT-SE-2 Workroom/conference		150	0
CT-SE-3 Restroom/shower		100	0
CT-SE-4 Career Tech. Evaluation		1200	0
CT-SE-5 Career Tech. Office		120	0
CT-SE-6 Small group room		360	0
CT-SE-7 Job training Office		120	0
CT-SE-8 Resource room		900	0
CT-SE-9 Storage		150	0
Special Education Total			**0**

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	400 Students			600 Students			800 Students			1000 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
CT-AD-1 Reception area	1	200	200	1	300	300	1	400	400	1	500	500	See Note 1
CT-AD-2 Secretarial space	1	200	200	1	300	300	1	400	400	1	500	500	See Note 2
CT-AD-3 Director/Principal's office	1	150	150	1	150	150	1	150	150	1	150	150	
CT-AD-4 Asst. Dir./Principal office	0	120	0	0	120	0	1	120	120	1	120	120	
CT-AD-5 Supervisor's office	1	120	120	2	120	240	2	120	240	3	120	360	
CT-AD-6 Coordinator's office	2	120	240	3	120	360	4	120	480	5	120	600	
CT-AD-7 Conference room	1	250	250	2	250	500	2	250	500	3	250	750	
CT-AD-8 Mail/work/copy room	1	200	200	1	250	250	1	300	300	1	350	350	See Note 3
CT-AD-9 Administrative Storage	1	150	150	1	150	150	1	200	200	1	200	200	See Note 4
CT-AD-1 Vault/records	1	50	50	1	65	65	1	80	80	1	100	100	See Note 5
CT-AD-1 Restroom	1	60	60	1	60	60	1	60	60	2	60	120	
CT-AD-1 Guidance counselor	2	120	240	2	120	240	3	120	360	3	120	360	
CT-AD-1 Guidance records/storage	1	100	100	1	100	100	1	100	100	1	150	150	See Note 6
CT-AD-1 Guidance conference	1	150	150	1	200	200	2	200	400	2	250	500	See Note 7
CT-AD-1 Parent/volunteer	1	200	200	1	200	200	1	250	250	1	400	400	See Note 8
CT-AD-1 Health clinic (incl. RR)	1	400	400	1	400	400	1	450	450	1	500	500	See Note 9
CT-AD-1 Itinerant personnel	1	120	120	1	120	120	1	120	120	1	120	120	
CT-AD-1 In-school suspension	1	200	200	1	275	275	1	300	300	1	400	400	See Note 10
Administrative Total			**3,030**			**3,910**			**4,910**			**6,180**	

Adminstration Worksheet

Space	Qty	SF	Area	
CT-AD-1 Reception area		200	0	See Note 1
CT-AD-2 Secretarial space		200	0	See Note 2
CT-AD-3 Director/Principal's office		150	0	
CT-AD-4 Asst. Dir./Principal office		120	0	
CT-AD-5 Supervisor's office		120	0	
CT-AD-6 Coordinator's office		120	0	
CT-AD-7 Conference room		250	0	
CT-AD-8 Mail/work/copy room		200	0	See Note 3
CT-AD-9 Administrative Storage		150	0	See Note 4
CT-AD-1 Vault/records		50	0	See Note 5
CT-AD-1 Restroom		60	0	
CT-AD-1 Guidance counselor		120	0	
CT-AD-1 Guidance records/storage		100	0	See Note 6
CT-AD-1 Guidance conference		150	0	See Note 7
CT-AD-1 Parent/volunteer		200	0	See Note 8
CT-AD-1 Health clinic (incl. RR)		400	0	See Note 9
CT-AD-1 Itinerant personnel		120	0	
CT-AD-1 In-school suspension		200	0	See Note 10
Administrative Total			**0**	

Square Footage Allowance Notes										
Student Enrollment	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
350-450 Students	200	200	200	150	50	100	150	200	400	200
451-800 Students	400	400	300	150	80	100	200	300	450	325
801-1200 Students	500	500	400	200	110	200	250	400	500	450
1201-1600 Students	600	600	500	200	140	200	250	400	550	575
Enrollment Determines SF Allowed										

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	400 Students			600 Students			800 Students			1000 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
CT-MC-1 Reading room/Circulation	1	1400	1400	1	2100	2100	1	2800	2800	1	3500	3500	See Note 1
CT-MC-2 Media Specialist office	1	120	120	1	120	120	2	120	240	2	120	240	
CT-MC-3 Workroom/storage	1	300	300	1	300	300	1	300	300	1	500	500	See Note 2
CT-MC-4 Main Control/Equipment room	1	300	300	1	300	300	1	300	300	1	300	300	
CT-MC-5 Conference room	1	250	250	1	250	250	1	250	250	1	250	250	
CT-MC-6 Multimedia Production room	0	500	0	1	500	500	1	500	500	1	500	500	
CT-MC-7 Document storage	1	200	200	1	300	300	1	250	250	1	400	400	See Note 3
CT-AC-9 Small group room	1	220	220	1	220	220	1	200	200	1	290	290	See Note 4
Media Center Total			**2,790**			**4,090**			**4,840**			**5,980**	

Media Center Worksheet

Space	Qty	SF	Area	
CT-MC-1 Reading room/Circulation		0	0	See Note 1
CT-MC-2 Media Specialist office		120	0	
CT-MC-3 Workroom/storage		300	0	See Note 2
CT-MC-4 Main Control/Equipment room		300	0	
CT-MC-5 Conference room		250	0	
CT-MC-6 Multimedia Production room		500	0	
CT-MC-7 Document storage		200	0	See Note 3
CT-AC-9 Small group room		220	0	See Note 4
Media Center Total			**0**	

Media Center Notes	
Number	**Notes:**
1	The size of the Reading Room/Circulation space is equal to 10% of the student enrollment multiplied by 35 SF per student.

Square Footage Allowance Notes			
Student Enrollment	**2**	**3**	4
350-450 Students	300	200	220
451-800 Students	400	300	220
801-1200 Students	500	250	200
1201-1600 Students	600	400	290
Enrollment Determines SF Allowed			

School District Name, School Building Name
STUDENT DINING SPACES
CT-SD

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE		400 Students			600 Students			800 Students			1000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
CT-SD-1	Student Dining	1	3000	3000	1	3500	3500	1	4667	4667	1	5833	5833	See Note 1
CT-SD-2	Stage	1	1000	1000	1	1200	1200	1	1600	1600	1	2000	2000	See Note 2
CT-SD-3	Staff Dining	0	400	0	1	500	500	1	600	600	1	900	900	See Note 3
CT-SD-4	Table Storage	1	400	400	1	450	450	1	500	500	1	611	611	See Note 4
CT-SD-5	Family Restroom	1	80	80	1	80	80	1	80	80	2	80	160	
Student Dining Total				**4,480**			**5,730**			**7,447**			**9,504**	

Student Dining Worksheet

Space	Qty	SF	Area	
CT-SD-1 Student Dining		3000	0	See Note 1
CT-SD-2 Stage		1000	0	See Note 2
CT-SD-3 Staff Dining		450	0	See Note 3
CT-SD-4 Table Storage		400	0	See Note 4
CT-SD-5 Family Restroom		80	0	
Student Dining Total			**0**	

Student Dining Notes

1 The size of the Student Dining space is equal to one-third of the student enrollment multiplied by 17.5 SF per student or 3,000 SF, whichever is greater.

2 The size of the stage equals student enrollment multiplied by 2 SF or 1,000 SF, whichever is larger.

Square Footage Allowance Notes		
Student Enrollment	**3**	**4**
350-450 Students	450	400
451-800 Students	600	500
801-1200 Students	750	600
1201-1600 Students	900	700
Enrollment Determines SF Allowed		

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE		400 Students			600 Students			800 Students			1000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
CT-FS-0	Warming Kitchen	0	800	0	0	1,200	0		1,600	0		2,000	0	See Note 1
CT-FS-1	Kitchen (total)	1		1400	1		2100	1		2800	1		3500	See Note 1 & 2
CT-FS-1a	Preparation area	1	504		1	756		1	1008		1	1260		See Kitchen Area Notes
CT-FS-1b	Serving area	1	476		1	714		1	952		1	1190		See Kitchen Area Notes
CT-FS-1c	Dry food storage	1	154		1	231		1	308		1	385		See Kitchen Area Notes
CT-FS-1d	Cooler/freezer	1	140		1	210		1	280		1	350		See Kitchen Area Notes
CT-FS-1e	Ware washing	1	126		1	189		1	252		1	315		See Kitchen Area Notes
CT-FS-2	Dietician Office	1	75	75	1	75	75	1	75	75	1	75	75	
CT-FS-3	Restroom/Locker Rm	1	140	140	1	140	140	1	140	140	2	140	280	
Food Service Total				**1,615**			**2,315**			**3,015**			**3,855**	

Food Service Worksheet

Space		Qty	SF	Area	
CT-FS-0	Warming Kitchen		0	0	See Note 1
CT-FS-1	Kitchen (total)		0	0	See Note 1 & 2
CT-FS-1a	Preparation area	1	0		See Kitchen Area Notes
CT-FS-1b	Serving area	1	0		See Kitchen Area Notes
CT-FS-1c	Dry food storage	1	0		See Kitchen Area Notes
CT-FS-1d	Cooler/freezer	1	0		See Kitchen Area Notes
CT-FS-1e	Ware washing	1	0		See Kitchen Area Notes
CT-FS-2	Dietician Office		75	0	
CT-FS-3	Restroom/Locker Rm		140	0	
Food Service Total				**0**	

Food Service Notes	
Number	**Notes:**
	Only one of the two Kitchens is used - either CT-FS-0 OR CT-FS-1, not both.
	The size of the kitchen is equal to the sum of the preparation area, serving area, dry food storage area, cooler/freezer area, and ware washing area.

Kitchen Area Notes					
Food Service Area	**Enroll**	**X**	**SF per Student**	**x**	**%**
Preparation Area	Enroll	x	3.5	x	36%
Serving Areas	Enroll	x	3.5	x	34%
Dry Food Storage	Enroll	x	3.5	x	11%
Cooler/	Enroll	x	3.5	x	10%
Ware Washing Area	Enroll	x	3.5	x	9%
Warming Kitchen	Enroll	x	2.0		
Multiply Enrollment x SF/Student x % to achieve size of area					

School District Name, School Building Name
CUSTODIAL SPACES
CT-CU

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	400 Students			600 Students			800 Students			1000 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
CT-CU-1 Workroom	1	200	200	1	300	300	1	400	400	1	400	400	See Note 1
CT-CU-2 Custodial Office	1	100	100	1	100	100	1	100	100	1	100	100	
Custodial Total			**300**			**400**			**500**			**500**	

Custodial Worksheet

Space	Qty	SF	Area	
CT-CU-1 Workroom		200	0	See Note 1
CT-CU-2 Custodial Office		100	0	
Custodial Total			**0**	

Square Footage Allowance	Notes 1
Student Enrollment	
Up to 400 Students	200
401-600 Students	300
Above 600 Students	400
Enrollment Determines SF Allowed	

The following school size example illustrates the suggested instructional and support spaces.
The example is intended to assist in the planning, design, and development of the summary of spaces.

EXAMPLE	400 Students			600 Students			800 Students			1000 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
CT-GS-1 Large group restrooms	1	1600	1600	1	2400	2400	1	3200	3200	1	4000	4000	See Build Svc Sizes
CT-GS-2 Custodial closet	2	50	100	3	50	150	3	50	150	4	50	200	
CT-GS-3 Electrical closet	2	50	100	3	50	150	3	50	150	4	50	200	
CT-GS-4 Technology closet	2	64	128	3	64	192	3	64	192	4	64	256	
CT-GS-5 Storage area	1	150	150	1	150	150	1	200	200	1	200	200	See Build Svc Sizes
CT-GS-6 Central Storage/Distribution Cente	1	893	893	1	1066	1066	1	1098	1098	1	1400	1400	See Build Svc Sizes
CT-GS-7 Loading/receiving area	1	120	120	1	120	120	1	120	120	1	120	120	
General Services Total			**3,091**			**4,228**			**5,110**			**6,376**	

General Services Worksheet

Space		Qty	SF	Area	
CT-GS-1	Large group restrooms		0	0	See Build Svc Sizes
CT-GS-2	Custodial closet		50	0	
CT-GS-3	Electrical closet		50	0	
CT-GS-4	Technology closet		64	0	
CT-GS-5	Storage area		150	0	See Build Svc Sizes
CT-GS-6	Central Storage/Distribution Center		0	0	See Build Svc Sizes
CT-GS-7	Loading/receiving area		120	0	
General Services Total				**0**	

Building Services Area Sizes			
Building Services Areas	**Enrol**	**X**	**SF/Student**
Large Group Restrooms	Enrol	x	4.0
Multiply total enrollment xSF/Student to achieve size of area			

Building Services Area Sizes		
Student Enrollment	**Stor**	**Ctl Stor**
Up to 400 Students	150	7.5 SF per Student
401-600 Students	150	6.6 SF per Student
601-800 Students	200	5.8 SF per Student
Above 801 Students	200	5.0 SF per Student
Enrollment Determines SF Allowed		

School District Name, School Building Name
BUILDING SERVICES SPACES
CT-BS

The following school size example illustrates the suggested instructional and support spaces
The example is intended to assist in the planning, design, and development of the summary of spaces

EXAMPLE	400 Students			600 Students			800 Students			1000 Students			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
CT-BS-1 Corridors	1	11799	11799	1	15923	15923	1	20393	20393	1	24238	24238	See Build Svc Sizes
CT-BS-2 Mechanical/electrical space/decks	1	5815	5815	1	7848	7848	1	10051	10051	1	11946	11946	See Build Svc Sizes
Building Services Total			**17,614**			**23,771**			**30,444**			**36,184**	

Building Services Worksheet

Space	Area	
CT-BS-1 Corridors	0	See Build Svc Sizes
CT-BS-2 Mechanical/electrical space/decks	0	See Build Svc Sizes
Building Services Total	0	

Building Services Area Sizes			
Building Services Areas	**Prog**	**X**	**%**
Corridors	Prog	x	14
Mechanical/Electrical Space/Decks	Prog	x	6.9
Multiply sum of net core and program Areas x % to achieve size of area			

The 80+ programs operated by Career -Technical Schools and the Comprehensive and Compact Schools are bracketed on thefollowing pages. These programs have been combined into seven program types based upon the characteristics of lab space requirements, related and support spaces, and required finishes within the laboratories. The bracket for each program type lists all of the programs within that type, the size of the laboratory and the sizes of any related and support spaces associated with each program. The related space in each bracket is associated with each program within the listing while support spaces are listed under the laboratory requirement for each program within its respective type.

Within each program type, an example is given for a typical 600 student Career-Technical School which depicts the specific programs which are currently housed within that school. Following each program example, a worksheet is included which may be utilized to record each program offered by an actual school.

School District Name, School Building Name
LABORATORY AND SUPPORT SPACES
CT-P1 CHAPTER 2: BRACKETING

The following lists all of the programs within Type 1 with the laboratory space requirements as well as the related space requirements. In this example of a 600 student Career-Technical School, it is indicated that four programs are being offered.

EXAMPLE				
Laboratory Space	***CTE Program Code***	**Quantity**	**SF**	**Area**
Accounting	G0	1	1200	1200
Administrative and Professional Support	C0		1200	0
Automation & Robotics	R0		1800	0
Aviation Occupations	T4	1	1500	1500
Business Management	C1		1200	0
Electronics	R1		1800	0
Financial Services	G1	1	1200	1200
Information Support and Services	N0		1200	0
Interactive Media	N1		1200	0
Legal Management and Support	C2		1200	0
Medical Management and Support	C3		1200	0
Network Systems	N2	1	1200	1200
Programming & Software Development	N3		1200	0
Telecommunications	F5		1200	0
Travel and Tourism	L2		1200	0
Visual Design and Imaging	B2		1200	0
Total Lab Spaces		**4**		
Related Spaces				
CT-P1-2 Office		4	120	480
CT-P1-3 Storage		4	200	800
Total Program Type 1				**6,380**

Laboratory and Support Spaces Worksheet

Laboratory Space	CTE Program Code	Quantity	SF	Area
Accounting	G0		1200	0
Administrative and Professional Support	C0		1200	0
Automation & Robotics	R0		1800	0
Aviation Occupations	T4		1500	0
Business Management	C1		1200	0
Electronics	R1		1800	0
Financial Services	G1		1200	0
Information Support and Services	N0		1200	0
Interactive Media	N1		1200	0
Legal Management and Support	C2		1200	0
Medical Management and Support	C3		1200	0
Network Systems	N2		1200	0
Programming & Software Development	N3		1200	0
Telecommunications	F5		1200	0
Travel and Tourism	L2		1200	0
Visual Design and Imaging	B2		1200	0
Total Lab Spaces		**0**		
Related Spaces				
CT-P1-2 Office			120	0
CT-P1-3 Storage			200	0
Total Program Type 1				**0**

School District Name, School Building Name
LABORATORY AND SUPPORT SPACES
CT-P2 CHAPTER 2: BRACKETING

The following lists all of the programs within Type 2 with the laboratory space requirements as well as related spaces requirements. In this example of a 600 student Career-Technical School, it is indicated that one program is being offered.

EXAMPLE				
Laboratory Space	***CTE Program Code***	**Quantity**	**SF**	**Area**
Allied Health & Nursing	***JM***		***1500***	***0***
Biomedical Science	***F0***		***1500***	***0***
Biotechnology for Food, Plant, Animal Science	A3		1500	0
Community Health Aide	J2		1500	0
Criminal Science Technology	P2		1500	0
Dental Laboratory Technology	J4		1500	0
Emergency Medical Technician	P3		1500	0
Energy Science	F1		1500	0
Engineering Science	***F2***		***1500***	***0***
Engineering and Design	***F6***		***1500***	***0***
Exercise Science and Sports Medicine	J6		1500	0
Health Information Management	J7		1500	0
Health Support Pathway	J8		1500	0
Health Unit Coordinator	J9		1500	0
Home Health	JA		1500	0
Medical Bioscience	J0		1500	0
Medical Laboratory Technology	JC		1500	0
Pharmacy Technician	JG		1500	0
Practical Nursing	JJ		1500	0
Therapeutic Pathway	JL		1500	0
Total Lab Spaces		0		
Related Space				
CT-P2-2 Office		1	120	120
CT-P2-3 Storage		1	200	200
CT-P2-4 Changing Room		1	490	490
Total Program Type 2				**810**

Laboratory and Support Spaces Worksheet

Laboratory Space	*CTE Program Code*	Quantity	SF	Area
Allied Health & Nursing	***JM***		***1500***	***0***
Biomedical Science	***F0***		***1500***	***0***
Biotechnology for Food, Plant, Animal Science	A3		1500	0
Community Health Aide	J2		1500	0
Criminal Science Technology	P2		1500	0
Dental Laboratory Technology	J4		1500	0
Emergency Medical Technician	P3		1500	0
Energy Science	F1		1500	0
Engineering Science	***F2***		***1500***	***0***
Engineering and Design	***F6***		***1500***	***0***
Exercise Science and Sports Medicine	J6		1500	0
Health Information Management	J7		1500	0
Health Support Pathway	J8		1500	0
Health Unit Coordinator	J9		1500	0
Home Health	JA		1500	0
Medical Bioscience	J0		1500	0
Medical Laboratory Technology	JC		1500	0
Pharmacy Technician	JG		1500	0
Practical Nursing	JJ		1500	0
Therapeutic Pathway	JL		1500	0
Total Lab Spaces		**0**		
Related Space				
CT-P2-2 Office			120	0
CT-P2-3 Storage			200	0
CT-P2-4 Changing Room			490	0
Total Program Type 2				**0**

School District Name, School Building Name
LABORATORY AND SUPPORT SPACES
CT-P3 CHAPTER 2: BRACKETING

The following lists all of the programs within Type 3 with the laboratory space requiremnts as well as the related spaced requirements. In this example of a 600 student Career-Technical School, it is indicated that three programs are being offered.

EXAMPLE				
Laboratory Space	***CTE Program Code***	**Quantity**	**SF**	**Area**
Supply Chain Management	S0			
Laboratory			1500	0
Early Childhood Education and Care	E0			
Laboratory		1	1500	1500
Observation		1	120	120
Infants		1	700	700
Kitchenette/Break room		1	350	350
Workroom		1	150	150
Toddler Restroom		1	60	60
Reception		1	500	500
Playground Area				0
Entrepreneurship	S1			
Laboratory		1	1000	1000
Bookstore			800	0
Display			100	0
Ground Operations	T5			
Laboratory		1	1500	1500
Reference Room			150	0
Lodging	L1			
Laboratory			1500	0
Banquet Room			800	0
Marketing Communications	S3			
Laboratory			900	0
Bookstore			800	0
Display			100	0
Marketing Management	S4			
Laboratory			900	0
Bookstore			800	0
Display			100	0
Total Lab Spaces		3		
Related Space				
CT-P3-2 Office		3	120	360
CT-P3-3 Storage		3	200	600
Total Program Type 3				**6,840**

Laboratory and Support Spaces Worksheet

Laboratory Space	*CTE Program Code*	Quantity	SF	Area
Supply Chain Management	S0			
Laboratory			1500	0
Early Childhood Education and Care	E0			
Laboratory			1500	0
Observation			120	0
Infants			700	0
Kitchenette/Break room			350	0
Reception			500	0
Workroom			150	0
Toddler Restroom			60	0
Playground Area				0
Entrepreneurship	S1			
Laboratory			1000	0
Bookstore			800	0
Display			100	0
Ground Operations	T5			
Laboratory			1500	0
Reference Room			150	0
Lodging	L1			
Laboratory			1500	0
Banquet Room			800	0
Marketing Communications	S3			
Laboratory			900	0
Bookstore			800	0
Display			100	0
Marketing Management	S4			
Laboratory			900	0
Bookstore			800	0
Display			100	0
Total Lab Spaces		**0**		
Related Space				
CT-P3-2 Office			120	0
CT-P3-3 Storage			200	0
Total Program Type 3				**0**

School District Name, School Building Name
LABORATORY AND SUPPORT SPACES
CT-P4 CHAPTER 2: BRACKETING

The following lists all of the programs within Type 4 with the laboratory space requirements as well as the related space requirements.
In this example of a 600 student Career-Technical School, it is indicated that three programs are being offered.

EXAMPLE				
Laboratory Space	***CTE Program Code***	**Quantity**	**SF**	**Area**
Animal Science and Management	A2			
Laboratory (small animal)			1000	0
Pet shop			1200	0
Clinic			350	0
Grooming			350	0
Animal Room			200	0
Animal Room			600	0
Kennel			250	0
Career Paths for the Law Profession	P0			
Laboratory			1200	0
Weight Room			800	0
Interrogation Room			150	0
Clinical Health Care Services	J1			
Laboratory			1200	0
Training Restroom			120	0
Laundry Room			120	0
Cosmetology	M1			
Laboratory		1	1600	1600
Dispensary		1	175	175
Laundry Room		1	150	150
Facial Room		1	200	200
Manicure Room		1	200	200
Customer Toilet		1	60	60
Criminal Justice	P1			
Laboratory		1	1200	1200
Weight Room		1	800	800
Interrogation Room		1	150	150
Culinary and Food Service Operations	L0			
Laboratory			1800	0
Restaurant			1500	0
Dry Storage			150	0
Total Program Type 4 (Page 1)		**2**		**4,535**

Laboratory and Support Spaces Notes
Notes:
1: One classroom space is to be allocated for every two program spaces (fractions thereof) in types 4 through 7

Lab & Support Space Worksheet		0 students			*Students Type A & C*						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	***CTE Program Code***	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**
Animal Science and Management	A2												
Laboratory (small animal)			1000	0			0	0	varies	0		1000	0
Pet shop			1200	0			0	0	varies	0		1200	0
Clinic			350	0			0	0	varies	0		350	0
Grooming			350	0			0	0	varies	0		350	0
Animal Room			200	0			0	0	varies	0		200	0
Animal Room			600	0			0	0	varies	0		600	0
Kennel			250	0			0	0	varies	0		250	0
Career Paths for the Law Profession	P0												
Laboratory			1200	0			0	0	varies	0		1200	0
Weight Room			800	0			0	0	varies	0		800	0
Interrogation Room			150	0			0	0	varies	0		150	0
Clinical Health Services	J1												
Laboratory			1200	0			0	0	varies	0		1200	0
Training Restroom			120	0			0	0	varies	0		120	0
Laundry Room			120	0			0	0	varies	0		120	0
Cosmetology	M1												
Laboratory			1600	0			0	0	varies	0		1600	0
Dispensary			175	0			0	0	varies	0		175	0
Laundry Room			150	0			0	0		0		150	0
Facial Room			200	0			0	0	varies	0		200	0
Manicure Room			200	0			0	0	varies	0		200	0
Customer Toilet			60	0			0	0	varies	0		60	0
Criminal Justice	P1												
Laboratory			1200	0			0	0	varies	0		1200	0
Weight Room			800	0			0	0	varies	0		800	0
Interrogation Room			150	0			0	0	varies	0		150	0
Culinary and Food Service Operations	L0												
Laboratory			1800	0			0	0	varies	0		1800	0
Restaurant			1500	0			0	0	varies	0		1500	0
Dry Storage			150	0			0	0	varies	0		150	0
Total Program Type 4 (Page 1)		**0**		**0**	**0**		**0**	**0**		**0**	**0**		**0**

Laboratory and Support Spaces Notes
1: One classroom space is to be allocated for every two program spaces (or fractions thereof) in types 4 through 7.
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

School District Name, School Building Name
LABORATORY AND SUPPORT SPACES
CT-P4

Laboratory and Support Spaces Worksheet

Laboratory Space	*CTE Program Code*	Quantity	SF	Area
Animal Science and Management	A2			
Laboratory (small animal)			1000	0
Pet shop			1200	0
Clinic			350	0
Grooming			350	0
Animal Room			200	0
Animal Room			600	0
Kennel			250	0
Career Paths for the Law Profession	P0			
Laboratory			1200	0
Weight Room			800	0
Interrogation Room			150	0
Clinical Health Care Services	J1			
Laboratory			1200	0
Training Restroom			120	0
Laundry Room			120	0
Cosmetology	M1			
Laboratory			1600	0
Dispensary			175	0
Laundry Room			150	0
Facial Room			200	0
Manicure Room			200	0
Customer Toilet			60	0
Criminal Justice	P1			
Laboratory			1200	0
Weight Room			800	0
Interrogation Room			150	0
Culinary and Food Service Operations	L0			
Laboratory			1800	0
Restaurant			1500	0
Dry Storage			150	0
Total Program Type 4 (Page 1)		**0**		**0**

Laboratory and Support Spaces Notes
Notes:
1: One classroom space is to be allocated for every two program spaces (fractions thereof) in types 4 through 7

School District Name, School Building Name
LABORATORY AND SUPPORT SPACES
CT-P4

Laboratory and Support Spaces Worksheet

Laboratory Space	*CTE Program Code*	Quantity	SF	Area	
Dental Assistant	J3				
Laboratory			1500	0	
X-ray Room			80	0	
Darkroom			80	0	
Diagnostic Pathway	J5				
Laboratory			1200	0	
Exam Room			200	0	
Firefighting and Emergency Medical Services	***P6***				
Laboratory			***1500***	***0***	
Weight Room			***800***	***0***	
Fire Fighter Training	P4				
Laboratory			1500	0	
Weight Room			800	0	
Media Arts	B0				
Laboratory			1500	0	
Media Arts Control Room/Edit			450	0	
Vestibule			84	0	
Medical Assistant	JB				
Laboratory			1200	0	
Training Restroom			120	0	
Laundry Room			120	0	
Nurse Assisting	JD				
Laboratory			1200	0	
Training Restroom			120	0	
Laundry Room			120	0	
Optometric Occupations	JE				
Laboratory			1200	0	
Exam Room			100	0	
Patient Care Technician	JF				
Laboratory			1500	0	
Training Restroom			120	0	
Laundry Room			120	0	
Performing Arts	B1				
Laboratory			1500	0	
Practice Room			150	0	
Private Security	P5				
Laboratory			1200	0	
Weight Room			800	0	
Interrogation Room			150	0	
Surgical Technology	JK				
Laboratory			1000	0	
Operating Room			800	0	
Instrument Room			700	0	
Scrub Room			500	0	
Total Lab Spaces (Page 1 & 2)		***0***			
Related Space					
CT-P4-2 Classroom			900	0	See Note 1
CT-P4-3 Office			120	0	
CT-P4-4 Storage			200	0	
CT-P4-5 Changing Room			490	0	
Total Program Type 4 (Page 1)				**0**	
Total Program Type 4 (Page 1 & 2)				**0**	

Laboratory and Support Spaces Notes
Notes:
1: One classroom space is to be allocated for every two program spaces (fractions thereof) in types 4 through 7

School District Name, School Building Name
LABORATORY AND SUPPORT SPACES
CT-P5 CHAPTER 2: BRACKETING

The following lists all of the programs within Type 5 with the laboratory space requirements as well as the related space requirements. In this example of a 600 student Career-Technical School, it is indicated that four programs are being offered.

EXAMPLE

Laboratory Space	*CTE Program Code*	Quantity	SF	Area	
Agribusiness and Production	A0				
Laboratory			4500	0	
Greenhouse			1000	0	
Auto Specialization	T2		3500	0	
Brick, Block, and Cement Masonry	D0		3500	0	
Building and Property Maintenance	D1	1	3000	3000	
Building Technology	D2		3000	0	
Custodial Services	D6	2	2500	5000	
Electrical Trades	D7		3000	0	
Environmental Control Technologies	D8	0	3000	0	
Heavy Equipment Operations	D9	0	4500	0	
Integrated Systems Technology	R2		3500	0	
Interior Design Applications	DA		3000	0	
Manufacturing Design and Development	R3		4500	0	
Natural Resource Management	A6				
Laboratory			3000	0	
Greenhouse			1000	0	
Plumbing and Pipefitting	DB		3000	0	
Power Equipment Technology	T8		3500	0	
Power Transmission	F4		3500	0	
Welding and Cutting	R6	1	3500	3500	
Total Lab Spaces		4			
Related Space					
CT-P5-2 Classroom		2	900	1800	See Note 1
CT-P5-3 Office		4	120	480	
CT-P5-4 Storage		4	200	800	
CT-P5-5 Changing Room		1	900	900	See Note 2
CT-P5-6 Tool Crib		4	550	2200	
CT-P5-7 Reference Room		4	200	800	
CT-P5-8 Toilet Room		4	68	272	
Total Program Type 5				**18,752**	

Laboratory and Support Spaces Notes
Notes:
1: One classroom space to be allocated for every two program spaces (or fraction thereof) of types 4 through 7.
2: Square footage of changing room determined by total number of approved programs types 5, 6, and 7 times 30 students times 9 SF per student. Changing room to be entered on POR once.

Lab & Support Space Worksheet		0 students			Students Type A & C						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	CTE Program Code	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
Manufacturing Occupations	***R7***												***0***
Laboratory			***3500***	***0***			***0***	***0***	***varies***	***0***		***3500***	***0***
CNC Room			***900***	***0***			***0***	***0***	***varies***	***0***		***900***	***0***
Inspection Room			***150***	***0***			***0***	***0***	***varies***	***0***		***150***	***0***
Mechanical, Electrical, and Plumbing	***DE***												
Laboratory			***3000***	***0***			***0***	***0***	***varies***	***0***		***3000***	***0***
CADD Room			***400***	***0***			***0***	***0***	***varies***	***0***		***400***	***0***
Medium/Heavy Truck Technician	T7												
Laboratory			6000	0			0	0	varies	0		6000	0
Engine Storage			800	0			0	0	varies	0		800	
Flammable Material Storage			60	0			0	0	varies	0		60	0
Machine Room			900	0			0	0	varies	0		900	0
Precision Machining	R5												
Laboratory			3500	0			0	0	varies	0		3500	0
CNC Room			900	0			0	0	varies	0		900	0
Inspection Room			150	0			0	0	varies	0		150	0
Structural Systems	***DD***												
Laboratory			***3000***	***0***			***0***	***0***	***varies***	***0***		***3000***	***0***
CADD Room			***400***	***0***			***0***	***0***	***varies***	***0***		***400***	***0***
Wood Product Technologies	DC												
Laboratory			3000	0			0	0	varies	0		3000	0
Finishing Room			500	0			0	0	varies	0		500	0
Material Storage			800	0			0	0	varies	0		800	0
	Total Lab Spaces	***0***			***0***			***0***			***0***		
Related Space - List per Program add rows as needed													
CT-P6-2 Related Classroom	***Note 1***		900	0			0	0	varies	0		900	0
CT-P6-3 Office			120	0			0	0	varies	0		120	0
CT-P6-5 Changing Room	***Note 2***		270	0			0	0	varies	0		270	0
CT-P6-4 Storage			200	0			0	0	varies	0		200	0
CT-P6-6 Tool Crib			550	0			0	0	varies	0		550	0
CT-P6-7 Reference Room			200	0			0	0	varies	0		200	0
CT-P6-8 Toilet Room			68	0			0	0	varies	0		68	0
Total Program Type 6 (Page 1)				0			0			0			0
Total Program Type 6 (Page 1 & 2)				**0**			**0**			**0**			**0**

Laboratory and Support Spaces Notes
1: One classroom space is to be allocated for every two program spaces (or fractions thereof) in types 4 through 7.
2: Square footage of changing room determined by total number of approved programs types 5, 6 and 7 times 30 students times 9 SF per student. Changing room to be entered on POR once.
*The Existing SF columns are only to be used in projects where there are to be buildilng additions

School District Name, School Building Name
LABORATORY AND SUPPORT SPACES
CT-P6

The following lists all of the programs within Type 6 with the laboratory space requirements as welll as the related space requirements. In this example of a 600 student Career-Technical School, it is indicated that three programs are being offered.

EXAMPLE

Laboratory Space	*CTE Program Code*	Qty	SF	Area
Auto Collision Repair	T1			
Laboratory			5000	0
Auto Parts Storage			300	0
Auto Technology	T3			
Laboratory			5000	0
Engine Storage			800	0
Machine Room			900	0
Flammable Material Storage			60	0
Carpentry	D3			
Laboratory			4000	0
Finishing Room			500	0
Material Storage			800	0
Construction - Management	D5			
Laboratory			3000	0
CADD Room			400	0
Construction - Design / Build	D4			
Laboratory			3000	0
CADD Room			400	0
Construction Design and Management	***DF***			
Laboratory			***3000***	***0***
CADD Room			***400***	***0***
Engineering ***Technology***	F3			
Laboratory			1500	0
CADD Room			400	0
Food Science and Technology	A4			
Laboratory			2000	0
Freezer			400	0
Cooler			400	0
Retail			400	0
Ground Transportation	***T9***			
Laboratory			***5000***	***0***
Engine Storage			***800***	***0***
Machine Room			***900***	***0***
Flammable Material Storage			***60***	***0***
Horticulture	A5			
Laboratory			2000	0
Retail			400	0
Greenhouse			3000	0
Industrial Power Technology	A1			
Laboratory			5000	0
Engine Storage			1000	0
Flammable Material Storage			200	0
Total Program Type 6 (Page 1)		***0***		**0**

Laboratory and Support Spaces Notes
Notes:
1: One classroom space to be allocated for every two program spaces (or fraction thereof) of types 4 through 7.
2: Square footage of changing room determined by total number of approved programs types 5, 6, and 7 times 30 students times 9 SF per student. Changing room to be entered on POR once.

School District Name, School Building Name
LABORATORY AND SUPPORT SPACES
CT-P6

The following lists all of the programs within Type 6 with the laboratory space requirements as welll as the related space requirements. In this example of a 600 student Career-Technical School, it is indicated that three programs are being offered.

EXAMPLE

Laboratory Space	*CTE Program Code*	Qty	SF	Area
Manufacturing Operations	***R7***			
Laboratory			***3500***	***0***
CNC Room			***900***	***0***
Inspection Room			***150***	***0***
Mechanical, Electrical, and Plumbing	***DE***			
Laboratory			***3000***	***0***
CADD Room			***400***	***0***
Medium/Heavy Truck Technician	T7			
Laboratory			6000	0
Engine Storage			800	0
Flammable Material Storage			60	0
Machine Room			900	0
Precision Machining	R5			
Laboratory			3500	0
CNC Room			900	0
Inspection Room			150	0
Structural Systems	***DD***			
Laboratory			***3000***	***0***
CADD Room			***400***	***0***
Wood Product Technology	DC			
Laboratory			3000	0
Finishing Room			500	0
Material Storage			800	0
Total Lab Spaces (Page 1 & 2)		***0***		
Related Space - List per Program add rows as needed				
CT-P6-2 Related Classroom		2	900	1800
CT-P6-3 Office		3	120	360
CT-P6-4 Storage		3	200	600
CT-P6-5 Changing Room		1	675	675
CT-P6-6 Tool Crib		3	550	1650
CT-P6-7 Reference Room		3	200	600
CT-P6-8 Toilet Room		3	68	204
Total Program Type 6 (Page 1)				**0**
Total Program Type 6 (Page 1 & 2)				**5,889**

Laboratory and Support Spaces Notes
Notes:
1: One classroom space to be allocated for every two program spaces (or fraction thereof) of types 4 through 7.
2: Square footage of changing room determined by total number of approved programs types 5, 6, and 7 times 30 students times 9 SF per student. Changing room to be entered on POR once.

School District Name, School Building Name
LABORATORY AND SUPPORT SPACES
CT-P6

Laboratory and Support Spaces Worksheet

Laboratory Space	*CTE Program Code*	Quantity	SF	Area
Auto Collision Repair	T1			
Laboratory			5000	0
Auto Parts Storage			300	0
Auto Technology	T3			
Laboratory			5000	0
Engine Storage			800	0
Machine Room			900	0
Flammable Material Storage			60	0
Carpentry	D3			
Laboratory			4000	0
Finishing Room			500	0
Material Storage			800	0
Construction - Management	D5			
Laboratory			3000	0
CADD Room			400	0
Construction - Design / Build	D4			
Laboratory			3000	0
CADD Room			400	0
Construction Design and Management	***DF***			
Laboratory			***3000***	***0***
CADD Room			***400***	***0***
Engineering ***Technology***	F3			
Laboratory			1500	0
CADD Room			400	0
Food Science and Technology	A4			
Laboratory			2000	0
Freezer			400	0
Cooler			400	0
Retail			400	0
Ground Transportation	***T9***			
Laboratory			***5000***	***0***
Engine Storage			***800***	***0***
Machine Room			***900***	***0***
Flammable Material Storage			***60***	***0***
Horticulture	A5			
Laboratory			2000	0
Retail			400	0
Greenhouse			3000	0
Industrial Power Technology	A1			
Laboratory			5000	0
Engine Storage			1000	0
Flammable Material Storage			200	0
Total Program Type 6 (Page 1)		***0***		***0***

Laboratory and Support Spaces Notes
Notes:
1: One classroom space to be allocated for every two program spaces (or fraction thereof) of types 4 through 7.
2: Square footage of changing room determined by total number of approved programs types 5, 6, and 7 times 30 students times 9 SF per student. Changing room to be entered on POR once.

School District Name, School Building Name
LABORATORY AND SUPPORT SPACES
CT-P6

Laboratory and Support Spaces Worksheet

Laboratory Space	CTE Program Code	Quantity	SF	Area
Manufacturing Operations	***R7***			
Laboratory			***3500***	***0***
CNC Room			***900***	***0***
Inspection Room			***150***	***0***
Mechanical, Electrical, and Plumbing	***DE***			
Laboratory			***3000***	***0***
CADD Room			***400***	***0***
Medium/Heavy Truck Technician	T7			
Laboratory			6000	0
Engine Storage			800	0
Flammable Material Storage			60	0
Machine Room			900	0
Precision Machining	R5			
Laboratory			3500	0
CNC Room			900	0
Inspection Room			150	0
Structural Systems	***DD***			
Laboratory			***3000***	***0***
CADD Room			***400***	***0***
Wood Product Technologies	DC			
Laboratory			3000	0
Finishing Room			500	0
Material Storage			800	0
Total Lab Spaces (Page 1 & 2)		***0***		
Related Space - List per Program add rows as needed				
CT-P6-2 Related Classroom	Note 1		900	0
CT-P6-3 Office			120	0
CT-P6-4 Storage			200	0
CT-P6-5 Changing Room	Note 2	See Type 5		
CT-P6-6 Tool Crib			550	0
CT-P6-7 Reference Room			200	0
CT-P6-8 Toilet Room			68	0
Total Program Type 6 (Page 1)				**0**
Total Program Type 6 (Page 1 & 2)				**0**

Laboratory and Support Spaces Notes
Notes:
1: One classroom space to be allocated for every two program spaces (or fraction thereof) of types 4 through 7.
2: Square footage of changing room determined by total number of approved programs types 5, 6, and 7 times 30 students times 9 SF per student. Changing room to be entered on POR once.

School District Name, School Building Name
LABORATORY AND SUPPORT SPACES
CT-P7

The following lists all of the programs within Type 7 with the laboratory space requirements as well as the related space requirements. In this example of a 600 student Career-Technical School, it is indicated that no programs are being offered.

EXAMPLE

Laboratory Space	*CTE Program Code*	Quantity	SF	Area	
Aircraft Maintenance	T0				
Laboratory			13000	0	
Cleaning Room			400	0	
Parts Storage			300	0	
Hazardous Materials Storage			60	0	
Paint Storage			60	***0***	
Air Transportation	***TA***				
Laboratory			***13000***	***0***	
Cleaning Room			***400***	***0***	
Hazardous Materials Storage			***60***	***0***	
Paint Storage			***60***	***0***	
Animal Science & Management - Equine	A2				
Laboratory			8000	0	
Stables			6800	0	
Total Lab Spaces		***0***			
Related Space					
CT-P7-2 Classroom			900	0	See Note 1
CT-P7-3 Office			120	0	
CT-P7-4 Storage			200	0	
CT-P7-5 Changing Room		See Type 5			See Note 3
CT-P7-6 Tool Crib			550	0	
CT-P7-7 Reference Room			200	0	
CT-P7-8 Toilet Room			68	0	
Total Program Type 7				**0**	See Note 2

Laboratory and Support Spaces Notes

Notes:

1: One classroom space to be allocated for every two program spaces (or fraction thereof) of types 4 through 7.

2: Support will be provided for only the first 10,000 SF for any one program.

3: Square footage of changing room determined by total number of approved programs types 5, 6, and 7 times 30 students times 9 SF per student. Changing room to be entered on POR once.

Laboratory and Support Spaces Worksheet

Laboratory Space	CTE Program Code	Quantity	SF	Area	
Aircraft Maintenance	T0				
Laboratory			13000	0	
Cleaning Room			400	0	
Parts Storage			300	0	
Hazardous Materials Storage			60	0	
Paint Storage			60	*0*	
Air Transportation	***TA***				
Laboratory			***13000***	***0***	
Cleaning Room			***400***	***0***	
Hazardous Materials Storage			***60***	***0***	
Paint Storage			***60***	***0***	
Animal Science & Management - Equine	A2				
Laboratory			8000	0	
Stables			6800	0	
Total Lab Spaces		*0*			
Related Space					
CT-P7-2 Classroom			900	0	See Note 1
CT-P7-3 Office			120	0	
CT-P7-4 Storage			200	0	
CT-P7-5 Changing Room		See Type 5			See Note 3
CT-P7-6 Tool Crib			550	0	
CT-P7-7 Reference Room			200	0	
CT-P7-8 Toilet Room			68	0	
Total Program Type 7				**0**	See Note 2

Laboratory and Support Spaces Notes
Notes:
1: One classroom space to be allocated for every two program spaces (or fraction thereof) of types 4 through 7.
2: Support will be provided for only the first 10,000 SF for any one program.
3: Square footage of changing room determined by total number of approved programs types 5, 6, and 7 times 30 students times 9 SF per student. Changing room to be entered on POR once.

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Introduction:

This page is meant to provide the School District and Design Professional with a simple tool for completing a Program of Requirements for a Comprehensive PK-12 School including Career Technical Programs. Please follow the directions found below and fill in the "yellow" cells.

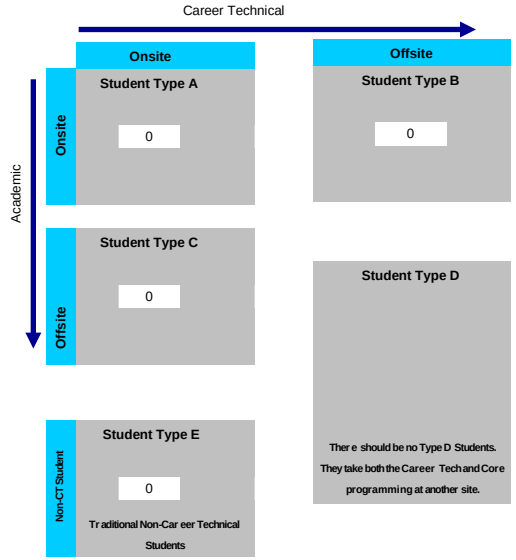
Please indicate in the yellow cells the projected number of students in each type.
This information can be found in the Master Plan or the district's enrollment projections.

	Career Tech Students			Non-CT	
Grade	A	B	C	E	Totals
PK-5					0
6-8					0
9-12					0
Total	0	0	0	0	0

The following table is to clarify the connection/labeling between the Enrollment Projection report and the Career Tech PORs.
Note that when the school is a Comp HS the emphasis is on the location of the CT Student.
When the school is a JVS or Coop school the emphasis is on the location of the Academic student.
For example a Type B - CT Off-site Comp HS student is a student that has academic programs on-site and CT programs off-site. A Type B - Acad On-site JVS student is a student that has academic programs on-site and CT off-site.

Comp HS School - Relates to location of CT Students	
Type A - Full time	Acad On-site + CT On-site of Comp HS
Type B - CT Off-site	Acad On-site + CT Off-site of Comp HS
Type C - CT On-site	Acad Off-site + CT On-site of Comp HS

JVS/Compact School - Relates to location of Academic Stude	
Type A - Full time	Acad On-site + CT On-site of JVS
Type B - Acad On-sit	Acad On-site + CT Off-site of JVS
Type C - Acad Off-sit	Acad Off-site + CT On-site of JVS



All student descriptions are in relation to the school being programmed.

Student Type A - Comprehensive Career-Technical Student/Full Time Career Technical Student (Grades 11-12)

Spends entire day at school attending academics and career-technical programming.

Student Type B – Career-Technical Off-Site Student (Grades 11-12)

Attends academic courses at the school and attends career-technical courses at another location, i.e. JVS, comprehensive high school in another district, etc.

Student Type C – Career-Technical On-Site Student (Grades 11-12)

Attends career-technical courses at the school and attends academics at another location, i.e., high school in another district or high school within the same district.

Student Type D – Full-Time Career-Technical Student-Attends all classes off site.

Attends both academic and career-technical courses at a site other than the home high school.

Student Type E – Does not participate in career technical programming. **(PK-12 Grades)**

Does not participate in Career Technical programming.

Previously, changes or additions made during the annual update of the Design Manual have been ***"bolded and italicized"*** for easy identification. Changes have been made to the formulas on this sheet which have not been bolded and italicized. The user is advised to carefully review all information.

WORKSHEET

	Career Tech Part Time	Academic Part Time	Academic Full Time Non-CT	SF/Student	Area	
Student Type A (CT)	0	0				
Student Type B (CT)		0				
Student Type C (CT)	0					
Student Type E - Elementary Grades PK-5			0	0	0	Insert numbers into the yellow cell
Student Type E - Middle Schools Grades 6-8			0	0	0	from your Master Plan document.
Student Type E - High School Grades 9-12 (non-CT)			0	0	0	
Total Student Enrollment per Student Type	0	0	0		**0**	Total Non-CT Space
Career Technical Core Space			0	0	0	Max. Gross SF - CT Core Space
Career Technical Program Space			0	**varies**		Max. Gross SF - CT Program Space
Total Career Technical Space					**0**	Total CT Space
Total A, B & E Students for Vertical Circulation Calculation		0				
Total Gross Square Footage					**0**	Total Gross Square Footage
						Vertical Circulation
SELECT ONE → ○ Single or Two Story Buildings ● 3 Stories or greater						
Vert. Circ. Area Allowance (3 Stories or greater)	Vertical Circulation ***(3 Stories or greater)*** refers only to stairways/stair towers, monumental stairs, elevators, and elevator equipment rooms.				0	
Total Adjusted POR Gross Square Footage					**0**	**Total Adjusted POR Gross Square Footage**

CORE SPACE ONLY

Core Spaces	Students Type E NEW	Students Type E Existing*	Students Type E TOTAL	Students Type A & B NEW	Students Type A & B Existing*	Students Type A & B TOTAL	Combined Total	OSDM Recommendation	
E/M/H/CT-AC Academic Core	0	0	0	0	0	0	0	0	
E/M/H/CT-SE Spec. Ed./Student Svs.	0	0	0	0	0	0	0	0	
E/M/H/CT-AD Administration	0	0	0	na	na	na	0	0	
E/M/H/CT-MC Media Center	0	0	0	na	na	na	0	0	
E/M/H-VA Visual Arts	0	0	0	na	na	na	0	0	
E/M/H-MU Music	0	0	0	na	na	na	0	0	
E/M/H-TE Technology Education	0	0	0	na	na	na	0	0	
E/M/H-BE Business Education	0	0	0	na	na	na	0	0	
E/M/H-FCS Family and Consumer Science	0	0	0	na	na	na	0	0	
E/M/H-PE Physical Education	0	0	0	na	na	na	0	0	
E/M/H/CT-SD Student Dining	0	0	0	na	na	na	0	0	
E/M/H/CT-FS Food Service	0	0	0	na	na	na	0	0	
E/M/H/CT-CU Custodial	0	0	0	na	na	na	0	0	
Net Core Space	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0	
E/M/H/CT-BS Building Services	0	0	0	na	na	na	0	0	
Total Core Space	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Construction Factor (11%)	0	0	0	0		0	0	0	
Actual Gross Core Space Developed	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	Note 1
Minus existing co-funded Oversize Area from Master Plan							na		Note 2
Adjusted Existing Area		**0**			**0**				
Total Adjusted Gross Square Footage Developed (without Oversize Area)			**0**			**0**	**0**		
Maximum Gross Core SF Co-Funded			0			0	0		
Difference			**0**			**0**	**0**		

CAREER TECHNICAL PROGRAM SPACE ONLY

Career Technical Program Spaces	Total Lab Spaces Developed	Students Type A & C NEW	Students Type A & C Existing*	Students Type A & C TOTAL	OSDM Recommendation SF	OSDM Recommendation # of Labs
CT-P1 Program Type 1	0	0	0	0	0	0
CT-P2 Program Type 2	0	0	0	0	0	0
CT-P3 Program Type 3	0	0	0	0	0	0
CT-P4 Program Type 4	0	0	0	0	0	0
CT-P5 Program Type 5	0	0	0	0	0	0
CT-P6 Program Type 6	0	0	0	0	0	0
CT-P7 Program Type 7	0	0	0	0	0	0
Net CT Program Spaces	**0**	**0**	**0**	**0**	**0**	**0**
CT Building Services		0	0	0		
Total CT Program Space		**0**	**0**	**0**		
CT Construction Factor (11%)		0		0		
Actual Gross CT Program Space Developed		**0**	**0**	**0**		
Maximum Gross CT Program SF Co-Funded				0		
Difference				**0**		

Total Gross Square Feet Co-Funded	**0**
Total Gross Square Feet Developed-Core & CT Program	**0**
Difference / Locally Funded Initiative	**0**

Worksheet Notes

1: Existing Gross Square Feet taken from master facility plan.

2: Oversize Area taken from master facility plan.

* Existing SF columns are to be used in projects where there are to be building additions or renovations.

The following is an example of a Comprehensive K-12 School including Career Technical Programs
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	used for this example:
E-AC-1	Pre-Kindergarten Classroom	1	1,200	1,200	300 ES students
E-AC-1	Kindergarten Classroom	1	1,200	1,200	150 MS students
E-AC-2	Pre-Kindergarten Restroom	1	60	60	200 HS students
E-AC-2	Kindergarten Restroom	1	60	60	
E-AC-3	Elementary Classroom	10	900	9,000	
E-AC-4	Science/Computer Lab	0	1,000	0	
E-AC-5	Teacher Prep Area/Workroom	1	300	300	See Note 2
E-AC-6	Individual Restroom	1	60	60	
E-AC-7	Instructional Material Storage	1	***200***	200	See Note 3
E-AC-8	***Small Group Room***	***0***	***150***	***0***	***See Note 4***
E-AC-9	***Multi-use Studio***	***0***	***1,500***	***0***	***See Note 4***
E-AC-10	***Kinesthetic Learning Studio***	***1***	***1,200***	***1,200***	***See Note 4***
M-AC-1	Middle School Classroom	3	900	2,700	
M-AC-2	Project Laboratory	1	1,000	1,000	
M-AC-3	Sci/Tech/Eng/Math/Computer Lab	0	1,000	0	
M-AC-4	Teacher Prep Area/Workroom	1	300	300	See Note 2
M-AC-5	Individual Restroom	1	60	60	
M-AC-6	Instructional Material Storage	1	***200***	200	See Note 3
M-AC-7	***Small Group Room***	***0***	***150***	***0***	
M-AC-7a	***Small Group Room***	***0***	***150***	***0***	***See Note 4***
M-AC-8	***Multi-use Studio***	***0***	***1,500***	***0***	***See Note 4***
M-AC-9	***Kinesthetic Learning Studio***	***0***	***1,200***	***0***	***See Note 4***
H-AC-1	High School Classroom	4	900	3,600	
H-AC-2	Science Classroom - General Physics	1	1,000	1,000	
H-AC-3	Science Classroom - Chemistry	1	1,000	1,000	
H-AC-4	Science Classroom - Biology	0	1,200	0	
H-AC-5	Science Prep	1	300	300	See Note 1
H-AC-6	Teacher Prep Area/Workroom	1	300	300	See Note 2
H-AC-7	Individual Restroom	1	60	60	
H-AC-8	Project Classroom	0	1,100	0	
H-AC-9	Small Group Room	0	150	0	
H-AC-10	Instructional Material Storage	***0***	50	0	See Note 3
H-AC-11	Multi-Use Room	0	1,500	0	
H-AC-12	Science Laboratory	0	1,000	0	
H-AC-9a	***Small Group Room***	***0***	***150***	***0***	***See Note 4***
H-AC-13	***Multi-use Studio***	***0***	***1,500***	***0***	***See Note 4***
H-AC-14	***Kinesthetic Learning Studio***	***0***	***1,200***	***0***	***See Note 4***
Academic Core Total				***23,800***	

Square Footage Allowance Notes			
Enroll	1	2	3
350-450	300	300	50
451-800	300	300	100
801-1200	400	400	150
1201-1600	400	600	200
Student capacity determines SF			

Academic Core Notes	
Number	*Notes:*
4	*These spaces are provided to encourage the development of student centered learning environments as found in Section 1020. Minimum sizes are: E-AC-8, M-AC-7a, H-AC-9a=150 SF. E/M/H Multi-use Studio=1500 SF. E/M/H Kinesthetic Studio=1200 SF.*

CAREER TECHNICAL PROGRAM SPACE EXAMPLE		400 Students			600 Students			800 Students			1000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
CT-AC-1	Academic classroom	7	900	6,300	13	900	11,700	17	900	15,300	22	900	19,800	
CT-AC-2	Computer room	1	1,200	1,200	1	1,200	1,200	2	1,200	2,400	2	1,200	2,400	
CT-AC-3	General Science/Physics	1	1,200	1,200	1	1,200	1,200	1	1,200	1,200	2	1,200	2,400	
CT-AC-4	Biology	1	1,200	1,200	1	1,200	1,200	2	1,200	2,400	2	1,200	2,400	
CT-AC-5	Chemistry	1	1,200	1,200	1	1,200	1,200	1	1,200	1,200	1	1,200	1,200	
CT-AC-6	Science Prep	1	300	300	2	300	600	2	300	600	3	300	900	See Note 1
CT-AC-7	Teacher Prep Area/Workroom	3	300	900	4	300	1,200	4	300	1,200	4	400	1,600	See Note 2
CT-AC-8	Individual restroom	2	60	120	2	60	120	4	60	240	4	60	240	
CT-AC-9	Small group room	2	140	280	2	140	280	3	137	410	3	137	410	
CT-AC-10	Instructional Material Storage	4	50	200	4	75	300	4	100	400	4	120	480	See Note 3
CT-AC-11	Multipurpose room	1	1,500	1,500	1	1,500	1,500	1	1,500	1,500	1	1,500	1,500	
CT-AC-12	Science Laboratory	0	1,000	0	0	1,000	0	0		0	0	1,000	0	
Academic Core Total				**14,400**			**20,500**			**26,850**			**33,330**	

Elementary School Grades PK-5 Students	0
Middle School 6-8 Students	0
High School 9-12 Students	0
Total Non-CT Students	0

Square Footage Allowance Notes			
Enroll	1	2	3
350-450	300	300	50
451-800	300	300	100
801-1200	400	400	150
1201-1600	400	600	200
Student capacity determines SF			

Academic Core Notes	
Number	*Notes:*
4	*These spaces are provided to encourage the development of student centered learning environments as found in Section 1020. Minimum sizes are: E-AC-8, M-AC-7a, H-AC-9a=150 SF. E/M/H Multi-use Studio=1500 SF. E/M/H Kinesthetic Studio=1200 SF.*

Academic Core Worksheet

		0 E, M, HS students - *Students Type E*									0 HS students - *Students Type A & B*									0 COMBINED			OSDM Recommendation			
		New			Existing*			TOTAL			New			Existing			TOTAL			TOTAL						
	Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-AC-1	Pre-Kindergarten Classroom		1,200	0			0	0	varies	0										0	varies	0		1,200	0	
E-AC-1	Kindergarten Classroom		1,200	0			0	0	varies	0										0	varies	0		1,200	0	
E-AC-2	Pre-Kindergarten Restroom		60	0			0	0	varies	0										0	varies	0		**60**	0	
E-AC-2	Kindergarten Restroom		60	0			0	0	varies	0										0	varies	0		**60**	0	
E-AC-3	Elementary Classroom		900	0			0	0	varies	0										0	varies	0		900	0	
E-AC-4	Science/Computer Lab		1,000	0			0	0	varies	0										0	varies	**0**		**1,000**	**0**	
E-AC-5	Teacher Prep Area/Workroom		300	0			0	0	varies	0										0	varies	0		300	0	See Note 2
E-AC-6	Individual Restroom		60	0			0	0	varies	0										0	varies	0		**60**	0	
E-AC-7	Instructional Material Storage		50	0			0	0	varies	0										0	varies	0		50	0	See Note 3
E-AC-8	***Small Group Room***		***150***	***0***			***0***	***0***	***varies***	***0***										***0***	***varies***	***0***		***150***	***0***	***See Note 4***
E-AC-9	***Multi-use Studio***		***1,500***	***0***			***0***	***0***	***varies***	***0***										***0***	***varies***	***0***		***1,500***	***0***	***See Note 4***
E-AC-10	***Kinesthetic Learning Studio***		***1,200***	***0***			***0***	***0***	***varies***	***0***										***0***	***varies***	***0***		***1,200***	***0***	***See Note 4***
M-AC-1	Middle School Classroom		900	0			0	0	varies	0										0	varies	0		900	0	
M-AC-2	Project Laboratory		1,000	0			0	0	varies	0										0	varies	0		1,000	0	
M-AC-3	Sci/Tech/Math/Computer Lab		1,000	0			0	0	varies	0										0	varies	**0**		**1,000**	**0**	
M-AC-4	Teacher Prep Area/Workroom		300	0			0	0	varies	0										0	varies	0		300	0	See Note 2
M-AC-5	Individual Restroom		60	0			0	0	varies	0										0	varies	0		**60**	0	
M-AC-6	Instructional Material Storage		50	0			0	0	varies	0										0	varies	0		**50**	0	See Note 3
M-AC-7	***Small Group Room***		***150***	***0***			***0***	***0***	***varies***	***0***										***0***	***varies***	***0***		***150***	***0***	
M-AC-7a	***Small Group Room***		***150***	***0***			***0***	***0***	***varies***	***0***										***0***	***varies***	***0***		***150***	***0***	***See Note 4***
M-AC-8	***Multi-use Studio***		***1,500***	***0***			***0***	***0***	***varies***	***0***										***0***	***varies***	***0***		***1,500***	***0***	***See Note 4***
M-AC-9	***Kinesthetic Learning Studio***		***1,200***	***0***			***0***	***0***	***varies***	***0***										***0***	***varies***	***0***		***1,200***	***0***	***See Note 4***
H/CT-AC-1	Academic Classroom		900	0			0	0	varies	0		900	0			0	0	varies	0	0	varies	0		900	0	
H-AC-2/CT-AC-3	Science Classroom - General Physics		1,200	0			0	0	varies	0		1,200	0			0	0	varies	0	0	varies	0		1,200	0	
H/CT-AC-4	Science Classroom - Chemistry		1,200	0			0	0	varies	0		1,200	0			0	0	varies	0	0	varies	0		1,200	0	
H-AC-3/CT-AC-5	Science Classroom - Biology		1,200	0			0	0	varies	0		1,200	0			0	0	varies	0	0	varies	0		1,200	0	
H-AC-5/CT-AC-6	Science Prep		300	0			0	0	varies	0		300	0			0	0	varies	0	0	varies	0		300	0	See Note 1
H-AC-6/CT-AC-7	Teacher Prep/workroom		300	0			0	0	varies	0		300	0			0	0	varies	0	0	varies	0		300	0	See Note 2
H-AC-7/CT-AC-8	Individual restroom		60	0			0	0	varies	0		60	0			0	0	varies	0	0	varies	0		**60**	0	
H/CT-AC-9	Small group room		150	0			0	0	varies	0		***150***	0			0	0	varies	0	0	varies	0		150	0	
H/CT-AC-10	Instructional Material storage		50	0			0	0	varies	0		50	0			0	0	varies	0	0	varies	0		**50**	0	See Note 3
H/CT-AC-11	Multipurpose room		1,500	0			0	0	varies	0		1,500	0			0	0	varies	0	0	varies	0		1,500	0	
H/CT-AC-12	Science Laboratory		1,000	0			0	0	varies	0		1,000	0			0	0	varies	0	0	varies	0		1,000	0	
H-AC-8	Project/Classroom		1,100	0			0	0	varies	0										0	varies	0		1,100	0	
CT-AC-2	Computer room											1,200	0			0	0	varies	0	0	varies	0		1,200	0	
H-AC-9a	***Small Group Room***		***150***	***0***			***0***	***0***	***varies***	***0***		***150***	***0***			***0***	***0***	***varies***	***0***	***0***	***varies***	***0***		***150***	***0***	***See Note 4***
H-AC-13	***Multi-use Room***		***1,500***	***0***			***0***	***0***	***varies***	***0***		***1,500***	***0***			***0***	***0***	***varies***	***0***	***0***	***varies***	***0***		***1,500***	***0***	***See Note 4***
H-AC-14	***Kinesthtic Learning Studio***		***1,200***	***0***			***0***	***0***	***varies***	***0***		***1,200***	***0***			***0***	***0***	***varies***	***0***	***0***	***varies***	***0***		***1,200***	***0***	***See Note 4***
Academic Core Total				***0***			***0***			***0***			***0***			***0***			***0***			***0***			***0***	

Academic Core Notes
* The Existing SF columns are to be used in projects where there are to be building additions or renovations.

The following are examples of a Comprehensive K-12 School including Career Technical Programs.
The examples are intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
E/M/H-SE-1	Self-contained Classroom	1	900	900	See Note 1
E/M/H-SE-2	Workroom/Conference	1	150	150	See Note 2
E/M/H-SE-3	Restroom/Shower	1	100	100	
E/M/H-SE-4	Special Education/Resource	1	900	900	See Note 3
E/M/H-SE-5	Small Self-contained Classroom	1	600	600	
Spec. Ed./Student Services Total				**2,650**	

Note: Special Education spaces are determined by using the bracketing table for each type of student.

PROGRAM SPACE EXAMPLE		400 Students			600 Students			800 Students			1000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
CT-SE-1	Classroom	1	900	900	1	900	900	2	900	1,800	2	900	1,800	*See Note 1*
CT-SE-2	Workroom/conference	1	150	150	1	150	150	2	150	300	2	150	300	*See Note 2*
CT-SE-3	Restroom/shower	1	100	100	1	100	100	1	100	100	1	100	100	
CT-SE-4	Career Technical Evaluation	1	1,200	1,200	1	1,200	1,200	1	1,200	1,200	*1*	1,200	1,200	
CT-SE-5	Career Technical Office	1	120	120	1	120	120	1	120	120	2	120	240	
CT-SE-6	Small group room	1	360	360	1	360	360	1	360	360	1	360	360	
CT-SE-7	Job training Office	1	120	120	1	120	120	2	120	240	2	120	240	
CT-SE-8	Resource room	1	900	900	1	900	900	1	900	900	1	900	900	*See Note 3*
CT-SE-9	Storage	1	150	150	1	150	150	1	150	150	1	150	150	
Spec. Ed./Student Services Total				**4,000**			**4,000**			**5,170**			**5,290**	

Elementary School Grades PK-5 Students	0
Middle School 6-8 Students	0
High School 9-12 Students	0
Total Non-CT Students	0

Sp. Ed./Stud. Svcs. Worksheet		0 ES, MS, HS students - *Students Type E*						0 HS students - *Students Type A & B*						0 COMBINED			OSDM Recommendation		
		New			Existing*		TOTAL	New			Existing*		TOTAL						
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E/M/H/CT-SE-1	Self-contained Classroom		900	0			0	0	varies	0		900	0		0	varies	0	0	varies	0		900	0	See Note 1
E/M/H/CT-SE-2	Workroom/Conference		150	0			0	0	varies	0		150	0		0	varies	0	0	varies	0		150	0	See Note 2
E/M/H/CT-SE-3	Restroom/shower		100	0			0	0	varies	0		100	0		0	varies	0	0	varies	0		100	0	
E/M/H-SE-4/CT-SE-8	Resource room		900	0			0	0	varies	0		900	0		0	varies	0	0	varies	0		900	0	See Note 3
E/M/H-SE-5	Small Self-Contained Classroom		600	0			0	0	varies	0		600	0		0	varies	0	0	varies	0		900	0	
CT-SE-4	Career Technical Evaluation											1,200	0		0	varies	0	0	varies	0		1,200	0	
CT-SE-5	Career Technical Office											120	0		0	varies	0	0	varies	0		120	0	
CT-SE-6	Small group room											360	0		0	varies	0	0	varies	0		360	0	
CT-SE-7	Job training Office											120	0		0	varies	0	0	varies	0		120	0	
CT-SE-9	Storage											150	0		0	varies	0	0	varies	0		150	0	
Spec. Ed./Student Services Total				**0**			**0**			**0**			**0**			**0**			**0**				**0**	

Special Education Notes	
Number	Notes:
	Self-contained classroom(s) could 'house' various special education programs including, but not limited to, cognitive disability, emotional disturbance, multiple disabilities, etc.
	Workroom/Conference could 'house' orthopedic impairment, autism, speech therapy, occupational therapy, and physical therapy.
	Special Education/Resource could 'house' cognitive disability, hearing impairment, visual impairment, emotional disturbance, orthopedic impairment, autistic, traumatic, brain injury, learning disability, deaf/blindness, etc. See Chapter 1, Section 1110 for more information.
*	The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive K-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
	Space	**Qty**	**SF**	**Area**	
E/M/H-AD-1	Reception Area	1	300	300	See Note 1
E/M/H-AD-2	Secretarial Area	1	250	250	See Note 2
E/M/H-AD-3	Principal's Office	1	150	150	
E/M/H-AD-4	Assistant Principal's Office	1	120	120	
E/M/H-AD-5	Conference Room	1	250	250	
E/M/H-AD-6	Mail/Work/Copy Room	1	200	200	See Note 3
E/M/H-AD-7	Administrative Storage	1	75	75	See Note 4
E/M/H-AD-8	Vault/Records Storage	1	100	100	See Note 5
E/M/H-AD-9	In-school Suspension	1	300	300	See Note 10
E/M/H-AD-10	Restroom	2	60	120	
E/M/H-AD-11	Guidance Counselor's Office	2	120	240	
E/M/H-AD-12	Guidance Records/Storage	1	75	75	See Note 6
E/M/H-AD-13	Guidance Conference Room	1	200	200	See Note 7
E/M/H-AD-14	Parent/Volunteer Room	0	225	0	See Note 8
E/M/H-AD-15	Health Clinic (includes restroom)	1	***345***	345	See Note 9
E/M/H-AD-16	Itinerant Personnel Office	1	120	120	
E/M/H-AD-17	Guidance Conf. & Career Ctr.	1	140	140	See Note 11
CT-AD-5	Supervisor's office	0	120	0	
CT-AD-6	Coordinator's office	0	120	0	
Administrative Total				**2,985**	

Note: Non-career technical students and career technical students are combined to determine the bracketing.

Elementary School Grades PK-5 Studen	0
Middle School 6-8 Students	0
High School 9-12 Students	0
Total Students	0

Administrative Worksheet		**0 ES, MS, HS students - COMBINED**										
		New			**Existing***			**TOTAL**			**OSDM Recommendation**			
	Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
E/M/H/CT-AD-1	Reception area		200	0			0	0	varies	0		200	0	See Note 1
E/M/H/CT-AD-2	Secretarial space		200	0			0	0	varies	0		200	0	See Note 2
E/M/H/CT-AD-3	Director/Principal's office		150	0			0	0	varies	0		150	0	
E/M/H/CT-AD-4	Asst. Dir./Principal office		120	0			0	0	varies	0		120	0	
E/M/H-AD-5/CT-AD-7	Conference room		250	0			0	0	varies	0		250	0	
E/M/H-AD-6/CT-AD-8	Mail/work/copy room		200	0			0	0	varies	0		200	0	See Note 3
E/M/H-AD-7/CT-AD-9	Administrative Storage		150	0			0	0	varies	0		150	0	See Note 4
E/M/H-AD-8/CT-AD-10	Vault/records		85	0			0	0	varies	0		85	0	See Note 5
E/M/H-AD-10/CT-AD-11	Restroom		60	0			0	0	varies	0		60	0	
E/MH-AD-11/CT-AD-12	Guidance counselor		120	0			0	0	varies	0		120	0	
E/M/H-AD-12/CT-AD-13	Guidance records/storage		100	0			0	0	varies	0		100	0	See Note 6
E/M/H-AD-13/CT-AD-14	Guidance conference		150	0			0	0	varies	0		150	0	See Note 7
E/M/H-AD-14/CT-AD-15	Parent/volunteer		200	0			0	0	varies	0		200	0	See Note 8
E/M/H-AD-15/CT-AD-16	Health clinic (includes restroom)		400	0			0	0	varies	0		400	0	See Note 9
E/M/H-AD-16/CT-AD-17	Itinerant personnel		120	0			0	0	varies	0		120	0	
E/M/H-AD-09/CT-AD-18	In-school suspension		200	0			0	0	varies	0		200	0	See Note 10
E/M/H-AD-17	Guidance Conf. & Career Ctr.		300	0			0	0	varies	0		300	0	See Note 11
CT-AD-5	Supervisor's office		120	0			0	0	varies	0		120	0	
CT-AD-6	Coordinator's office		120	0			0	0	varies	0		120	0	
Administrative Total				**0**			**0**			**0**			**0**	

Administrative Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

Administrative Notes											
Student Enrollment	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
350-450 Students	200	200	200	150	85	100	150	200	400	200	300
451-800 Students	400	400	300	150	115	100	200	300	450	325	400
801-1200 Students	500	500	400	200	145	200	250	400	500	450	500
1201-1600 Students	600	600	500	200	175	200	250	400	550	575	700
Enrollment determines SF allowed											

The following is an example of a Comprehensive K-12 School including Career Technical Programs. The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
E-MC-1	Reading Room/Circulation	1	900	900	See Note 1
E-MC-2	Media Specialist Office	0	120	0	
E-MC-3	Workroom/Storage	0	100	0	See Note 2
E-MC-4	Main Control/Equipment Rm	0	300	0	E - 300 students
E-MC-5	Conference Room	0	200	0	
M-MC-1	Reading Room/Circulation	1	525	525	See Note 3
M-MC-2	Media Specialist Office	0	120	0	
M-MC-3	Workroom/Storage	0	100	0	See Note 4
M-MC-4	Main Control/Equipment Rm	0	300	0	M - 150 Students
M-MC-5	Conference Room	0	100	0	***See Note 5***
M-MC-6	Multimedia Production Room	0	***400***	0	***See Note 6***
H-MC-1	Reading Room/Circulation	1	700	700	***See Note 7***
H-MC-2	Media Specialist Office	1	120	120	
H-MC-3	Workroom/Storage	1	***210***	210	***See Note 8***
H-MC-4	Main Control/Equipment Rm	1	300	300	H - 200 Students
H-MC-5	Conference Room	1	120	120	
H-MC-6	Multimedia Production Room	1	***300***	300	
H-MC-7	Document Storage	1	100	100	***See Note 9***
H-AC-9	Small group room	0	100	0	***See Note 10***
Media Center Total				**3,275**	

Note: Non-career technical students and career technical students are combined to determine the bracketing.

Elementary School Grades PK-5 Students	0
Middle School 6-8 Students	0
High School 9-12 Students	0
Total Students	0

Elementary SF Allowance Notes	
Student Enrollment	2
350-400 Students	***190***
401-550 Students	***250***
551-700 Students	***340***
Enroll. Determines SF Allowed	

Middle or K-6 SF Allowance Notes			
Student Enrollment	4	5	6
350-450 Students	150	***210***	***400***
451-600 Students	***233***	***280***	***400***
601-750 Students	***340***	***310***	***500***
Enrollment Determines SF Allowed			

High or K-12 or 6-12 SF Allowance Notes			
Student Enrollment	***8***	***9***	***10***
350-450 Students	300	200	***160***
451-800 Students	400	300	***260***
801-1200 Students	500	300	***280***
1201-1600 Students	600	400	***330***
Enrollment Determines SF Allowed			

Media Center Notes

1: The size of the reading room/circulation space is equal to 10% of the elementary student enrollment multiplied by 30 SF per student.
3: The size of the reading room/circulation space is equal to 10% of the middle school (or K-6) student enrollment multipled by 35 SF per student.
7 : The size of the reading room/circulation space is equal to 10% of the high school (or K-12 or 6-12) student enrollment multiplied by 35 SF per student.
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

Media Center Worksheet		0 ES, MS, HS students - COMBINED										
		New			Existing*			TOTAL			OSDM Recommendation		
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-MC-1	Reading Room/Circulation		0	0			0	0	varies	0		0	0	See Note 1
E-MC-2	Media Specialist Office		120	0			0	0	varies	0		120	0	
E-MC-3	Workroom/Storage		***190***	0			0	0	varies	0		***190***	0	See Note 2
E-MC-4	Main Control/Equipment Rm		300	0			0	0	varies	0		300	0	E - 300 students
E-MC-5	Conference Room		200	0			0	0	varies	0		200	0	
M-MC-1	Reading Room/Circulation		0	0			0	0	varies	0		0	0	See Note 3
M-MC-2	Media Specialist Office		120	0			0	0	varies	0		120	0	
M-MC-3	Workroom/Storage		***150***	0			0	0	varies	0		***150***	0	See Note 4
M-MC-4	Main Control/Equipment Rm		300	0			0	0	varies	0		300	0	M - 150 Students
M-MC-5	Conference Room		***210***	0			0	0	varies	0		***210***	0	***See Note 5***
M-MC-6	Multimedia Production Room		***400***	0			0	0	varies	0		***400***	0	***See Note 6***
H/CT-MC-1	Reading Room/Circulation		0	0			0	0	varies	0		0	0	***See Note 7***
H/CT-MC-2	Media Specialist Office		120	0			0	0	varies	0		120	0	
H/CT-MC-3	Workroom/Storage		300	0			0	0	varies	0		300	0	***See Note 8***
H/CT-MC-4	Main Control/Equipment Rm		300	0			0	0	varies	0		300	0	H - 200 Students
H/CT-MC-5	Conference Room		250	0			0	0	varies	0		250	0	
H/CT-MC-6	Multimedia Production Room		500	0			0	0	varies	0		500	0	
H/CT-MC-7	Document Storage		200	0			0	0	varies	0		200	0	***See Note 9***
H-AC-9	Small group room		***160***	0			0	0	varies	0		***160***	0	***See Note 10***
Media Center Total				**0**			**0**			**0**			**0**	

The following is an example of a Comprehensive K-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
E-VA-1	Elementary Art Room	1	1,200	1,200	See Note 1
E-VA-2	Kiln/Ceramic Storage	1	100	100	See Note 2
E-VA-3	Art Material Storage	0	100	0	See Note 3
M-VA-1	Middle School Art Room	0	1,200	0	See Note 1
M-VA-2	Kiln/Ceramic Storage	0	100	0	See Note 2
M-VA-3	Art Material Storage	0	100	0	See Note 4
H-VA-1	High School Art Room	1	1,200	1,200	See Note 1
H-VA-2	Kiln/Ceramic Storage	1	100	100	See Note 2
H-VA-3	Art Material Storage	1	200	200	See Note 5
Visual Arts Total				**2,800**	

Visual Art SF Allowance Notes		
Student Enrollment	1	2
350-450 Students	1200	100
451-800 Students	1200	200
Above 801 Students	1400	200
Enrollment Determines SF Allowed		

Middle SF Allowance Notes	
Student Enrollment	4
350-450 Students	100
451-600 Students	150
Above 601 Students	200
Enrollment Determines SF Allowed	

Elementary SF Allowance Notes	
Student Enrollment	3
350-400 Students	100
401-550 Students	125
Above 551 Students	150
Enrollment Determines SF Allowed	

HS SF Allowance Notes	
Student Enrollment	5
350-450 Students	200
Above 451 Students	300
Enrollment Determines SF Allowed	

Note: Only non-career technical students are used to determine the bracketing.

Elementary School Grades PK-5 Students	0
Middle School 6-8 Students	0
High School 9-12 Students	0
Total Non-CT Students	0

Visual Art Worksheet		0 ES, MS, HS students - *Students Type E*								OSDM Recommendation			
		New			Existing*			TOTAL					
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E-VA-1	Elementary Art Room		1,200	0			0	0	varies	0		1,200	0	See Note 1
E-VA-2	Kiln/Ceramic Storage		100	0			0	0	varies	0		100	0	See Note 2
E-VA-3	Art Material Storage		100	0			0	0	varies	0		100	0	See Note 3
M-VA-1	Middle School Art Room		1,200	0			0	0	varies	0		1,200	0	See Note 1
M-VA-2	Kiln/Ceramic Storage		100	0			0	0	varies	0		100	0	See Note 2
M-VA-3	Art Material Storage		100	0			0	0	varies	0		100	0	See Note 4
H-VA-1	Art Room		1,200	0			0	0	varies	0		1,200	0	See Note 1
H-VA-2	Kiln/Ceramic Storage		100	0			0	0	varies	0		100	0	See Note 2
H-VA-3	Art Material Storage		200	0			0	0	varies	0		200	0	See Note 5
Visual Arts Total				**0**			**0**			**0**			**0**	

Visual Art Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive K-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
E-MU-1	Music Room	1	1,200	1,200	E - 300 students
M-MU-1	Instrumental Room	0	1,400	0	See Note 1
M-MU-2	Vocal Room	0	1,200	0	
M-MU-3	Music Library	1	200	200	M - 150 students
H-MU-1	Instrumental Room	1	1,800	1,800	See Note 2
H-MU-2	Instrument Storage	1	325	325	See Note 3
H-MU-3	Orchestra Storage	0	200	0	See Note 4
H-MU-4	Instrumental Music Office/Librar	0	120	0	
H-MU-5	Uniform Storage	1	150	150	See Note 5 - H - 200 students
H-MU-6	Vocal Room	0	1,200	0	See Note 6
H-MU-7	Vocal Storage	0	150	0	See Note 7
H-MU-8	Vocal Music Office/Library	0	120	0	
H-MU-9	Ensemble Room	1	200	200	See Note 8
H-MU-10	Practice Room	1	80	80	
Music Total				**3,955**	

Middle SF Allowance Notes	
Student Enrollment	1
350-450 Students	1400
451-650 Students	1500
Above 651 Students	1600
Enrollment Determines SF Allowed	

HS or 6-12 SF Allowance Notes							
Student Enrollment	2	3	4	5	6	7	8
350-450 Students	1800	400	200	150	1200	150	200
451-800 Students	2000	500	250	200	1200	200	300
801-1200 Students	2500	600	250	300	1200	300	300
1201-1600 Students	3000	700	350	300	1500	300	300
Enrollment Determines SF Allowed							

Note: Only non-career technical students are used to determine the bracketing.

Elementary School Grades PK-5 Student	0
Middle School 6-8 Students	0
High School 9-12 Students	0
Total Non-CT Students	0

Music Worksheet

0 ES, MS, HS students - *Students Type E*

Space		New Qty	New SF	New Area	Existing* Qty	Existing* SF	Existing* Area	TOTAL Qty	TOTAL SF	TOTAL Area	OSDM Recommendation Qty	OSDM Recommendation SF	OSDM Recommendation Area	
E-MU-1	Music Room		1,200	0			0	0	varies	0		1,200	0	E - 300 students
M-MU-1	Instrumental Room		1,400	0			0	0	varies	0		1,400	0	See Note 1
M-MU-2	Vocal Room		1,200	0			0	0	varies	0		1,200	0	
M-MU-3	Music Library		200	0			0	0	varies	0		200	0	M - 150 students
H-MU-1	Instrumental Room		1,800	0			0	0	varies	0		1,800	0	See Note 2
H-MU-2	Instrument Storage		400	0			0	0	varies	0		400	0	See Note 3
H-MU-3	Orchestra Storage		200	0			0	0	varies	0		200	0	See Note 4
H-MU-4	Instrumental Music Library		120	0			0	0	varies	0		120	0	
H-MU-5	Uniform Storage		150	0			0	0	varies	0		150	0	See Note 5 - H - 200 students
H-MU-6	Vocal Room		1,200	0			0	0	varies	0		1,200	0	See Note 6
H-MU-7	Vocal Storage		150	0			0	0	varies	0		150	0	See Note 7
H-MU-8	Vocal Music Library		120	0			0	0	varies	0		120	0	
H-MU-9	Ensemble Room		200	0			0	0	varies	0		200	0	See Note 8
H-MU-10	Practice Room		80	0			0	0	varies	0		80	0	
Music Total				**0**			**0**			**0**			**0**	

Music Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive K-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS				
Space	Qty	SF	Area	
M-TE-1a Modular Technology Lab	1	1,300	1,300	
M-TE-1b Production Lab	0	1,300	0	
M-TE-2 Storage	1	150	150	See Note 1
H-TE-1 Modular Technology Lab	1	1,800	1,800	
or				
H-TE-1a Ag-Ed Lab	0	1,800	0	
H-TE-2 Storage	1	100	100	See Note 1
H-TE-3 CAD Lab	0	1,200	0	
H-TE-4 Production Lab	0	1,600	0	
Technology Education Total			**3,350**	

Tech. Ed. SF Allowance Notes	
Student Enrollment	1
350-450 Students	150
451-1600 Students	200
Enrollment Determines SF Allowed	

Note: Only non-career technical students are used to determine the bracketing.

Elementary School Grades PK-5 Stu	0
Middle School 6-8 Students	0
High School 9-12 Students	0
Total Non-CT Students	0

Tech. Ed. Workshee 0 ES, MS, HS students - *Students Type E*

	New			Existing*			TOTAL			OSDM Recommendation			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-TE-1a Modular Technology Lab		1,300	0			0	0	varies	0		1,300	0	
M-TE-1b Production Lab		1,300	0			0	0	varies	0		1,300	0	
M-TE-2 Storage		150	0			0	0	varies	0		150	0	See Note 1
H-TE-1 Modular Technology Lab		1,800	0			0	0	varies	0		1,800	0	
or													
H-TE-1a Ag-Ed Lab		1,800	0			0	0	varies	0		1,800	0	
H-TE-2 Storage		150	0			0	0	varies	0		150	0	See Note 1
H-TE-3 CADD Lab		1,200	0			0	0	varies	0		1,200	0	
H-TE-4 Production Lab		1,600	0			0	0	varies	0		1,800	0	
Technology Education Total			**0**			**0**			**0**			**0**	

Technology Education Notes

*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive K-12 School including Career Technical Programs
The example is intended to assist in the development of the summary of spaces

EXAMPLE - 650 STUDENTS				
Space		Qty	SF	Area
H-BE-1	Computer and Business Classroom	0	1,200	0
H-BE-2	Marketing Classroom	0	900	0
H-BE-3	Workroom/Storage	0	100	0
Business Education Total				0

See Note 1

Bus. Ed. SF Allowance Notes	
Student Enrollment	1
350-450 Students	100
451-800 Students	200
801-1200 Students	250
1201-1600 Students	300
Enrollment Determines SF Allowed	

Note: Only non-career technical students are used to determine the bracketing.

Elementary School Grades PK-5 Students	0
Middle School 6-8 Students	0
High School 9-12 Students	0
Total Non-CT Students	0

Business Ed. Workshee — **0** ES, MS, HS students - ***Students Type E***

		New			Existing*			TOTAL			OSDM Recommendation			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-BE-1	Computer and Business Classroom		1,200	0			0	0	varies	0		1,200	0	
H-BE-2	Marketing Classroom		900	0			0	0	varies	0		900	0	
H-BE-3	Workroom/Storage		100	0			0	0	varies	0		100	0	See Note 1
Business Education Total				**0**			**0**			**0**			**0**	

Business Ed. Notes
The Existing SF columns are to be used in projects where there are to be building additions or renovations.

The following is an example of a Comprehensive K-12 School including Career Technical Programs
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS				
Space		**Qty**	**SF**	**Area**
M-FCS-1	Life Skills Lab	1	1,100	1,100
M-FCS-2	Life Skills Storage	0	100	0
H-FCS-1	Life Skills Lab	1	1,200	1,200
H-FCS-2	Life Skills Storage	1	200	200
H-FCS-3	Laundry	1	150	150
H-FCS-4	Child Development	0	1,200	0
Family and Consumer Science Total				**2,650**

See Note 1

F & C Sci. SF Allowance Notes	
Student Enrollment	**1**
350-450 Students	200
451-800 Students	250
801-1200 Students	300
1201-1600 Students	350
Enrollment Determines SF Allowed	

Note: Only non-career technical students are used to determine the bracketing.

Elementary School Grades PK-5 Students	0
Middle School 6-8 Students	0
High School 9-12 Students	0
Total Non-CT Students	0

F & C Sci. Worksheet

0 ES, MS, HS students - *Students Type E*

		New			Existing*			TOTAL			OSDM Recommendation			
Space		**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
M-FCS-1	Life Skills Lab		1,100	0			0	0	varies	0		1,100	0	
M-FCS-2	Life Skills Storage		100	0			0	0	varies	0		100	0	
H-FCS-1	Life Skills Lab		1,200	0			0	0	varies	0		1,200	0	
H-FCS-2	Life Skills Storage		200	0			0	0	varies	0		200	0	See Note 1
H-FCS-3	Laundry		150	0			0	0	varies	0		150	0	
H-FCS-4	Child Development		1,200	0			0	0	varies	0		1,200	0	
Family and Consumer Science Total				**0**			**0**			**0**			**0**	

Family & Consumer Science Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive K-12 School including Career Technical Programs
The example is intended to assist in the development of the summary of spaces

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
E-PE-1	Gymnasium	0	3,500	0	See Note 1 - E - 300 Students
E-PE-2	P. E. Workroom/Storage	0	200	0	See Note 2
M-PE-1	Gymnasium	1	***4,000***	4,000	See Note 3 - M - 150 Students
M-PE-2	***Auxiliary Gymnasium***	***0***	***0***	***0***	***See Note 15***
M-PE-3	P.E./Athletic Office	0	75	0	
M-PE-4	Staff Shower	0	75	0	
M-PE-5	Student Locker Room	0	***600***	0	See Note 4
M-PE-6	Student Restroom/Shower	0	250	0	H - 200 students
M-PE-7	Physical Education Storage	0	200	0	See Note 5
H-PE-1	Gymnasium	1	***9,300***	9,300	See Note 6
H-PE-2	Auxiliary Gymnasium	0	7,000	0	See Note 7
H-PE-3	Student Locker Room	2	550	1,100	See Note 8
H-PE-4	Student Restroom/Shower	2	200	400	See Note 9
H-PE-5	Physical Education Storage	1	400	400	See Note 10
H-PE-6	P.E./Athletic Office	2	75	150	
H-PE-7	Staff Shower	2	75	150	
H-PE-8	Athletic Director's Office	0	120	0	
H-PE-9	Lobby Services	1	100	100	See Note 11
H-PE-10	Training Room	1	200	200	See Note 12
H-PE-11	Physical Health Classroom	0	750	0	See Note 13
H-PE-12	Multi-use P.E. Room	0	1,200	0	See Note 14
Physical Education Total				**15,800**	

Note: Only non-career technical students are used to determine the bracketing.

Elementary School Grades PK-5 Stu	0
Middle School 6-8 Students	0
High School 9-12 Students	0
Total Non-CT Students	0

Elementary School SF Allowance Notes		
Student Enrollment	1	2
350-400 Students	3500	200
401-550 Students	***4000***	300
551-700 Students	***4700***	400
Enrollment Determines SF Allowed		

MS or K-6 SF Allowance Notes			
Student Enrollment	3	4	5
350-450 Students	7000	***600***	***300***
451-600 Students	***7500***	600	***325***
Above 601 Students	***8000***	650	500
Enrollment Determines SF Allowed			

HS or K-12 or 6-12 SF Allowance Notes								
Student Enrollment	6	8	9	10	11	12	13	14
350-450 Students	***9300***	550	200	400	100	200	750	***1400***
451-800 Students	***10700***	650	250	600	200	300	1500	***1400***
801-1200 Students	***12400***	700	300	800	200	400	1500	***1600***
1201-1600 Students	***14000***	850	350	1000	200	500	2000	***1800***
Enrollment Determines SF Allowed								

Physical Education Notes	
Number	*Notes:*
	7 Auxilary Gym is 7,000 SF regardless of the number of students.
	15 Auxilary Gym may be selected for student enrollments above 1000 MS students.

PE Worksheet	**0 ES, MS, HS students - *Students Type E***									**OSDM Recommendation**			
	New			**Existing***			**TOTAL**						
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
E-PE-1 Gymnasium		***3,500***	0			0	0	varies	0		***3,500***	0	See Note 1 - E - 300 Students
E-PE-2 P. E. Workroom/Storage		200	0			0	0	varies	0		200	0	See Note 2
M-PE-1 Gymnasium		***7,000***	0			0	0	varies	0		***7,000***	0	See Note 3 - M - 150 Students
M-PE-2 Auxiliary Gymnasium		***0***	***0***			***0***	***0***	***varies***	***0***		***0***	***0***	***See Note 15***
M-PE-3 P.E./Athletic Office		75	0			0	0	varies	0		75	0	
M-PE-4 Staff Shower		75	0			0	0	varies	0		75	0	
M-PE-5 Student Locker Room		***600***	0			0	0	varies	0		***600***	0	See Note 4
M-PE-6 Student Restroom/Shower		250	0			0	0	varies	0		250	0	H - 200 students
M-PE-7 Physical Education Storage		***300***	0			0	0	varies	0		***300***	0	See Note 5
H-PE-1 Gymnasium		***9,300***	0			0	0	varies	0		***9,300***	0	See Note 6
H-PE-2 Auxiliary Gymnasium		7,000	0			0	0	varies	0		7,000	0	See Note 7
H-PE-3 Student Locker Room		550	0			0	0	varies	0		550	0	See Note 8
H-PE-4 Student Restroom/Shower H-PE-5 Physical Education Storage H-PE-6 P.E./Athletic Office		200	0			0	0	varies	0		200	0	See Note 9
		400	0			0	0	varies	0		400	0	See Note 10
		75	0			0	0	varies	0		75	0	
H-PE-7 Staff Shower		75	0			0	0	varies	0		75	0	
H-PE-8 Athletic Director's Office		120	0			0	0	varies	0		120	0	
H-PE-9 Lobby Services		100	0			0	0	varies	0		100	0	See Note 11
H-PE-10 Training Room		200	0			0	0	varies	0		200	0	See Note 12
H-PE-11 Physical Health Classroom		750	0			0	0	varies	0		750	0	See Note 13
H-PE-12 Multi-use P.E. Room		***1,400***	0			0	0	varies	0		***1,400***	0	See Note 14
Physical Education Total			**0**			**0**			**0**			**0**	

Physical Education Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive K-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
E/M/H-SD-1	Student Dining	1	3,792	3,792	See Note 1
E/M/H-SD-2	Stage	1	1,000	1,000	See Note 2
E&M-SD-3/H-SD-7	Staff Dining	0	400	0	See Note 3
E&M-SD-4/H-SD-8	Table Storage	1	400	400	See Note 4
H-SD-3	Scene Shop and Storage	1	350	350	See Note 5
H-SD-4	Make-up/Dressing Rooms	2	200	400	See Note 6
H-SD-5	Theatrical Control Room	1	150	150	
H-SD-6	Drama Storage	1	150	150	See Note 7
H-SD-9/CT-SD-5	Family Restroom	1	80	80	
Student Dining Total				**6,322**	

Note: Non-career technical students and career technical students are combined to determine the bracketing.

Student Dining SF Allowance Notes		
Student Enrollment	3	4
350-500 Students	250	300
501-700 Students	400	400
701-900 Students	550	500
Above 901 Students	700	600
Enrollment Determines SF Allowed		

High School SF Allowance Notes			
Student Enrollment	5	6	7
350-450 Students	400	200	200
451-800 Students	450	250	400
801-1200 Students	***500***	250	500
Above 1201 Students	***600***	300	600
Enrollment Determines SF Allowed			

Elementary School Grades PK-5 Students	0
Middle School 6-8 Students	0
High School 9-12 Students	0
Total Students	0

Student Dining Worksheet		0 ES, MS, HS students - COMBINED										
		New			Existing*			TOTAL			OSDM Recommendation			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
E/M/H/CT-SD-1	Student Dining		3,000	0			0	0	varies	0		3,000	0	See Note 1
E/M/H/CT-SD-2	Stage		1,000	0			0	0	varies	0		1,000	0	See Note 2
H-SD-7/CT-SD-3	Staff Dining		250	0			0	0	varies	0		250	0	See Note 3
H-SD-8/CT-SD-4	Table Storage		300	0			0	0	varies	0		300	0	See Note 4
H-SD-3	Scene Shop and Storage		400	0			0	0	varies	0		400	0	See Note 5
H-SD-4	Make-up/Dressing Rooms		200	0			0	0	varies	0		200	0	See Note 6
H-SD-5	Theatrical Control Room		200	0			0	0	varies	0		200	0	
H-SD-6	Drama Storage		200	0			0	0	varies	0		200	0	See Note 7
H-SD-9/CT-SD-5	Family Restroom		80	0			0	0	varies	0		80	*0*	
Student Dining Total				**0**			**0**			**0**			**0**	

Student Dining Notes
Note 1: The size of the student dining space is equal to one-third of the student ***enrollment*** multiplied by 17.5 SF or 3000 SF, whichever is greater.
Note 2: The size of the stage equals student ***enrollment*** multiplied by 2.0 SF or 1000 SF, whichever is greater.
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive K-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
E/M/H-FS-0	Warming Kitchen	0	1,300	0	*See Note 1 & Kit. Area Not*
E/M/H-FS-1	Kitchen (total)	1		2,275	*See Note 2*
E/M/H-FS-1a	Preparation Area	1	819		*See Kit. Area Note*
E/M/H-FS-1b	Serving Area	1	774		*See Kit. Area Note*
E/M/H-FS-1c	Dry Food Storage	1	250		*See Kit. Area Note*
E/M/H-FS-1d	Cooler/Freezer	1	228		*See Kit. Area Note*
E/M/H-FS-1e	Ware Washing	1	205		*See Kit. Area Note*
E/M/H-FS-2	Dietician Office	1	75	75	
E/M/H-FS-3	Restroom / Locker Room	1	140	140	
Food Service Total				**2,490**	

Kitchen Area Sizes					
Food Service Area	Enroll	X	SF/Student	x	%
Preparation Area	Enroll	x	3.5	x	36%
Serving Areas	Enroll	x	3.5	x	34%
Dry Food Storage	Enroll	x	3.5	x	11%
Cooler/ Freezer	Enroll	x	3.5	x	10%
Ware Washing Area	Enroll	x	3.5	x	9%
Warming Kitchen	Enroll	x	2.0		
Multiply Enrollment x SF/Student x % to achieve size of area					

Note: Non-career technical students and career technical students are combined to determine the bracketing.

Elementary School Grades PK-5 Students	0
Middle School 6-8 Students	0
High School 9-12 Students	0
Total Students	0

Food Services Worksheet		0 ES, MS, HS students - COMBINED								OSDM Recommendation			
		New			Existing*			TOTAL					
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
E/M/H/CT-FS-0	Warming Kitchen		0	0			0	0	varies	0		0	0
E/M/H/CT-FS-1	Kitchen (total)			0			0	0	varies	0			0
E/M/H/CT-FS-1a	Preparation area		0						varies			0	
E/M/H/CT-FS-1b	Serving area		0						varies			0	
E/M/H/CT-FS-1c	Dry food storage		0						varies			0	
E/M/H/CT-FS-1d	Cooler/freezer		0						varies			0	
E/M/H/CT-FS-1e	Ware washing		0						varies			0	
E/M/H/CT-FS-2	Dietician Office		75	0			0	0	varies	0		75	0
E/M/H/CT-FS-3	Restroom / Locker Room		140	0			0	0	varies	0		*140*	0
Food Service Total				**0**			**0**			**0**			**0**

See Note 1 & Kit. Area No	
See Note 2	
See Kit. Area Note	
See Kit. Area Note	
See Kit. Area Note	
See Kit. Area Note	
See Kit. Area Note	

Food Service Notes	
Number	Notes:
	Only one of the two Kitchens is to be used - either ***E/M/H/CT-FS-0 or E/M/H/CT-FS-1*** - not both.
	The size of the kitchen is equal to the sum of preparation area, serving area, dry food storage area, cooler/freezer area, and ware washing area.
*	The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive K-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 students					
Space		Qty	SF	Area	
E/M/H-CU-1	Workroom	1	400	400	See Note 1
E/M/H-CU-2	Custodial Office	1	100	100	
Custodial Total				**500**	

Note: Non-career technical students and career technical students are combined to determine the bracketing.

Cust. Spaces SF Allowance	Notes
Student Enrollment	**1**
Up to 400 Students	200
401-600 Students	300
Above 600 Students	400
Enrollment Determines SF Allowed	

Elementary School Grades PK-5	0
Middle School 6-8 Students	0
High School 9-12 Students	0
Total Students	0

Custodial Worksheet	**0**	**ES, MS, HS students - COMBINED**								**OSDM Recommendation**			
	New			**Existing***			**TOTAL**						
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
E/M/H/CT-CU-1 Workroom		200	0			0	0	varies	0		200	0	See Note 1
E/M/H/CT-CU-2 Custodial Office		100	0			0	0	varies	0		100	0	
Custodial Total			**0**			**0**			**0**			**0**	

Custodial Spaces Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

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The following is an example of a Comprehensive K-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 students ES, MS, HS, & On-site Career Tech Students-Combined					
Space		Qty	SF	Area	
E/M/H-BS-1	Large Group Restrooms		2,470	2,470	See Build Svc Area Sizes
E/M/H-BS-2	Custodial Closet	2	50	100	
E/M/H-BS-3	Electrical Closet	2	50	100	
E/M/H-BS-4	Telecommunications Room (TR)	2	64	128	See Note 1
E/M/H-BS-5	Corridors		14,116	14,116	See Build Svc Area Sizes
E/M/H-BS-6	Mechanical Rooms/Decks		4,870	4,870	See Build Svc Area Sizes
E/M/H-BS-7	Storage Area	1	200	200	See SF Allowance Notes
E/M/H-BS-8	Central Storage Area	1	200	200	See SF & Central Storage-CT Notes
E/M/H-BS-9	Loading/Receiving Area	1	120	120	
E/M/H-BS-10	Restroom	0	60	0	
E/M/H-BS-11	***Recycling Room***	***1***	100	100	See SF Allowance Notes
Building Services Total				**22,405**	

Note: Non-career technical students and career technical students are combined to determine the bracketing.

Square Footage Allowance Notes			
Student Enrollment	Stor	*Ctl Stor-Non CT*	*Recycle*
350-450 Students	150	170	80
451-800 Students	200	200	100
801-1200 Students	250	220	130
1201-1600 Students	250	240	160
1601-2400 Students	250	590	210
Enrollment Determines SF Allowed			

Central Storage-CT Notes	
Student Enrollment	Ctl Stor CT
Up to 400 Students	7.5 SF/Student
400-600 Students	6.6 SF/Student
600-800 Students	5.8 SF/Student
Above 800 Students	5 SF/Student
Enrollment Determines SF Allowed	

Elementary School Grades PK-5 Students	0
Middle School 6-8 Students	0
High School 9-12 (Including On-site CT) Students	0
Total Students	0

Building Services Worksheet

0 ES, MS, HS Academic & On-site Career Tech Students - COMBINED

Space		New Qty	New SF	New Area	Existing* Qty	Existing* SF	Existing* Area	TOTAL Qty	TOTAL SF	TOTAL Area	OSDM Recommendation Qty	OSDM Recommendation SF	OSDM Recommendation Area	
E/M/H-BS-1/***CT-GS-1***	***Large Group Restrooms***	-	0	0	-		0	-	varies	0	-	0	0	See Build Svc Area Sizes
E/M/H-BS-2/CT-GS-2	Custodial Closet		50	0			0	0	varies	0		50	0	
E/M/H-BS-3/CT-GS-3	Electrical Closet		50	0			0	0	varies	0		50	0	
E/M/H-BS-4/CT-GS-4	Telecommunications Room		64	0			0	0	varies	0		64	0	See Note 1
E/M/H-BS-5	Corridors - Non-CT	-	0	0	-		0	-	varies	0	-	0	0	See Build Svc Area Sizes
CT-BS-1	Corridors - CT	-	0	0	-		0	-	varies	0	-	**0**	**0**	See Build Svc Area Sizes
	Vertical Circulation	-	***0***	0	-		0	-	varies	0	-	0	0	See Note 2
E/M/H-BS-6	Mechanical/Electrical Space/Decks - Non-CT	-	0	0	-		0	-	varies	0	-	0	0	See Build Svc Area Sizes
CT-BS-2	Mechanical/Electrical Space/Decks - CT	-	0	0	-		0	-	varies	0	-	**0**	**0**	See Build Svc Area Sizes
E/M/H-BS-7/CT-GS-5	Storage Area		150	0			0	0	varies	0		150	0	See SF Allowance Notes
E/M/H-BS-8	Central Storage Area: Non-CT		170	0			0	0	varies	0		170	0	See SF Allowance Notes
CT-GS-6	Central Storage Area: CT Only		0	0			0	0	varies	0		0	0	See SF & Central Storage-CT Not
E/M/H-BS-9/H-GS-7	Loading/Receiving Area		120	0			0	0	varies	0		120	0	
E/M/H-BS-10	Restroom		60	0			0	0	varies	0		60	0	
E/M/H-BS-11	***Recycling Room***		80	0			0	0	varies	0		80	0	See SF Allowance Notes
Building Services - Non-CT Total				**0**			**0**			**0**			**0**	
Building Services - CT Total				***0***			***0***			***0***			***0***	
Building Services Grand Total				**0**			**0**			**0**			**0**	

Building Services Notes	
Number	Notes:
	Size of Telecommunications Room varies with size of school. See page 4111-4, 5113-4, 6114-4.
	Vertical Circulation refers only to the following: Stairways/staitowers, monumental stairs, elevators and elevator equipment room.
*	The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

Building Services Area Sizes			
Building Services Areas	**Prog**	**X**	**%**
Large Group Restrooms-Non CT & CT	Prog	x	3.5
Corridors-Non-CT	Acad Prog	x	20.0
Corridors-CT	CT Prog	x	14.0
Mech./Elec. Space/Decks-Non-CT	Acad Prog	x	6.9
Mech./Elec. Space/Decks-CT	CT Prog	x	5.0
Multiply Sum of Prog. Areas - Build. Svcs. x % to achieve size of area			

Lab & Support Space Worksheet		0 students			Students Type A & C						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	CTE Program Code	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
Accounting	G0		1200	0				0	varies	0		1200	0
Administrative and Professional Support	C0		1200	0				0	varies	0		1200	0
Automation & Robotics	R0		1800	0				0	varies	0		1800	0
Aviation Occupations	T4		1500	0				0	varies	0		1500	0
Business Management	C1		1200	0				0	varies	0		1200	0
Electronics	R1		1800	0				0	varies	0		1500	0
Financial Services	G1		1200	0				0	varies	0		1500	0
Information Support and Services	N0		1200	0				0	varies	0		1800	0
Interactive Media	N1		1200	0				0	varies	0		1000	0
Legal Management and Support	C2		1200	0				0	varies	0		1200	0
Medical Management and Support	C3		1200	0				0	varies	0		1200	0
Network Systems	N2		1200	0				0	varies	0		1200	0
Programming & Software Development	N3		1200	0				0	varies	0		1200	0
Telecommunications	F5		1200	0				0	varies	0		1200	0
Travel and Tourism	L2		1200	0				0	varies	0		1200	0
Visual Design and Imaging	B2		1200	0				0	varies	0		1200	0
Total Lab Spaces		**0**			**0**			**0**			**0**		
Related Spaces													
CT-P1-2 Office			120	0				0	varies	0		120	0
CT-P1-3 Storage			200	0				0	varies	0		200	0
Total Program Type 1				**0**						**0**			**0**

Laboratory and Support Spaces Notes

*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

Lab & Support Space Worksheet		**0 students**			***Students Type A & C***						**OSDM Recommendation**		
		New			**Existing***			**TOTAL**					
Laboratory Space	***CTE Program***	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**
	Code												
Allied Health & Nursing	***JM***		***1500***	***0***				***0***	***varies***	***0***		***1500***	***0***
Biomedical Science	***F0***		***1500***	***0***				***0***	***varies***	***0***		***1500***	***0***
Biotechnology for Food, Plant, Animal Science	A3		1500	0				0	varies	0		1500	0
Community Health Aide	J2		1500	0				0	varies	0		1500	0
Criminal Science Technology	P2		1500	0				0	varies	0		1500	0
Dental Laboratory Technology	J4		1500	0				0	varies	0		1500	0
Emergency Medical Technician	P3		1500	0				0	varies	0		1500	0
Energy Science	F1		1500	0				0	varies	0		1500	0
Engineering Science	***F2***		***1500***	***0***				***0***	***varies***	***0***		***1500***	***0***
Engineering and Design	***F6***		***1500***	***0***				***0***	***varies***	***0***		***1500***	***0***
Exercise Science and Sports Medicine	J6		1500	0				0	varies	0		1500	0
Health Information Management	J7		1500	0				0	varies	0		1500	0
Health Support Pathway	J8		1500	0				0	varies	0		1500	0
Health Unit Coordinator	J9		1500	0				0	varies	0		1500	0
Home Health	JA		1500	0				0	varies	0		1500	0
Medical Bioscience	J0		1500	0				0	varies	0		1500	0
Medical Laboratory Technology	JC		1500	0				0	varies	0		1500	0
Pharmacy Technician	JG		1500	0				0	varies	0		1500	0
Practical Nursing	JJ		1500	0				0	varies	0		1500	0
Therapeutic Pathway	JL		1500	0				0	varies	0		1500	0
Total Lab Spaces		**0**			**0**			**0**			**0**		
Related Space													
CT-P2-2 Office			120	0				0	varies	0		120	0
CT-P2-3 Storage			200	0				0	varies	0		200	0
CT-P2-4 Changing Room			450	0				0	varies	0		450	0
Total Program Type 2				**0**						**0**			**0**

Laboratory and Support Spaces Notes

*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

Lab & Support Space Worksheet		**0 students**			***Students Type A & C***						**OSDM Recommendation**		
		New			**Existing***			**TOTAL**					
Laboratory Space	***CTE Program Code***	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**
Supply Chain Management	S0												
Laboratory			1500	0		0	0	0	varies	0		1500	0
Early Childhood Education	E0												
Laboratory			1500	0		0	0	0	varies	0		1500	0
Observation			120	0		0	0	0	varies	0		120	0
Infants			700	0		1	0	0	varies	0		700	0
Kitchenette/Break room			350	0		0	0	0	varies	0		350	0
Reception			500	0		0	0	0	varies	0		500	0
Workroom			150	0		0	0	0	varies	0		150	0
Toddler Restroom			60	0		0	0	0	varies	0		60	0
Playground Area													
Entrepreneurship	S1												
Laboratory			1000	0		0	0	0	varies	0		1000	0
Bookstore			800	0		0	0	0	varies	0		800	0
Display			100	0		0	0	0	varies	0		100	0
Ground Operations	T5												
Laboratory			1500	0		0	0	0	varies	0		1500	0
Reference Room			150	0		0	0	0	varies	0		150	0
Lodging	L1												
Laboratory			1500	0		0	0	0	varies	0		1500	0
Banquet Room			800	0		0	0	0	varies	0		800	0
Marketing Communications	S3												
Laboratory			900	0		0	0	0	varies	0		900	0
Bookstore			800	0		0	0	0	varies	0		800	0
Display			100	0		0	0	0	varies	0		100	0
Marketing Management	S4												
Laboratory			900	0		0	0	0	varies	0		900	0
Bookstore			800	0		0	0	0	varies	0		800	0
Display			100	0		0	0	0	varies	0		100	0
	Total Lab Spaces	**0**			**0**			**0**			**0**		
Related Space													
CT-P3-2 Office			120	0		0	0	0	varies	0		120	0
CT-P3-3 Storage			200	0		0	0	0	varies	0		200	0
Total Program Type 3				***0***			***0***			***0***			***0***

Laboratory and Support Spaces Notes

*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

Lab & Support Space Worksheet		0 students			*Students Type A & C*						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	***CTE Program Code***	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**
Animal Science and Management	A2												
Laboratory (small animal)			1000	0			0	0	varies	0		1000	0
Pet shop			1200	0			0	0	varies	0		1200	0
Clinic			350	0			0	0	varies	0		350	0
Grooming			350	0			0	0	varies	0		350	0
Animal Room			200	0			0	0	varies	0		200	0
Animal Room			600	0			0	0	varies	0		600	0
Kennel			250	0			0	0	varies	0		250	0
Career Paths for the Law Profession	P0												
Laboratory			1200	0			0	0	varies	0		1200	0
Weight Room			800	0			0	0	varies	0		800	0
Interrogation Room			150	0			0	0	varies	0		150	0
Clinical Health Services	J1												
Laboratory			1200	0			0	0	varies	0		1200	0
Training Restroom			120	0			0	0	varies	0		120	0
Laundry Room			120	0			0	0	varies	0		120	0
Cosmetology	M1												
Laboratory			1600	0			0	0	varies	0		1600	0
Dispensary			175	0			0	0	varies	0		175	0
Laundry Room			150	0			0	0		0		150	0
Facial Room			200	0			0	0	varies	0		200	0
Manicure Room			200	0			0	0	varies	0		200	0
Customer Toilet			60	0			0	0	varies	0		60	0
Criminal Justice	P1												
Laboratory			1200	0			0	0	varies	0		1200	0
Weight Room			800	0			0	0	varies	0		800	0
Interrogation Room			150	0			0	0	varies	0		150	0
Culinary and Food Service Operations	L0												
Laboratory			1800	0			0	0	varies	0		1800	0
Restaurant			1500	0			0	0	varies	0		1500	0
Dry Storage			150	0			0	0	varies	0		150	0
Total Program Type 4 (Page 1)		**0**		**0**	**0**		**0**	**0**		**0**	**0**		**0**

Laboratory and Support Spaces Notes
1: One classroom space is to be allocated for every two program spaces (or fractions thereof) in types 4 through 7.
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

Lab & Support Space Worksheet		0 students			Students Type A & C			TOTAL			OSDM Recommendation		
		New			Existing*								
Laboratory Space	CTE Program Code	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
Dental Assistant	J3												
Laboratory			1500	0			0	0	varies	0		1500	0
X-ray Room			80	0			0	0	varies	0		80	0
Darkroom			80	0			0	0	varies	0		80	0
Diagnostic Pathway	J5												
Laboratory			1200	0			0	0	varies	0		1200	0
Exam Room			200	0			0	0	varies	0		200	0
Firefighting and Emergency Medical Services	***P6***												
Laboratory			***1500***	***0***			***0***	***0***	***varies***	***0***		***1500***	***0***
Weight Room			***800***	***0***			***0***	***0***	***varies***	***0***		***800***	***0***
Fire Fighter Training	P4												
Laboratory			1500	0			0	0	varies	0		1500	0
Weight Room			800	0			0	0	varies	0		800	0
Media Arts	B0												
Laboratory			1500	0			0	0	varies	0		1500	0
Media Arts Control Room/Edit			450	0			0	0	varies	0		450	0
Vestibule			84	0			0	0	varies	0		84	0
Medical Assistant	JB												
Laboratory			1200	0			0	0	varies	0		1200	0
Training Restroom			120	0			0	0	varies	0		120	0
Laundry Room			120	0			0	0	varies	0		120	0
Nurse Assisting	JD												
Laboratory			1200	0			0	0	varies	0		1200	0
Training Restroom			120	0			0	0	varies	0		120	0
Laundry Room			120	0			0	0				120	0
Optometric Occupations	JE												
Laboratory			1200	0			0	0	varies	0		1200	0
Exam Room			100	0			0	0	varies	0		100	0
Patient Care Technician	JF												
Laboratory			1500	0			0	0	varies	0		1500	0
Training Restroom			120	0			0	0	varies	0		120	0
Laundry Room			120	0			0	0	varies	0		120	0
Performing Arts	B1												
Laboratory			1500	0			0	0	varies	0		1500	0
Practice Room			150	0			0	0	varies	0		150	0
Private Security	P5												
Laboratory			1200	0			0	0	varies	0		1200	0
Weight Room			800	0			0	0	varies	0		800	0
Interrogation Room			150	0			0	0	varies	0		150	0
Surgical Technology	JK												
Laboratory			1000	0			0	0	varies	0		1000	0
Operating Room			800	0			0	0	varies	0		800	0
Instrument Room			700	0			0	0	varies	0		700	0
Scrub Room			500	0			0	0	varies	0		500	0
Total Lab Spaces 0					***0***			***0***			***0***		
Related Space													
CT-P4-2 Classroom	***Note 1***		900	0			0	0	varies	0		900	0
CT-P4-3 Office			120	0			0	0	varies	0		120	0
CT-P4-4 Storage			200	0			0	0	varies	0		200	0
CT-P4-5 Changing Room			450	0			0	0	varies	0		450	0
Total Program Type 4 (Page 1)				0			0			0			0
Total Program Type 4 (Page 1 & 2)				**0**			**0**			**0**			**0**

Laboratory and Support Spaces Notes

1: One classroom space is to be allocated for every two program spaces (or fractions thereof) in types 4 through 7.
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

Lab & Support Space Worksheet		**0 students**			***Students Type A & C***						**OSDM Recommendation**		
		New			**Existing***			**TOTAL**					
Laboratory Space	***CTE Program Code***	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**
Agribusiness and Production	A0												
Laboratory			4500	0			0	0	varies	0		4500	0
Greenhouse			1000	0			0	0	varies	0		1000	0
Auto Specilization	T2		3500	0			0	0	varies	0		3500	0
Brick, Block, and Cement Masonry	D0		3500	0			0	0	varies	0		3500	0
Building and Property Maintenance	D1		3000	0			0	0	varies	0		3000	0
Building Technology	D2		3000	0			0	0	varies	0		3000	0
Custodial Services	D6		2500	0			0	0	varies	0		2500	0
Electrical Trades	D7		3000	0			0	0	varies	0		3000	0
Environmental Control Technologies	D8		3000	0			0	0	varies	0		3000	0
Heavy Equipment Operations	D9		4500	0			0	0	varies	0		4500	0
Integrated Systems Technology	R2		3500	0			0	0	varies	0		3500	0
Interior Design Applications	DA		3000	0			0	0	varies	0		3000	0
Manufacturing Design and Development	R3		4500	0			0	0	varies	0		4500	0
Natural Resource Management	A6												
Laboratory			3000	0			0	0	varies	0		3000	0
Greenhouse			1000	0			0	0	varies	0		1000	0
Plumbing and Pipefitting	DB		3000	0			0	0	varies	0		3000	0
Power Equipment Technology	T8		3500	0			0	0	varies	0		3500	0
Power Transmission	F4		3500	0			0	0	varies	0		3500	0
Welding and Cutting	R6		3500	0			0	0	varies	0		3500	0
Total Lab Spaces		**0**			**0**			**0**			**0**		
Related Space - List per Program add rows as nee													
CT-P5-2 Classroom	***Note 1***		900	0			0	0	varies	0		900	0
CT-P5-3 Office			120	0			0	0	varies	0		120	0
CT-P5-4 Storage			200	0			0	0	varies	0		200	0
CT-P5-5 Changing Room	***Note 2***		270	0			0	0	varies	0		270	0
CT-P5-6 Tool Crib			550	0			0	0	varies	0		550	0
CT-P5-7 Reference Room			200	0			0	0	varies	0		200	0
CT-P5-8 Toilet Room			68	0			0	0	varies	0		68	0
Total Program Type 5				**0**			**0**			**0**			**0**

Laboratory and Support Spaces Notes

1: One classroom space is to be allocated for every two program spaces (or fractions thereof) in types 4 through 7.

2: Square footage of chaging room determined by total number of approved programs types 5, 6 and 7 times 30 stud ents times 9 SF per student. Changing room to be entered on POR once.

*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

Lab & Support Space Worksheet		**0 students**			***Students Type A & C***						**OSDM Recommendation**		
		New			**Existing***			**TOTAL**					
Laboratory Space	***CTE Program Code***	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**
Auto Collision Repair	T1												
Laboratory			5000	0			0	0	varies	0		5000	0
Auto Parts Storage			300	0			0	0	varies	0		300	0
Auto Technology	T3												
Laboratory			5000	0			0	0	varies	0		5000	0
Engine Storage			800	0			0	0	varies	0		800	0
Machine Room			900	0			0	0	varies	0		900	0
Flammable Material Storage			60	0			0	0	varies	0		60	0
Carpentry	D3												
Laboratory			4000	0			0	0	varies	0		4000	0
Finishing Room			500	0			0	0	varies	0		500	0
Material Storage			800	0			0	0	varies	0		800	0
Construction - Management	D5												
Laboratory			3000	0			0	0	varies	0		3000	0
CADD Room			400	0			0	0	varies	0		400	0
Construction - Design / Build	D4												
Laboratory			3000	0			0	0	varies	0		3000	0
CADD Room			400	0			0	0	varies	0		400	0
Construction Design and Management	***DF***												
Laboratory			***3000***	***0***			***0***	***0***	***varies***	***0***		***3000***	***0***
CADD Room			***400***	***0***			***0***	***0***	***varies***	***0***		***400***	***0***
Engineering Technology	F3												
Laboratory			1500	0			0	0		0		1500	0
CADD Room			400	0			0	0	varies	0		400	0
Food Science and Technology	A4												0
Laboratory			2000	0			0	0	varies	0		2000	0
Freezer			400	0			0	0	varies	0		400	0
Cooler			400	0			0	0	varies	0		400	0
Retail			400	0			0	0	varies	0		400	0
Ground Transportation	***T9***												
Laboratory			***5000***	***0***			***0***	***0***	***varies***	***0***		***5000***	***0***
Engine Storage			***800***	***0***			***0***	***0***	***varies***	***0***		***800***	***0***
Machine Room			***900***	***0***			***0***	***0***	***varies***	***0***		***900***	***0***
Flammable Material Storage			***60***	***0***			***0***	***0***	***varies***	***0***		***60***	***0***
Horticulture	A5												
Laboratory			2000	0			0	0	varies	0		2000	
Retail			400	0			0	0	varies	0		400	
Greenhouse			3000	0			0	0	varies	0		3000	0
Industrial Power Technology	A1												
Laboratory			5000	0			0	0	varies	0		5000	0
Engine Storage			1000	0			0	0	varies	0		1000	0
Flammable Material Storage			200	0			0	0	varies	0		200	0
Total Program Type 6 (Page 1)		***0***		***0***	***0***		***0***	***0***		***0***	***0***		***0***

Laboratory and Support Spaces Notes
1: One classroom space is to be allocated for every two program spaces (or fractions thereof) in types 4 through 7.
2: Square footage of chaging room determined by total number of approved programs types 5, 6 and 7 times 30 students times 9 SF per student. Changing room to be entered on POR once.
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

Lab & Support Space Worksheet		**0 students**			***Students Type A & C***						**OSDM Recommendation**		
		New			**Existing***			**TOTAL**					
Laboratory Space	***CTE Program Code***	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**
Manufacturing Occupations	***R7***												***0***
Laboratory			***3500***	***0***			***0***	***0***	***varies***	***0***		***3500***	***0***
CNC Room			***900***	***0***			***0***	***0***	***varies***	***0***		***900***	***0***
Inspection Room			***150***	***0***			***0***	***0***	***varies***	***0***		***150***	***0***
Mechanical, Electrical, and Plumbing	***DE***												
Laboratory			***3000***	***0***			***0***	***0***	***varies***	***0***		***3000***	***0***
CADD Room			***400***	***0***			***0***	***0***	***varies***	***0***		***400***	***0***
Medium/Heavy Truck Technician	T7												
Laboratory			6000	0			0	0	varies	0		6000	0
Engine Storage			800	0			0	0	varies	0		800	
Flammable Material Storage			60	0			0	0	varies	0		60	0
Machine Room			900	0			0	0	varies	0		900	0
Precision Machining	R5												
Laboratory			3500	0			0	0	varies	0		3500	0
CNC Room			900	0			0	0	varies	0		900	0
Inspection Room			150	0			0	0	varies	0		150	0
Structural Systems	***DD***												
Laboratory			***3000***	***0***			***0***	***0***	***varies***	***0***		***3000***	***0***
CADD Room			***400***	***0***			***0***	***0***	***varies***	***0***		***400***	***0***
Wood Product Technologies	DC												
Laboratory			3000	0			0	0	varies	0		3000	0
Finishing Room			500	0			0	0	varies	0		500	0
Material Storage			800	0			0	0	varies	0		800	0
Total Lab Spaces		***0***			***0***			***0***			***0***		
Related Space - List per Program add rows as needed													
CT-P6-2 Related Classroom	***Note 1***		900	0			0	0	varies	0		900	0
CT-P6-3 Office			120	0			0	0	varies	0		120	0
CT-P6-5 Changing Room	***Note 2***		270	0			0	0	varies	0		270	0
CT-P6-4 Storage			200	0			0	0	varies	0		200	0
CT-P6-6 Tool Crib			550	0			0	0	varies	0		550	0
CT-P6-7 Reference Room			200	0			0	0	varies	0		200	0
CT-P6-8 Toilet Room			68	0			0	0	varies	0		68	0
Total Program Type 6 (Page 1)				0			0			0			0
Total Program Type 6 (Page 1 & 2)				**0**			**0**			**0**			**0**

Laboratory and Support Spaces Notes
1: One classroom space is to be allocated for every two program spaces (or fractions thereof) in types 4 through 7.
2: Square footage of chaging room determined by total number of approved programs types 5, 6 and 7 times 30 students times 9 SF per student. Changing room to be entered on POR once.
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

Lab & Support SpaceWorksheet		0 students			Students Type A & C						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	CTE Program Code	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
Aircraft Maintenance	T0												
Laboratory			13000	0			0	0	varies	0		13000	0
Cleaning Room			400	0			0	0	varies	0		400	0
Parts Storage			300	0			0	0	varies	0		300	0
Hazardous Materials Storage			60	0			0	0	varies	0		60	0
Paint Storage			100	0			0	0	varies	0		100	0
Air Transportation	***TA***												
Laboratory			***13000***	***0***			***0***	***0***	***varies***	***0***		***13000***	***0***
Cleaning Room			***400***	***0***			***0***	***0***	***varies***	***0***		***400***	***0***
Hazardous Materials Storage			***60***	***0***			***0***	***0***	***varies***	***0***		***60***	***0***
Paint Storage			***100***	***0***			***0***	***0***	***varies***	***0***		***100***	***0***
Animal Science & Management (Equine)	A2												
Laboratory			8000	0			0	0	varies	0		8000	0
Stables			6800	0			0	0	varies	0		6800	0
Total Lab Spaces		***0***			***0***			***0***			***0***		
Related Space													
CT-P7-2 Classroom	***Note 1***		900	0			0	0	varies	0		900	0
CT-P7-3 Office			120	0			0	0	varies	0		120	0
CT-P7-4 Storage			200	0			0	0	varies	0		200	0
CT-P7-5 Changing Room	***Note 3***		270	0			0	0	varies	0		270	0
CT-P7-6 Tool Crib			550	0			0	0	varies	0		550	0
CT-P7-7 Reference Room			200	0			0	0	varies	0		200	0
CT-P7-8 Toilet Room			68	0			0	0	varies	0	68		0
Total Program Type 7				**0**			**0**			**0**			**0**

Laboratory and Support Spaces Notes

1: One classroom space is to be allocated for every two program spaces (or fractions thereof) in types 4 through 7.

2: Support will be provided for only the first 10,000 SF for any one program.

3: Square footage of changing room determined by total number of approved programs types 5, 6 and 7 times 30 students times 9 SF per student.

*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

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Introduction:

This page is meant to provide the School District and Design Professional with a simple tool for completing a Program of R a Comprehensive 6-12 School including Career Technical Programs. Please follow the directions found below and fill in the

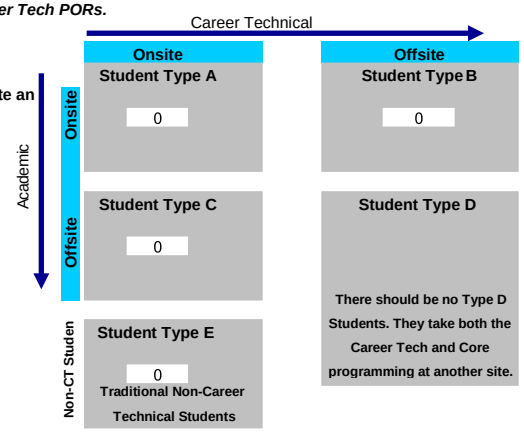
	Career Tech Students			Non-CT	
Grade	A	B	C	E	Totals
6-8					0
9-12					0
Total	0	0	0	0	0

Please indicate in the yellow cells the projected number of students in each type.
This information can be found in the Master Plan or the district's enrollment projections.

The following table is to clarify the connection/labeling between the Enrollment Projection report and the Career Tech PORs.
Note that when the school is a Comp HS the emphasis is on the location of the CT Student.
When the school is a JVS or Coop school the emphasis is on the location of the Academic student.
For example a Type B - CT Off-site Comp HS student is a student that has academic programs on-site and CT programs off-site. A Type B - Acad On-site JVS student is a student that has academic programs on-site an

Comp HS School - Relates to location of CT Students	
Type A - Full time	Acad On-site + CT On-site of Comp HS
Type B - CT Off-si	Acad On-site + CT Off-site of Comp HS
Type C - CT On-si	Acad Off-site + CT On-site of Comp HS

JVS/Compact School - Relates to location of Academic Stu lents	
Type A - Full time	Acad On-site + CT On-site of JVS
Type B - Acad On	Acad On-site + CT Off-site of JVS
Type C - Acad Off	Acad Off-site + CT On-site of JVS



All student descriptions are in relation to the school being programmed.

Student Type A - Comprehensive Career-Technical Student/Full Time Career Technical Student (Grades 11-12)
Spends entire day at school attending academics and career-technical programming.

Student Type B – Career-Technical Off-Site Student (Grades 11-12)
Attends academic courses at the school and attends career-technical courses at another location, i.e. JVS, comprehensive high school in another district, etc.

Student Type C – Career-Technical On-Site Student (Grades 11-12)
Attends career-technical courses at the school and attends academics at another location, i.e., high school in another district or high school within the same district.

Student Type D – Full-Time Career-Technical Student-Attends all classes off site.
Attends both academic and career-technical courses at a site other than the home high school.

Student Type E – Does not participate in career technical programming. **(6-12 Grades)**
Does not participate in Career Technical programming.

School District Name, School Building Name
COMPREHENSIVE 6-12 SCHOOL & CAREER TECHNICAL PROGRAMS
SUMMARY WORKSHEET

Previously, changes or additions made during the annual update of the Design Manual have been ***"bolded and italicized"*** for easy identification. Changes have been made to the formulas on this sheet which have not been bolded and italicized. The user is advised to carefully review all information.

WORKSHEET

	Career Tech Part Time	Academic Part Time	Academic Full Time Non-CT	SF/Student	Area	
Student Type A (CT)	0	0				
Student Type B (CT)		0				
Student Type C (CT)	0					Insert numbers into the yellow cell from your Master Plan document.
Student Type E - Middle Schools Grades 6-8			0	0	0	
Student Type E - High School Grades 9-12 (non-CT)			0	0	0	
Total Student Enrollment per Student Type	0	0	0		**0**	Total Non-CT Space
Career Technical Core Space			0	0	0	Max. Gross SF - CT Core Space
Career Technical Program Space			0	**varies**		Max. Gross SF - CT Program Space
Total Career Technical Space					**0**	Total CT Space
Total A, B & E Students for Vertical Circulation Calculation		0				
Total Gross Square Footage					**0**	Total Gross Square Footage
						Vertical Circulation
SELECT ONE ⟶ ◉ Single or Two Story Buildings ○ 3 Stories or greater						
Vert. Circ. Area Allowance (3 Stories or greater)	Vertical Circulation ***(3 Stories or greater)*** refers only to stairways/stair towers, monumental stairs, elevators, and elevator equipment rooms.				0	
Total Adjusted POR Gross Square Footage					**0**	**Total Adjusted POR Gross Square Footage**

CORE SPACE ONLY

Core Spaces	Students Type E NEW	Students Type E Existing*	Students Type E TOTAL	Students Type A & B NEW	Students Type A & B Existing*	Students Type A & B TOTAL	Combined Total	OSDM Recommendation
M/H/CT-AC Academic Core M/H/CT-	0	0	0	0	0	0	0	0
SE Spec. Ed./Student Svs. M/H/CT-	0	0	0	0	0	0	0	0
AD Administration	0	0	0	na	na	na	0	0
M/H/CT-MC Media Center	0	0	0	na	na	na	0	0
M/H-VA Visual Arts	0	0	0	na	na	na	0	0
M/H-MU Music	0	0	0	na	na	na	0	0
M/H-TE Technology Education	0	0	0	na	na	na	0	0
M/H-BE Business Education	0	0	0	na	na	na	0	0
M/H-FCS Family and Consumer Science	0	0	0	na	na	na	0	0
M/H-PE Physical Education	0	0	0	na	na	na	0	0
M/H/CT-SD Student Dining	0	0	0	na	na	na	0	0
M/H/CT-FS Food Service	0	0	0	na	na	na	0	0
M/H/CT-CU Custodial	0	0	0	na	na	na	0	0
Net Core Space	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
M/H/CT-BS Building Services	0	0	0	na	na	na	0	0
Total Core Space	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Construction Factor (11%)	0	0	0	0		0	0	0
Actual Gross Core Space Developed	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
							na	See Note 1
Minus existing co-funded Oversize Area from Master Plan								See Note 2
Adjusted Existing Area		**0**			**0**			
Total Adjusted Gross Square Footage Developed (without Oversize Area)			**0**			**0**	**0**	
Maximum Gross Core SF Co-Funded			0			0	0	
Difference			**0**			**0**	**0**	

CAREER TECHNICAL PROGRAM SPACE ONLY

Career Technical Program Spaces	Total Lab Spaces Developed	Students Type A & C NEW	Students Type A & C Existing*	Students Type A & C TOTAL	OSDM Recommendation SF	OSDM Recommendation # of Labs
CT-P1 Program Type 1	0	0	0	0	0	0
CT-P2 Program Type 2	0	0	0	0	0	0
CT-P3 Program Type 3	0	0	0	0	0	0
CT-P4 Program Type 4	0	0	0	0	0	0
CT-P5 Program Type 5	0	0	0	0	0	0
CT-P6 Program Type 6	0	0	0	0	0	0
CT-P7 Program Type 7	0	0	0	0	0	0
Net CT Program Spaces	**0**	**0**	**0**	**0**	**0**	**0**
CT Building Services		0	0	0		
Total CT Program Space		**0**	**0**	**0**		
CT Construction Factor (11%)		0		0		
Actual Gross CT Program Space Developed		**0**	**0**	**0**		
Maximum Gross CT Program SF Co-Funded				0		
Difference				**0**		

Total Gross Square Feet Co-Funded	**0**
Total Gross Square Feet Developed-Core & CT Program	**0**
Difference / Locally Funded Initiative	**0**

Worksheet Notes

1: Existing Gross Square Feet taken from master facility plan.
2: Oversize Area taken from master facility plan.
* Existing SF columns are to be used in projects with building additions or renovations.

The following is an example of a Comprehensive 6-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	Used for this example:
M-AC-1	Middle School Classroom	7	900	6,300	278 MS students
M-AC-2	Project Laboratory	1	1,100	1,100	372 HS students
M-AC-3	***Sci/Tech/Math/Computer Lab***	***0***	***1,000***	***0***	
M-AC-4	Teacher Prep Area/Workroom	1	300	300	See Note 2
M-AC-5	Individual Restroom	1	60	60	
M-AC-6	Instructional Material Storage	1	***200***	200	See Note 3
M-AC-7	***Small Group Room***	***0***	***150***	***0***	
M-AC-7a	***Small Group Room***	***0***	***150***	***0***	***See Note 4***
M-AC-8	***Multi-use Studio***	***0***	***1,500***	***0***	***See Note 4***
M-AC-9	***Kinesthetic Learning Studio***	***1***	***1,200***	***1,200***	***See Note 4***
H-AC-1	High School Classroom	6	900	5,400	
H-AC-2	Science Classroom - General Physics	1	1,200	1,200	
H-AC-3	Science Classroom - Chemistry	1	1,200	1,200	
H-AC-4	Science Classroom - Biology	1	1,200	1,200	
H-AC-5	Science Prep	2	200	400	See Note 1
H-AC-6	Teacher Prep Area/Workroom	1	300	300	See Note 2
H-AC-7	Individual Restroom	1	60	60	
H-AC-8	Project Classroom	1	1,000	1,000	
H-AC-9	Small Group Room	1	150	150	
H-AC-10	Instructional Material Storage	1	50	50	See Note 3
H-AC-11	Multi-Use Room	0	1,500	0	
H-AC-12	Science Laboratory	0	1,000	0	
H-AC-9a	***Small Group Room***	***0***	***150***	***0***	***See Note 4***
H-AC-13	***Multi-use Studio***	***0***	***1,500***	***0***	***See Note 4***
H-AC-14	***Kinesthetic Learning Studio***	***0***	***1,200***	***0***	***See Note 4***
Academic Core Total				***20,120***	

Square Footage Allowance Notes			
Enroll	1	2	3
350-450	300	300	50
451-800	300	300	100
801-1200	400	400	150
1201-1600	400	600	200
Student capacity determines SF			

Academic Core Notes	
Number	*Notes:*
4	*These spaces are provided to encourage the development of student centered learning environments as found in Section 1020. Minimum sizes are: M-AC-7a& H-AC-9a=150 SF. M/H Multi-use Studio=1500 SF. M/H Kinesthetic Studio=1200 SF.*

CAREER TECHNICAL PROGRAM SPACE EXAMPLE		400 Students			600 Students			800 Students			1000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
CT-AC-1	Academic classroom	7	900	6,300	13	900	11,700	17	900	15,300	22	900	19,800	
CT-AC-2	Computer room	1	1,200	1,200	1	1,200	1,200	2	1,200	2,400	2	1,200	2,400	
CT-AC-3	General Science/Physics	1	1,200	1,200	1	1,200	1,200	1	1,200	1,200	2	1,200	2,400	
CT-AC-4	Biology	1	1,200	1,200	1	1,200	1,200	2	1,200	2,400	2	1,200	2,400	
CT-AC-5	Chemistry	1	1,200	1,200	1	1,200	1,200	1	1,200	1,200	1	1,200	1,200	
CT-AC-6	Science Prep	1	300	300	2	300	600	2	300	600	3	300	900	See Note 1
CT-AC-7	Teacher Prep/workroom	3	300	900	4	300	1,200	4	300	1,200	4	400	1,600	See Note 2
CT-AC-8	Individual restroom	2	60	120	2	60	120	4	60	240	4	60	240	
CT-AC-9	Small group room	2	140	280	2	140	280	3	137	410	3	137	410	
CT-AC-10	Instructional material storage	4	50	200	4	75	300	4	100	400	4	120	480	See Note 3
CT-AC-11	Multipurpose room	1	1,500	1,500	1	1,500	1,500	1	1,500	1,500	1	1,500	1,500	
CT-AC-12	Science Laboratory	0	1,000	0	0	1,000	0	0		0	0	1,000	0	
Academic Core Total				14,400			20,500			26,850			33,330	

Middle School 6-8 Students	0
High School 9-12 Students	0
Total Non-CT Students	0

Square Footage Allowance Notes			
Enroll	1	2	3
350-450	300	300	50
451-800	300	300	100
801-1200	400	400	150
1201-1600	400	600	200
Student capacity determines SF			

Academic Core Notes	
Number	*Notes:*
4	*These spaces are provided to encourage the development of student centered learning environments as found in Section 1020. Minimum sizes are: M-AC-7a& H-AC-9a=150 SF. M/H Multi-use Studio=1500 SF. M/H Kinesthetic Studio=1200 SF.*

Academic Core Worksheet

		0 M & HS students - *Students Type E*									0 HS students - *Students Type A & B*									0 COMBINED				OSDM Recommendation			
		New			Existing*			TOTAL			New			Existing			TOTAL			TOTAL							
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area		Qty	SF	Area
M-AC-1	Middle School Classroom		900	0			0	0	varies	0										0	varies	0			900	0
M-AC-2	Project Laboratory		1,000	0			0	0	varies	0										0	varies	0			1,000	0
M-AC-3	Sci/Tech/Eng/Math/Computer Lab		1,000	0			0	0	varies	0										0	varies	0			1,000	0
M-AC-4	Teacher Prep Area/Workroom		300	0			0	0	varies	0										0	varies	0	See Note 2		300	0
M-AC-5	Individual Restroom		60	0			0	0	varies	0										0	varies	0			50	0
M-AC-6	Instructional Material Storage		50	0			0	0	varies	0										0	varies	0	See Note 3		50	0
M-AC-7	***Small Group Room***		***150***	***0***			***0***	***0***	***varies***	***0***										***0***	***varies***	***0***			***150***	***0***
M-AC-7a	***Small Group Room***		***150***	***0***			***0***	***0***	***varies***	***0***										***0***	***varies***	***0***	***See Note 4***		***150***	***0***
M-AC-8	***Multi-use Studio***		***1,500***	***0***			***0***	***0***	***varies***	***0***										***0***	***varies***	***0***	***See Note 4***		***1,500***	***0***
M-AC-9	***Kinesthetic Learning Studio***		***1,200***	***0***			***0***	***0***	***varies***	***0***										***0***	***varies***	***0***	***See Note 4***		***1,200***	***0***
H/CT-AC-1	Academic Classroom		900	0			0	0	varies	0		900	0			0	0	varies	0	0	varies	0			900	0
H-AC-2/CT-AC-3	Science Classroom - General Physics		1,200	0			0	0	varies	0		1,200	0			0	0	varies	0	0	varies	0			1,200	0
H/CT-AC-4	Science Classroom - Chemistry		1,200	0			0	0	varies	0		1,200	0			0	0	varies	0	0	varies	0			1,200	0
H-AC-3/CT-AC-5	Science Classroom - Biology		1,200	0			0	0	varies	0		1,200	0			0	0	varies	0	0	varies	0			1,200	0
H-AC-5/CT-AC-6	Science Prep		300	0			0	0	varies	0		300	0			0	0	varies	0	0	varies	0	See Note 1		300	0
H-AC-6/CT-AC-7	Teacher Prep Area/Workroom		300	0			0	0	varies	0		300	0			0	0	varies	0	0	varies	0	See Note 2		300	0
H-AC-7/CT-AC-8	Individual restroom		60	0			0	0	varies	0		60	0			0	0	varies	0	0	varies	0			60	0
H/CT-AC-9	Small group room		150	0			0	0	varies	0		***150***	0			0	0	varies	0	0	varies	0			150	0
H/CT-AC-10	Instructional Material Storage		50	0			0	0	varies	0		50	0			0	0	varies	0	0	varies	0	***See Note 3***		***50***	0
H/CT-AC-11	Multipurpose room		1,500	0			0	0	varies	0		1,500	0			0	0	varies	0	0	varies	0			1,500	0
H/CT-AC-12	Science Laboratory		1,000	0			0	0	varies	0		1,000	0			0	0	varies	0	0	varies	0			1,000	0
H-AC-8	Project/Classroom		1,100	0			0	0	varies	0										0	varies	0			1,100	0
CT-AC-2	Computer room											1,200	0			0	0	varies	0	0	varies	0			1,200	0
H-AC-9a	***Small Group Room***		***150***	***0***			***0***	***0***	***varies***	***0***		***150***	***0***			***0***	***0***	***varies***	***0***	***0***	***varies***	***0***	***See Note 4***		***150***	***0***
H-AC-13	***Multi-use Room***		***1,500***	***0***			***0***	***0***	***varies***	***0***		***1,500***	***0***			***0***	***0***	***varies***	***0***	***0***	***varies***	***0***	***See Note 4***		***1,500***	***0***
H-AC-14	***Kinesthetic Learning Studio***		***1,200***	***0***			***0***	***0***	***varies***	***0***		***1,200***	***0***			***0***	***0***	***varies***	***0***	***0***	***varies***	***0***	***See Note 4***		***1,200***	***0***
Academic Core Total				***0***			***0***			***0***			***0***			***0***			***0***			***0***				***0***

Academic Core Notes
* The Existing SF columns are to be used in projects where there are to be building additions or renovations.

The following is an example of a Comprehensive 6-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
M/H-SE-1	Self-contained Classroom	1	900	900	See Note 1
M/H-SE-2	Workroom/Conference	1	150	150	See Note 2
M/H-SE-3	Restroom/Shower	1	100	100	
M/H-SE-4	Special Education/Resource	1	900	900	See Note 3
M/H-SE-5	Small Self-contained Classroom	1	600	600	
Special Education Total				**2,650**	

Note: Special Education spaces are determined by using the bracketing table for each type of student.

PROGRAM SPACE EXAMPLE		400 Students			600 Students			800 Students			1000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
CT-SE-1	Classroom	1	900	900	1	900	900	2	900	1,800	2	900	1,800	See Note 1
CT-SE-2	Workroom/conference	1	150	150	1	150	150	2	150	300	2	150	300	See Note 2
CT-SE-3	Restroom/shower	1	100	100	1	100	100	1	100	100	1	100	100	
CT-SE-4	Career Technical Evaluation	1	1,200	1,200	1	1,200	1,200	1	1,200	1,200	2	1,200	2,400	
CT-SE-5	Career Technical Office	1	120	120	1	120	120	1	120	120	2	120	240	
CT-SE-6	Small group room	1	360	360	1	360	360	1	360	360	1	360	360	
CT-SE-7	Job training Office	1	120	120	1	120	120	2	120	240	2	120	240	
CT-SE-8	Resource room	1	900	900	1	900	900	1	900	900	1	900	900	See Note 3
CT-SE-9	Storage	1	150	150	1	150	150	1	150	150	1	150	150	
Spec. Ed./Student Services Total				**4,000**			**4,000**			**5,170**			**6,490**	

Middle School 6-8 Students	0
High School 9-12 Students	0
Total Non-CT Students	0

Sp. Ed./Stud. Svcs. Worksheet		0 MS & HS students - *Students Type E*						0 HS students - *Students Type A & B*						0 COMBINED			OSDM Recommendation		
		New			Existing*		TOTAL	New			Existing*		TOTAL	TOTAL					
Space		Qty	SF	Area	Qty	SF Area	Qty SF Area	Qty	SF	Area	Qty	SF Area	Qty SF Area	Qty	SF	Area	Qty SF	Area	
M/H/CT-SE-1	***Self-contained Classroom***		900	0		0	0 varies 0		900	0		0	0 varies 0	0	varies	0	900	0	***See Note 1***
M/H/CT-SE-2	***Workroom/Conference***		150	0		0	0 varies 0		150	0		0	0 varies 0	0	varies	0	150	0	***See Note 2***
M/H/CT-SE-3	Restroom/shower		100	0		0	0 varies 0		100	0		0	0 varies 0	0	varies	0	100	0	
M/H-SE-4/CT-SE-8	***Resource room***		900	0		0	0 varies 0		900	0		0	0 varies 0	0	varies	0	900	0	***See Note 3***
M/H-SE-5	Small Self-Contained Classroom		600	0		0	0 varies 0		600	0		0	0 varies 0	0	varies	0	***600***	0	
CT-SE-4	Career Technical Evaluation								1,200	0		0	0 varies 0	0	varies	0	1,200	0	
CT-SE-5	Career Technical Office								120	0		0	0 varies 0	0	varies	0	120	0	
CT-SE-6	Small group room								360	0		0	0 varies 0	0	varies	0	360	0	
CT-SE-7	Job training Office								120	0		0	0 varies 0	0	varies	0	120	0	
CT-SE-9	Storage								150	0		0	0 varies 0	0	varies	0	150	0	
Spec. Ed./Student Services Total				**0**			**0**			**0**			**0**			**0**			**0**

Special Education Notes	
Number	Notes:
	Self-contained classroom(s) could 'house' various special education programs including, but not limited to, cognitive disability, emotional disturbance, multiple disabilities, etc.
	Workroom/Conference could 'house' orthopedic impairment, autism, speech therapy, occupational therapy, and physical therapy.
	Special Education/Resource could 'house' cognitive disability, hearing impairment, visual impairment, emotional disturbance, orthopedic impairment, autistic, traumatic, brain injury, learning disability, deaf/blindness, etc. See Chapter 1, Section 1110 for more information.
*	*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive 6-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
M/H-AD-1	Reception Area	1	300	300	See Note 1
M/H-AD-2	Secretarial Area	1	250	250	See Note 2
M/H-AD-3	Principal's Office	1	150	150	
M/H-AD-4	Assistant Principal's Office	1	120	120	
M/H-AD-5	Conference Room	1	250	250	
M/H-AD-6	Mail/Work/Copy Room	1	200	200	See Note 3
M/H-AD-7	Administrative Storage	1	82	82	See Note 4
M/H-AD-8	Vault/Records Storage	1	***100***	100	See Note 5
M/H-AD-9	In-school Suspension	1	300	300	***See Note 10***
M/H-AD-10	Restroom	***2***	60	120	
M/H-AD-11	Guidance Counselor's Office	2	120	240	
M/H-AD-12	Guidance Records/Storage	1	75	75	***See Note 6***
M/H-AD-13	Guidance Conference Room	1	200	200	***See Note 7***
M/H-AD-14	Parent/Volunteer Room	0	150	0	***See Note 8***
M/H-AD-15	Health Clinic (includes restroom)	1	350	350	***See Note 9***
M/H-AD-16	Itinerant Personnel Office	1	120	120	
M/H-AD-17	Guidance Conf. & Career Ctr.	1	200	200	See Note 11
Administrative Total				**3,057**	

Note: Non-career technical students and career technical students are combined to determine the bracketing.

Middle School 6-8 Students	0
High School 9-12 Students	0
Total Students	0

Administrative Worksheet		0 MS & HS students - COMBINED									OSDM Recommendation		
		New			Existing*			TOTAL					
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
M/H/CT-AD-1	Reception area		200	0			0	0	varies	0		200	0 See Note 1
M/H/CT-AD-2	Secretarial space		200	0			0	0	varies	0		200	0 See Note 2
M/H/CT-AD-3	Director/Principal's office		150	0			0	0	varies	0		150	0
M/H/CT-AD-4	Asst. Dir./Principal office		120	0			0	0	varies	0		120	0
M/H-AD-5/CT-AD-7	Conference room		250	0			0	0	varies	0		250	0
M/H-AD-6/CT-AD-8	Mail/work/copy room		200	0			0	0	varies	0		200	0 See Note 3
M/H-AD-7/CT-AD-9	Administrative Storage		150	0			0	0	varies	0		150	0 See Note 4
M/H-AD-8/CT-AD-10	Vault/records		***85***	0			0	0	varies	0		***85***	0 See Note 5
M/H-AD-10/CT-AD-11	Restroom		60	0			0	0	varies	0		60	0
MH-AD-11/CT-AD-12	Guidance counselor		120	0			0	0	varies	0		120	0
M/H-AD-12/CT-AD-13	Guidance records/storage		100	0			0	0	varies	0		100	0 See Note 6
M/H-AD-13/CT-AD-14	Guidance conference M/H-		150	0			0	0	varies	0		150	0 See Note 7
AD-14/CT-AD-15	Parent/volunteer		200	0			0	0	varies	0		200	0 See Note 8
M/H-AD-15/CT-AD-16	Health clinic (includes restroom)		400	0			0	0	varies	0		400	0 See Note 9
M/H-AD-16/CT-AD-17	Itinerant personnel		120	0			0	0	varies	0		120	0
M/H-AD-09/CT-AD-18	In-school suspension		200	0			0	0	varies	0		200	0 See Note 10
M/H-AD-17	Guidance Conf. & Career Ctr.		***300***	0			0	0	varies	0		300	0 See Note 11
CT-AD-5	Supervisor's office		120	0			0	0	varies	0		120	0
CT-AD-6	Coordinator's office		120	0			0	0	varies	0		120	0
Administrative Total				**0**			**0**			**0**			**0**

Administrative Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

Administrative Notes											
Student Enrollment	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
350-450 Students	200	200	200	150	***85***	100	150	200	400	200	300
451-800 Students	400	400	300	150	***115***	100	200	300	450	325	400
801-1200 Students	500	500	400	200	***145***	200	250	400	500	450	500
1201-1600 Students	600	600	500	200	***175***	200	250	400	550	575	700
Enrollment determines SF allowed											

The following is an example of a Comprehensive 6-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
M-MC-1	Reading Room/Circulation	1	973	973	See Note 1 - M - 307 Students
M-MC-2	Media Specialist Office	0	120	0	
M-MC-3	Workroom/Storage	1	***150***	150	See Note 2
M-MC-4	Main Control/Equipment Rm	0	300	0	
M-MC-5	Conference Room	0	100	0	***See Note 3***
M-MC-6	Multimedia Production Room	0	500	0	***See Note 4***
H-MC-1	Reading Room/Circulation	1	1,302	1,302	See Note ***7*** - H - 383 Students
H-MC-2	Media Specialist Office	1	120	120	
H-MC-3	Workroom/Storage	1	***200***	200	See Note 5
H-MC-4	Main Control/Equipment Rm	1	300	300	
H-MC-5	Conference Room	1	250	250	
H-MC-6	Multimedia Production Room	1	***330***	330	
H-MC-7	Document Storage	1	100	100	See Note 6
H-AC-9	Small Group Room	***0***	***160***	0	***See Note 7***
Media Center Total				**3,725**	

Note: Non-career technical students and career technical students are combined to determine the bracketing.

Middle School 6-8 Students	0
High School 9-12 Students	0
Total Students	0

Middle School SF Allowance Notes			
Student Enrollment	**2**	**3**	**4**
350-450 Students	150	***210***	***400***
451-600 Students	***233***	***280***	***400***
601-750 Students	***340***	***310***	***500***
Enrollment Determines SF Allowed			

High School SF Allowance Notes			
Student Enrollment	**5**	**6**	**7**
350-450 Students	300	***200***	***160***
451-800 Students	400	***300***	***260***
801-1200 Students	500	***300***	***280***
1201-1600 Students	600	***400***	***330***
Enrollment Determines SF Allowed			

Media Center Notes

1: The size of the reading room/circulation space is equal to 10% of the middle school student ***enrollment*** multiplied by 35 SF per student.
7 : The size of the reading room/circulation space is equal to 10% of the high school (or 6-12) student ***enrollment*** multiplied by 35 SF per student.
*The Existing SF columns are to be used in projects where there are

Media Center Worksheet

0 MS & HS students - COMBINED

		New			Existing*			TOTAL			OSDM Recommendation			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-MC-1	Reading Room/Circulation		0	0			0	0	varies	0		0	0	See Note 1 - M - 307 Students
M-MC-2	Media Specialist Office		120	0			0	0	varies	0		120	0	
M-MC-3	Workroom/Storage		***150***	0			0	0	varies	0		***150***	0	See Note 2
M-MC-4	Main Control/Equipment Rm		300	0			0	0	varies	0		300	0	
M-MC-5	Conference Room		***210***	0			0	0	varies	0		***210***	0	***See Note 3***
M-MC-6	Multimedia Production Room		***400***	0			0	0	varies	0		***400***	0	***See Note 4***
H/CT-MC-1	Reading Room/Circulation		0	0			0	0	varies	0		0	0	See Note ***7*** - H - 383 Students
H/CT-MC-2	Media Specialist Office		120	0			0	0	varies	0		120	0	
H/CT-MC-3	Workroom/Storage		300	0			0	0	varies	0		300	0	See Note 5
H/CT-MC-4	Main Control/Equipment Rm		300	0			0	0	varies	0		300	0	
H-MC-5	Conference Room		250	0			0	0	varies	0		250	0	
H-MC-6	Multimedia Production Room		500	0			0	0	varies	0		500	0	
H-MC-7	Document Storage		***200***	0			0	0	varies	0		***200***	0	See Note 6
H-AC-9	Small Group Room		***160***	0			0	0	varies	0		***160***	**0**	***See Note 7***
Media Center Total				**0**			**0**			**0**			**0**	

The following is an example of a Comprehensive 6-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
M-VA-1	Middle School Art Room	1	1,200	1,200	See Note 1
M-VA-2	Kiln/Ceramic Storage	0	100	0	See Note 2
M-VA-3	Art Material Storage	1	100	100	See Note 3
H-VA-1	High School Art Room	1	1,200	1,200	See Note 1
H-VA-2	Kiln/Ceramic Storage	1	150	150	See Note 2
H-VA-3	Art Material Storage	1	150	150	See Note 4
Visual Arts Total				**2,800**	

Visual Art SF Allowance Notes		
Student Enrollment	1	2
350-450 Students	1200	100
451-600 Students	1200	200
601-800 Students	1200	200
Above 801 Students	1400	200
Enrollment Determines SF Allowed		

MS SF Allowance Notes	
Student Enrollment	3
350-450 Students	100
451-600 Students	150
601-800 Students	200
Above 801 Students	200
Enrollment Determines SF Allowed	

HS or 6-12 SF Allowance Notes	
Student Enrollment	4
350-450 Students	200
451-600 Students	300
601-800 Students	300
Above 801 Student	300
Enrollment Determines SF Allowed	

Note: Only non-career technical students are used to determine the bracketing.

Middle School 6-8 Students	0
High School 9-12 Students	0
Total Non-CT Students	0

Visual Art Worksheet	0 MS & HS students - *Students Type E*									OSDM Recommendation			
	New			Existing*			TOTAL						
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-VA-1	Middle School Art Room		1,200	0			0	0	varies	0		1,200	0	See Note 1
M-VA-2	Kiln/Ceramic Storage		100	0			0	0	varies	0		100	0	See Note 2
M-VA-3	Art Material Storage		100	0			0	0	varies	0		100	0	See Note 3
H-VA-1	Art Room		1,200	0			0	0	varies	0		1,200	0	See Note 1
H-VA-2	Kiln/Ceramic Storage		100	0			0	0	varies	0		100	0	See Note 2
H-VA-3	Art Material Storage		200	0			0	0	varies	0		200	0	See Note 4
Visual Arts Total				**0**			**0**			**0**			**0**	

Visual Art Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive 6-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS				
Space	Qty	SF	Area	
M-MU-1 Instrumental Room	*1*	1,200	1,200	See Note 1
M-MU-2 Vocal Room	0	1,200	0	
M-MU-3 Music Library	1	150	150	**M - 278 Students**
H-MU-1 Instrumental Room	1	1,800	1,800	See Note 2
H-MU-2 Instrument Storage	1	350	350	See Note 3
H-MU-3 Orchestra Storage	0	250	0	See Note 4
H-MU-4 Instrumental Music Office/Librar	1	120	120	
H-MU-5 Uniform Storage	0	200	0	See Note 5 - H - 372 Students
H-MU-6 Vocal Room	0	1,150	0	See Note 6
H-MU-7 Vocal Storage	0	200	0	See Note 7
H-MU-8 Vocal Music Office/Library	1	120	120	
H-MU-9 Ensemble Room	1	200	200	See Note 8
H-MU-10 Practice Room	1	80	80	
Music Total			**4,020**	

MS Ft. Allowance Notes	
Student Enrollment	**1**
350-450 Students	1400
451-650 Students	1500
Above 651 Students	1600
Enrollment Determines SF Allowed	

High School or 6-12 Square Footage Allowance Notes							
Student Enrollment	**2**	**3**	**4**	**5**	**6**	**7**	**8**
350-450 Students	1800	400	200	150	1200	150	200
451-800 Students	2000	500	250	200	1200	200	300
801-1200 Students	2500	600	250	300	1200	300	300
Above 1201 Students	3000	700	350	300	1500	300	300
Enrollment Determines SF Allowed							

Note: Only non-career technical students are used to determine the bracketing.

Middle School 6-8 Students	0
High School 9-12 Students	0
Total Non-CT Students	0

Music Worksheet	0 MS & HS students - *Students Type E*									
	New			Existing*			TOTAL			OSDM Recommendation
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-MU-1 Instrumental Room		1,400	0			0	0	varies	0		1,400	0	See Note 1
M-MU-2 Vocal Room		1,200	0			0	0	varies	0		1,200	0	
M-MU-3 Music Library		200	0			0	0	varies	0		200	0	**M - 278 Students**
H-MU-1 Instrumental Room		1,800	0			0	0	varies	0		1,800	0	See Note 2
H-MU-2 Instrument Storage		400	0			0	0	varies	0		400	0	See Note 3
H-MU-3 Orchestra Storage		200	0			0	0	varies	0		200	0	See Note 4
H-MU-4 Instrumental Music Office/Librar y		120	0			0	0	varies	0		120	0	
H-MU-5 Uniform Storage		150	0			0	0	varies	0		150	0	See Note 5 - H - 372 Students
H-MU-6 Vocal Room H-		1,200	0			0	0	varies	0		1,200	0	See Note 6
MU-7 Vocal Storage		150	0			0	0	varies	0		150	0	See Note 7
H-MU-8 Vocal Music Library		120	0			0	0	varies	0		120	0	
H-MU-9 Ensemble Room		200	0			0	0	varies	0		200	0	See Note 8
H-MU-10 Practice Room		80	0			0	0	varies	0		80	0	
Music Total			**0**			**0**			**0**			**0**	

Music Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive 6-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS				
Space	Qty	SF	Area	
M-TE-1a Modular Technology Lab	1	1,300	1,300	
M-TE-1b Production Lab	0	1,300	0	
M-TE-2 Storage	1	150	150	See Note 1
H-TE-1 Modular Technology Lab	1	1,800	1,800	
H-TE-1a Ag-Ed Lab	0	1,800	0	
H-TE-2 Storage	1	100	100	
H-TE-3 CAD Lab	0	1,200	0	See Note 1
H-TE-4 Production Lab	0	1,600	0	
Technology Education Total			**3,350**	

S or 6-12 Sq. Ft. Allowance Note	
Student Enrollmen	1
350-450 Students	150
451-800 Students	200
801-1200 Students	200
1201-1600 Student	200
Enrollment Determines SF Allowed	

Note: Only non-career technical students are used to determine the bracketing.

Middle School 6-8 Students	0
High School 9-12 Students	0
Total Non-CT Students	0

Tech. Ed. Worksheet	0 MS & HS students - *Students Type E*									OSDM Recommendation			
	New			Existing*			TOTAL						
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-TE-1a Modular Technology Lab		1,300	0			0	0	varies	0		1,300	0	
M-TE-1b Production Lab		1,300	0			0	0	varies	0		1,300	0	
M-TE-2 Storage		150	0			0	0	varies	0		150	0	See Note 1
H-TE-1 Modular Technology Lab		1,800	0			0	0	varies	0		1,800	0	
or													
H-TE-1a Ag-Ed Lab		1,800	0			0	0	varies	0		1,800	0	
H-TE-2 Storage		150	0			0	0	varies	0		150	0	See Note 1
H-TE-3 CADD Lab		1,200	0			0	0	varies	0		1,200	0	
H-TE-4 Production Lab		1,600	0			0	0	varies	0		1,800	0	
Technology Education Total			**0**			**0**			**0**			**0**	

Technology Education Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive 6-12 School including Career Technical Programs
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS				
Space	**Qty**	**SF**	**Area**	
H-BE-1 Computer and Business Classroom	0	1,200	0	
H-BE-2 Marketing Classroom	0	900	0	
H-BE-3 Workroom/Storage	0	100	0	See Note 1
Business Education Total			**0**	

SF Allowance Notes	
Student Enrollment	**1**
350-450 Students	100
451-800 Students	200
801-1200 Students	250
1201-1600 Students	300
Enrollment Determines SF Allowe	

Note: Only non-career technical students are used to determine the bracketing.

Middle School 6-8 Students	0
High School 9-12 Students	0
Total Non-CT Students	0

Bus. Ed. Worksheet	**0** MS & HS students - *Students Type E*									OSDM Recommendation			
	New			Existing*			TOTAL						
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
H-BE-1 Computer and Business Classroom		1,200	0			0	0	varies	0		1,200	0	
H-BE-2 Marketing Classroom		900	0			0	0	varies	0		900	0	
H-BE-3 Workroom/Storage		100	0			0	0	varies	0		100	0	See Note 1
Business Education Total			**0**			**0**			**0**			**0**	

Business Education Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive 6-12 School including Career Technical Programs
The example is intended to assist in the development of the summary of spaces

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
M-FCS-1	Life Skills Lab	1	1,100	1,100	
M-FCS-2	Life Skills Storage	0	100	0	
H-FCS-1	Life Skills Lab	1	1,200	1,200	
H-FCS-2	Life Skills Storage	1	200	200	See Note 1
H-FCS-3	Laundry	1	150	150	
H-FCS-4	Child Development	0	1,200	0	
Family and Consumer Science Total				**2,650**	

SF Allowance Notes	
Student Enrollment	**1**
350-450 Students	200
451-800 Students	250
801-1200 Students	300
1201-1600 Students	350
Enrollment Determines SF Allowe	

Note: Only non-career technical students are used to determine the bracketing.

Middle School 6-8 Students	0
High School 9-12 Students	0
Total Non-CT Students	0

F & C Sci. Workshee	0 MS & HS students - *Students Type E*									OSDM Recommendation			
		New			Existing*			TOTAL					
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M-FCS-1	Life Skills Lab		1,100	0			0	0	varies	0		1,100	0	
M-FCS-2	Life Skills Storage		100	0			0	0	varies	0		100	0	
H-FCS-1	Life Skills Lab		1,200	0			0	0	varies	0		1,200	0	
H-FCS-2	Life Skills Storage		200	0			0	0	varies	0		200	0	See Note 1
H-FCS-3	Laundry		150	0			0	0	varies	0		150	0	
H-FCS-4	Child Development		1,200	0			0	0	varies	0		1,200	0	
Family and Consumer Science Total				**0**			**0**			**0**			**0**	

Family & Consumer Science Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive 6-12 School including Career Technical Programs
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS				
Space	**Qty**	**SF**	**Area**	
M-PE-1 Gymnasium	1	***5,500***	5,500	See Note 1 - M - 278 Students
M-PE-2 Auxiliary Gymnasium	***0***	***0***	***0***	***See Note 13***
M-PE-3 P.E./Athletic Office	2	75	150	
M-PE-4 Staff Shower	2	75	150	
M-PE-5 Student Locker Room	2	500	1,000	See Note 2
M-PE-6 Student Restroom/Shower	2	250	500	
M-PE-7 Physical Education Storage	1	200	200	See Note 3
H-PE-1 Gymnasium	1	***9,300***	9,300	See Note 4 - H - 372 Students
H-PE-2 Auxiliary Gymnasium	0	7,000	0	See Note 5
H-PE-3 Student Locker Room	2	550	1,100	See Note 6
H-PE-4 Student Restroom/Shower	2	250	500	See Note 7
H-PE-5 Physical Education Storage	1	400	400	See Note 8
H-PE-6 P.E./Athletic Office	2	75	150	
H-PE-7 Staff Shower	2	75	150	
H-PE-8 Athletic Director's Office	0	120	0	
H-PE-9 Lobby Services	1	200	200	See Note 9
H-PE-10 Training Room	1	250	250	See Note 10
H-PE-11 Physical Health Classroom	0	750	0	See Note 11
H-PE-12 Multi-use P.E. Room	0	1,000	0	See Note 12
Physical Education Total			**19,550**	

Middle School Sq. Ft. Allowance Notes			
Student Enrollmen	**1**	**2**	**3**
350-450 Students	7000	***600***	***300***
451-600 Students	***7500***	600	***325***
601-750 Students	***8000***	650	500
Enrollment Determines SF Allowed			

High School or 6-12 Square Footage Allowance Notes								
Student Enrollment	**4**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
350-450 Students	***9300***	550	200	400	100	200	750	***1400***
451-800 Students	***10700***	650	250	600	200	300	1500	***1400***
801-1200 Students	***12400***	700	300	800	200	400	1500	***1600***
1201-1600 Students	***14000***	850	350	1000	200	500	2000	***1800***
Enrollment Determines SF Allowed								

Physical Education Notes	
Number	***Notes:***
5	***Auxilary Gym is 7,000 SF regardless of the number of students.***
13	***Auxilary Gym may be selected for student enrollments above 1000 MS students.***

Note: Only non-career technical students are used to determine the bracketing.

Middle School 6-8 Students	0
High School 9-12 Students	0
Total Non-CT Students	0

Phys. Ed. Worksheet	**0 MS & HS students - *Students Type E***									**OSDM Recommendation**			
	New			**Existing***			**TOTAL**						
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
M-PE-1 Gymnasium		***7,000***	0			0	0	varies	0		***7,000***	0	See Note 1 - M - 278 Students
M-PE-2 Auxiliary Gymnasium		***0***	***0***			***0***	***0***	***varies***	***0***		***0***	***0***	***See Note 13***
M-PE-3 P.E./Athletic Office		75	0			0	0	varies	0		75	0	
M-PE-4 Staff Shower		75	0			0	0	varies	0		75	0	
M-PE-5 Student Locker Room		***600***	0			0	0	varies	0		***600***	0	See Note 2
M-PE-6 Student Restroom/Shower ***M-***		250	0			0	0	varies	0		250	0	
PE-7 Physical Education Storage H-		***300***	0			0	0	varies	0		***300***	0	See Note 3
PE-1 Gymnasium		***9,300***	0			0	0	varies	0		***9,300***	0	See Note 4 - H - 372 Students
H-PE-2 Auxiliary Gymnasium		7,000	0			0	0	varies	0		7,000	0	See Note 5
H-PE-3 Student Locker Room		550	0			0	0	varies	0		550	0	See Note 6
H-PE-4 Student Restroom/Shower H-		200	0			0	0	varies	0		200	0	See Note 7
PE-5 Physical Education Storage H-		400	0			0	0	varies	0		400	0	See Note 8
PE-6 P.E./Athletic Office		75	0			0	0	varies	0		75	0	
H-PE-7 Staff Shower		75	0			0	0	varies	0		75	0	
H-PE-8 Athletic Director's Office		120	0			0	0	varies	0		120	0	
H-PE-9 Lobby Services		100	0			0	0	varies	0		100	0	See Note 9
H-PE-10 Training Room		200	0			0	0	varies	0		200	0	See Note 10
H-PE-11 Physical Health Classroom		750	0			0	0	varies	0		750	0	See Note 11
H-PE-12 Multi-use P.E. Room		***1,400***	0			0	0	varies	0		***1,400***	0	See Note 12
Physical Education Total			**0**			**0**			**0**			**0**	

Physical Education Notes
Note 5: Auxiliary gymnasium is 7,000 SF regardless of the number of students.
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

CHAPTER 2: BRACKETING

The following is an example of a Comprehensive 6-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
M/H-SD-1	Student Dining	1	3,792	3,792	See Note 1
M/H-SD-2	Stage	1	1,000	1,000	See Note 2
M/H-SD-7	Staff Dining	0	400	0	See Note 3
M/H-SD-8	Table Storage	1	400	400	See Note 4
H-SD-3	Scene Shop and Storage	1	350	350	See Note 5
H-SD-4	Make-up/Dressing Rooms	2	200	400	See Note 6
H-SD-5	Theatrical Control Room	1	150	150	
H-SD-6	Drama Storage	1	***300***	300	See Note 7
H-SD-9/CT-SD-5	Family Restroom	1	80	80	
Student Dining Total				**6,472**	

Square Foot Allowance Notes		
Student Enrollment	**3**	4
350-500 Students	250	300
501-700 Students	400	400
701-900 Students	550	500
Above 901 Students	700	600
Enrollment Determines SF Allowed		

High School Sq. Ft. Allowance Notes			
Student Enrollment	**5**	**6**	**7**
350-450 Students	400	200	200
451-800 Students	450	250	400
801-1200 Students	500	250	500
Above 1201 Students	600	300	600
Enrollment Determines SF Allowed			

Note: Non-career technical students and career technical students are combined to determine the bracketing.

Middle School 6-8 Students	0
High School 9-12 Students	0
Total Students	0

Student Dining Worksheet

0 MS & HS students - COMBINED

Space		New Qty	New SF	New Area	Existing* Qty	Existing* SF	Existing* Area	TOTAL Qty	TOTAL SF	TOTAL Area	OSDM Recommendation Qty	OSDM Recommendation SF	OSDM Recommendation Area	
M/H/CT-SD-1	Student Dining		3,000	0			0	0	varies	0		3,000	0	See Note 1
M/H/CT-SD-2	Stage		1,000	0			0	0	varies	0		1,000	0	See Note 2
M/H-SD-7/CT-SD-3	Staff Dining		250	0			0	0	varies	0		250	0	See Note 3
M/H-SD-8/CT-SD-4	Table Storage		300	0			0	0	varies	0		300	0	See Note 4
H-SD-3	Scene Shop and Storage		400	0			0	0	varies	0		400	0	See Note 5
H-SD-4	Make-up/Dressing Rooms		200	0			0	0	varies	0		200	0	See Note 6
H-SD-5	Theatrical Control Room		200	0			0	0	varies	0		200	0	
H-SD-6	Drama Storage		200	0			0	0	varies	0		200	0	See Note 7
H-SD-9/CT-SD-5	Family Restroom		80	0			0	0	varies	0		80	0	
							0							
Student Dining Total				**0**			**0**			**0**			**0**	

Student Dining Notes

1: The size of the student dining space is equal to one-third of the student ***enrollment*** multiplied by 17.5 SF per student or 3000 SF, whichever is greater.

2: The size of the stage equals student ***enrollment*** multiplied by 2.0 SF, or 1,000 SF, whichever is greater.

*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive 6-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
M/H-FS-0	Warming Kitchen	0	1,300	0	*See Note 1 & Kit. Area Not*
M/H-FS-1	Kitchen (total)	1		2,275	*See Note 2*
M/H-FS-1a	Preparation Area	1	819		*See Kit. Area Note*
M/H-FS-1b	Serving Area	1	774		*See Kit. Area Note*
M/H-FS-1c	Dry Food Storage	1	250		*See Kit. Area Note*
M/H-FS-1d	Cooler/Freezer	1	228		*See Kit. Area Note*
M/H-FS-1e	Ware Washing	1	205		*See Kit. Area Note*
M/H-FS-2	Dietician Office	1	75	75	
M/H-FS-3	Restroom / Locker Room	1	140	140	
Food Service Total				**2,490**	

Kitchen Area Sizes					
Food Service Are	Enroll	X	SF per Studen	x	%
Preparation Area	Enroll	x	3.5	x	36%
Serving Areas	Enroll	x	3.5	x	34%
Dry Food Storage	Enroll	x	3.5	x	11%
Cooler/Freezer	Enroll	x	3.5	x	10%
Ware Washing Ar	Enroll	x	3.5	x	9%
Warming Kitchen	Enroll	x	2.0		
Multiply Enrollment x SF/Student x % to achieve size of area					

Note: Non-career technical students and career technical students are combined to determine the bracketing.

Middle School 6-8 Students	0
High School 9-12 Students	0
Total Students	0

Food Service Worksheet	0 MS & HS students - COMBINED									OSDM Recommendation			
	New			Existing*			TOTAL						
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M/H/CT-FS-0 Warming Kitchen		0	0			0	0	varies	0		0	0	*See Note 1 & Kit. Area Not*
M/H/CT-FS-1 Kitchen (total)			0			0	0	varies	0			0	*See Note 2*
M/H/CT-FS-1a Preparation area		0						varies			0		*See Kit. Area Note*
M/H/CT-FS-1b Serving area		0						varies			0		*See Kit. Area Note*
M/H/CT-FS-1c Dry food storage		0						varies			0		*See Kit. Area Note*
M/H/CT-FS-1d Cooler/freezer		0						varies			0		*See Kit. Area Note*
M/H/CT-FS-1e Ware washing		0						varies			0		*See Kit. Area Note*
M/H/CT-FS-2 Dietician Office		75	0			0	0	varies	0		75	0	
M/H/CT-FS-3 Restroom / Locker Room		140	0			0	0	varies	0		140	0	
Food Service Total			**0**			**0**			**0**			**0**	

Food Services Notes
1: The size of the kitchen is equal to the sum of preparation area, serving area, dry food storage area, cooler/freezer area, and ware washing area.
2 : Only one of the two kitchens is to be used - either***M/H/CT-FS-0 or M/H/CT-FS-1*** - not both.
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive 6-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
M/H-CU-1	Workroom	1	400	400	See Note 1
M/H-CU-2	Custodial Office	1	100	100	
Custodial Total				**500**	

SF Allowance Notes	
Student Enrollment	**1**
Up to 400 Students	200
401-600 Students	***300***
Above 600 Students	400
Enrollment Determines SF Allowed	

Note: Non-career technical students and career technical students are combined to determine the bracketing.

Middle School 6-8 Students	0
High School 9-12 Students	0
Total Students	0

Custodial Worksheet		**0** MS & HS students - COMBINED									OSDM Recommendation			
		New			Existing*			TOTAL						
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M/H/CT-CU-1	Workroom - note 1		200	0			0	0	varies	0		200	0	See Note 1
M/H/CT-CU-2	Custodial Office		100	0			0	0	varies	0		100	0	
Custodial Total				**0**			**0**			**0**			**0**	

Custodial Services Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

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The following is an example of a Comprehensive 6-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 MS, HS< & On-site Career Tech Students-Combined					
Space		Qty	SF	Area	
M/H-BS-1	Large Group Restrooms		2,498	2,498	See Build Svc Area Sizes
M/H-BS-2	Custodial Closet	2	50	100	
M/H-BS-3	Electrical Closet	2	50	100	
M/H-BS-4	Telecommunications Room (TR)	2	64	128	See Note 1
M/H-BS-5	Corridors		14,277	14,277	See Build Svc Area Sizes
M/H-BS-6	Mechanical Rooms/Decks		4,925	4,925	See Build Svc Area Sizes
M/H-BS-7	Storage Area	1	200	200	See SF Allowance Notes
M/H-BS-8	Central Storage Area	1	200	200	See Central Storage-CT Notes
M/H-BS-9	Loading/Receiving Area	1	120	120	
M/H-BS-10	Restroom	0	60	0	
M/H-BS-11	***Recycling Room***	***1***	100	100	See SF Allowance Notes
Building Services Total				**22,648**	

Note: Non-career technical students and career technical students are combined to determine the bracketing.

Bldg. Services Sq. Ft. Allowance Notes			
Student Enrollment	Sto	*Ctl Stor-Non CT*	*Recycle*
350-450 Students	150	170	80
451-800 Students	200	200	100
801-1200 Students	250	220	130
Above 1201 Students	250	240	160
Enrollment Determines SF Allowed			

Central Storage-CT Notes	
Student Enrollment	**Ctl Stor CT**
Up to 400 Students	7.5 SF/Student
400-600 Students	6.6 SF/Student
600-800 Students	5.8 SF/Student
Above 800 Students	5 SF/Student
Enrollment Determines SF Allowed	

Middle School 6-8 Students	0
High School 9-12 (Including On-site CT) Students	0
Total Students	0

Building Svcs. Worksheet		0 MS & HS Academic & On-site Career Techstudents - COMBINED									
		New			Existing*			TOTAL			OSDM Recommendation
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M/H-BS-1/***CT-GS-1 Large Group Restrooms***		-	0	0	-		0	-	varies	0	-	0	0	See Build Svc Area Sizes
M/H-BS-2/CT-GS-2	Custodial Closet		50	0			0	0	varies	0		50	0	
M/H-BS-3/CT-GS-3	Electrical Closet		50	0			0	0	varies	0		50	0	
M/H-BS-4/CT-GS-4	Telecommunications Room		64	0			0	0	varies	0		64	0	See Note 1
M/H-BS-5	Corridors - Non-CT	-	0	0	-		0	-	varies	0	-	0	0	See Build Svc Area Sizes
CT-BS-1	Corridors - CT	-	0	0	-		0	-	varies	0	-	0	0	See Build Svc Area Sizes
	Vertical Circulation	-	***0***	0	-		0	-	varies	0	-	0	0	See Note 2
M/H-BS-6	Mechanical/Electrical Space/Decks - Non-C	-	0	0	-		0	-	varies	0	-	0	0	See Build Svc Area Sizes
CT-BS-2	Mechanical/Electrical Space/Decks - CT	-	0	0	-		0	-	varies	0	-	0	0	See Build Svc Area Sizes
M/H-BS-7/CT-GS-5	Storage Area		150	0			0	0	varies	0		150	0	See SF Allowance Notes
M/H-BS-8	Central Storage Area: Non-CT		170	0			0	0	varies	0		170	0	See SF Allowance Notes
CT-GS-6	Central Storage Area: CT Only		0	0			0	0	varies	0		0	0	See Central Storage-CT Notes
M/H-BS-9/H-GS-7	Loading/Receiving Area		120	0			0	0	varies	0		120	0	
M/H-BS-10	Restroom		60	0			0	0	varies	0		60	0	
M/H-BS-11	Recycling Room		80	0			0	0	varies	0		80	0	See SF Allowance Notes
Building Services - Non-CT Total				**0**			**0**			**0**			**0**	
Building Services - CT Total				***0***			***0***			***0***			***0***	
Building Services Grand Total				**0**			**0**			**0**			**0**	

Building Services Notes	
Number	**Notes:**
	Size of Telecommunications Room varies with size of high school. See page 5113-4, 6114-4.
	Vertical Circulation refers only to the following: Stairways/stairtowers, monumental stairs, elevators and elevator equipment room. The total size of the Vertical Circulation is equal to the sum of the program areas, excluding building services, multiplied by 2.5%.
*	The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

Building Services Area Sizes			
Building Services Areas	**Prog**	**X**	**%**
Large Group Restrooms-Non CT & CT	Prog	x	3.5
Corridors-Non-CT	Acad Prog	x	20.0
Corridors-CT	CT Prog	x	14.0
Mech./Elec. Space/Decks-Non-CT	Acad Prog	x	6.9
Mech./Elec. Space/Decks-CT	CT Prog	x	5.0
Multiply Sum of Prog. Areas - Build. Svcs. x % to achieve size of area			

Lab & Support Space Worksheet		0 students			Students Type A & C						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	CTE Program Code	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
Accounting	G0		1200	0				0	varies	0		1200	0
Administrative and Professional Support	C0		1200	0				0	varies	0		1200	0
Automation & Robotics	R0		1800	0				0	varies	0		1800	0
Aviation Occupations	T4		1500	0				0	varies	0		1500	0
Business Management	C1		1200	0				0	varies	0		1200	0
Electronics	R1		1800	0				0	varies	0		1800	0
Financial Services	G1		1200	0				0	varies	0		1200	0
Information Support and Services	N0		1200	0				0	varies	0		1200	0
Interactive Media	N1		1200	0				0	varies	0		1200	0
Legal Management and Support	C2		1200	0				0	varies	0		1200	0
Medical Management and Support	C3		1200	0				0	varies	0		1200	0
Network Systems	N2		1200	0				0	varies	0		1200	0
Programming & Software Development	N3		1200	0				0	varies	0		1200	0
Telecommunications	F5		1200	0				0	varies	0		1200	0
Travel and Tourism	L2		1200	0				0	varies	0		1200	0
Visual Design and Imaging	B2		1200	0				0	varies	0		1200	0
Total Lab Spaces		**0**			**0**			**0**			**0**		
Related Spaces													
CT-P1-2 Office			120	0				0	varies	0		120	0
CT-P1-3 Storage			200	0				0	varies	0		200	0
Total Program Type 1				**0**						**0**			**0**

Laboratory and Support Spaces Notes
*The Existing SF columns are only to be used in projects where there are to be buildilng additions

Lab & Support Space Worksheet		0 students			Students Type A & C						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	CTE Program	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
	Code												
Allied Health & Nursing	***JM***		***1500***	***0***				***0***	***varies***	***0***		***1500***	***0***
Biomedical Science	***F0***		***1500***	***0***				***0***	***varies***	***0***		***1500***	***0***
Biotechnology for Food, Plant, Animal Science	A3		1500	0				0	varies	0		1500	0
Community Health Aide	J2		1500	0				0	varies	0		1500	0
Criminal Science Technology	P2		1500	0				0	varies	0		1500	0
Dental Laboratory Technology	J4		1500	0				0	varies	0		1500	0
Emergency Medical Technician	P3		1500	0				0	varies	0		1500	0
Energy Science	F1		1500	0				0	varies	0		1500	0
Engineering Science	***F2***		***1500***	***0***				***0***	***varies***	***0***		***1500***	***0***
Engineering and Design	***F6***		***1500***	***0***				***0***	***varies***	***0***		***1500***	***0***
Exercise Science and Sports Medicine	J6		1500	0				0	varies	0		1500	0
Health Information Management	J7		1500	0				0	varies	0		1500	0
Health Support Pathway	J8		1500	0				0	varies	0		1500	0
Health Unit Coordinator	J9		1500	0				0	varies	0		1500	0
Home Health	JA		1500	0				0	varies	0		1500	0
Medical Bioscience	J0		1500	0				0	varies	0		1500	0
Medical Laboratory Technology	JC		1500	0				0	varies	0		1500	0
Pharmacy Technician	JG		1500	0				0	varies	0		1500	0
Practical Nursing	JJ		1500	0				0	varies	0		1500	0
Therapeutic Pathway	JL		1500	0				0	varies	0		1500	0
Total Lab Spaces		**0**			**0**			**0**			**0**		
Related Space													
CT-P2-2 Office			120	0				0	varies	0		120	0
CT-P2-3 Storage			200	0				0	varies	0		200	0
CT-P2-4 Changing Room			450	0				0	varies	0		450	0
Total Program Type 2				**0**						**0**			**0**

Laboratory and Support Spaces Notes
*The Existing SF columns are only to be used in projects where there are to be buildilng additions

Lab & Support Space Worksheet		0 students			Students Type A & C						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	CTE Program Code	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
Supply Chain Management	S0												
Laboratory			1500	0		0	0	0	varies	0		1500	0
Early Childhood Education	E0												
Laboratory			1500	0		0	0	0	varies	0		1500	0
Observation			120	0		0	0	0	varies	0		120	0
Infants			700	0		0	0	0	varies	0		700	0
Kitchenette/Break room			350	0		0	0	0	varies	0		350	0
Reception			500	0		0	0	0	varies	0		500	0
Workroom			150	0		0	0	0	varies	0		150	0
Toddler Restroom			60	0		0	0	0	varies	0		60	0
Playground Area													
Entrepreneurship	S1												
Laboratory			*1000*	*0*		*0*	*0*	*0*	*varies*	*0*		*1000*	*0*
Bookstore			*800*	*0*		*0*	*0*	*0*	*varies*	*0*		*800*	*0*
Display			*100*	*0*		*0*	*0*	*0*	*varies*	*0*		*100*	*0*
Ground Operations	T5												
Laboratory			1500	0		0	0	0	varies	0		1500	0
Reference Room			150	0		0	0	0	varies	0		150	0
Lodging	L1												
Laboratory			1500	0		0	0	0	varies	0		1500	0
Banquet Room			800	0		0	0	0	varies	0		800	0
Marketing Communications	S3												
Laboratory			900	0		0	0	0	varies	0		900	0
Bookstore			800	0		0	0	0	varies	0		800	0
Display			100	0		0	0	0	varies	0		100	0
Marketing Management	S4												
Laboratory			900	0		0	0	0	varies	0		900	0
Bookstore			800	0		0	0	0	varies	0		800	0
Display			100	0		0	0	0	varies	0		100	0
Total Lab Spaces		**0**			**0**			**0**			**0**		
Related Space													
CT-P3-2 Office			120	0		0	0	0	varies	0		120	0
CT-P3-3 Storage			200	0		0	0	0	varies	0		200	0
Total Program Type 3				***0***			***0***			***0***			***0***

Laboratory and Support Spaces Notes

The Existing SF columns are only to be used in projects where there are to be building additions

Lab & Support Space Worksheet		**0 students**			***Students Type A & C***						**OSDM Recommendation**		
		New			**Existing***			**TOTAL**					
Laboratory Space	***CTE Program Code***	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**
Animal Science and Management	A2												
Laboratory (small animal)			1000	0			0	0	varies	0		1000	0
Pet shop			1200	0			0	0	varies	0		1200	0
Clinic			350	0			0	0	varies	0		350	0
Grooming			350	0			0	0	varies	0		350	0
Animal Room			200	0			0	0	varies	0		200	0
Animal Room			600	0			0	0	varies	0		600	0
Kennel			250	0			0	0	varies	0		250	0
Career Paths for the Law Profession	P0												
Laboratory			1200	0			0	0	varies	0		1200	0
Weight Room			800	0			0	0	varies	0		800	0
Interrogation Room			150	0			0	0	varies	0		150	0
Clinical Health Services	J1												
Laboratory			1200	0			0	0	varies	0		1200	0
Training Restroom			120	0			0	0	varies	0		120	0
Laundry Room			120	0			0	0	varies	0		120	0
Cosmetology	M1												
Laboratory			1600	0			0	0	varies	0		1600	0
Dispensary			175	0			0	0	varies	0		175	0
Laundry Room			150	0			0	0		0		150	0
Facial Room			200	0			0	0	varies	0		200	0
Manicure Room			200	0			0	0	varies	0		200	0
Customer Toilet			60	0			0	0	varies	0		60	0
Criminal Justice	P1												
Laboratory			1200	0			0	0	varies	0		1200	0
Weight Room			800	0			0	0	varies	0		800	0
Interrogation Room			150	0			0	0	varies	0		150	0
Culinary and Food Service Operations	L0												
Laboratory			1800	0			0	0	varies	0		1800	0
Restaurant			1500	0			0	0	varies	0		1500	0
Dry Storage			150	0			0	0	varies	0		150	0
Total Program Type 4 (Page 1)		**0**		**0**	**0**		**0**	**0**		**0**	**0**		**0**

Laboratory and Support Spaces Notes
*The Existing SF columns are only to be used in projects where there are to be buildilng additions

Lab & Support Space Worksheet		0 students			Students Type A & C						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	CTE Program Code	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
Dental Assistant	J3												
Laboratory			1500	0			0	0	varies	0		1500	0
X-ray Room			80	0			0	0	varies	0		80	0
Darkroom			80	0			0	0	varies	0		80	0
Diagnostic Pathway	J5												
Laboratory			1200	0			0	0	varies	0		1200	0
Exam Room			200	0			0	0	varies	0		200	0
Firefighting and Emergency Medical Services	***P6***												
Laboratory			***1500***	***0***			***0***	***0***	***varies***	***0***		***1500***	***0***
Weight Room			***800***	***0***			***0***	***0***	***varies***	***0***		***800***	***0***
Fire Fighter Training	P4												
Laboratory			1500	0			0	0	varies	0		1500	0
Weight Room			800	0			0	0	varies	0		800	0
Media Arts	B0												
Laboratory			1500	0			0	0	varies	0		1500	0
Media Arts Control Room/Edit			450	0			0	0	varies	0		450	0
Vestibule			84	0			0	0	varies	0		84	0
Medical Assistant	JB												
Laboratory			1200	0			0	0	varies	0		1200	0
Training Restroom			120	0			0	0	varies	0		120	0
Laundry Room			120	0			0	0	varies	0		120	0
Nurse Assisting	JD												
Laboratory			1200	0			0	0	varies	0		1200	0
Training Restroom			120	0			0	0	varies	0		120	0
Laundry Room			120	0			0	0				120	0
Optometric Occupations	JE												
Laboratory			1200	0			0	0	varies	0		1200	0
Exam Room			100	0			0	0	varies	0		100	0
Patient Care Technician	JF												
Laboratory			1500	0			0	0	varies	0		1500	0
Training Restroom			120	0			0	0	varies	0		120	0
Laundry Room			120	0			0	0	varies	0		120	0
Performing Arts	B1												
Laboratory			1500	0			0	0	varies	0		1500	0
Practice Room			150	0			0	0	varies	0		150	0
Private Security	P5												
Laboratory			1200	0			0	0	varies	0		1200	0
Weight Room			800	0			0	0	varies	0		800	0
Interrogation Room			150	0			0	0	varies	0		150	0
Surgical Technology	JK												
Laboratory			1000	0			0	0	varies	0		1000	0
Operating Room			800	0			0	0	varies	0		800	0
Instrument Room			700	0			0	0	varies	0		700	0
Scrub Room			500	0			0	0	varies	0		500	0
	Total Lab Spaces	***0***			***0***			***0***			***0***		
Related Space													
CT-P4-2 Classroom	***Note 1***		900	0			0	0	varies	0		900	0
CT-P4-3 Office			120	0			0	0	varies	0		120	0
CT-P4-4 Storage			200	0			0	0	varies	0		200	0
CT-P4-5 Changing Room			450	0			0	0	varies	0		450	0
Total Program Type 4 (Page 1)				0			0			0			0
Total Program Type 4 (Page 1 & 2)				**0**			**0**			**0**			**0**

Laboratory and Support Spaces Notes
1: One classroom space is to be allocated for every two program spaces (or fractions thereof) in types 4 through 7.
*The Existing SF columns are only to be used in projects where there are to be buildilng additions

Lab & Support Space Worksheet		0 students			Students Type A & C						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	CTE Program Code	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
Agribusiness and Production	A0												
Laboratory			4500	0			0	0	varies	0		4500	0
Greenhouse			1000	0			0	0	varies	0		1000	0
Auto Specilization	T2		3500	0			0	0	varies	0		3500	0
Brick, Block, and Cement Masonry	D0		3500	0			0	0	varies	0		3500	0
Building and Property Maintenance	D1		3000	0			0	0	varies	0		3000	0
Building Technology	D2		3000	0			0	0	varies	0		3000	0
Custodial Services	D6		2500	0			0	0	varies	0		2500	0
Electrical Trades	D7		3000	0			0	0	varies	0		3000	0
Environmental Control Technologies	D8		3000	0			0	0	varies	0		3000	0
Heavy Equipment Operations	D9		4500	0			0	0	varies	0		4500	0
Integrated Systems Technology	R2		3500	0			0	0	varies	0		3500	0
Interior Design Applications	DA		3000	0			0	0	varies	0		3000	0
Manufacturing Design and Development	R3		4500	0			0	0	varies	0		4500	0
Natural Resource Management	A6												
Laboratory			3000	0			0	0	varies	0		3000	0
Greenhouse			1000	0			0	0	varies	0		1000	0
Plumbing and Pipefitting	DB		3000	0			0	0	varies	0		3000	0
Power Equipment Technology	T8		3500	0			0	0	varies	0		3500	0
Power Transmission	F4		3500	0			0	0	varies	0		3500	0
Welding and Cutting	R6		3500	0			0	0	varies	0		3500	0
Total Lab Spaces		**0**			**0**			**0**			**0**		
Related Space - List per Program add rows as neede													
CT-P5-2 Classroom	***Note 1***		900	0			0	0	varies	0		900	0
CT-P5-3 Office			120	0			0	0	varies	0		120	0
CT-P5-4 Storage			200	0			0	0	varies	0		200	0
CT-P5-5 Changing Room	***Note 2***		270	0			0	0	varies	0		270	0
CT-P5-6 Tool Crib			550	0			0	0	varies	0		550	0
CT-P5-7 Reference Room			200	0			0	0	varies	0		200	0
CT-P5-8 Toilet Room			68	0			0	0	varies	0		68	0
Total Program Type 5				**0**			**0**			**0**			**0**

Laboratory and Support Spaces Notes
1: One classroom space is to be allocated for every two program spaces (or fractions thereof) in types 4 through 7.
2: Square footage of changing room determined by total number of approved programs types 5, 6 and 7 times 30 students times 9 SF per student. Changing room to be entered on POR once.
*The Existing SF columns are only to be used in projects where there are to be buildilng additions

Lab & Support Space Worksheet		0 students			Students Type A & C						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	CTE Program Code	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
Auto Collision Repair	T1												
Laboratory			5000	0			0	0	varies	0		5000	0
Auto Parts Storage			300	0			0	0	varies	0		300	0
Auto Technology	T3												
Laboratory			5000	0			0	0	varies	0		5000	0
Engine Storage			800	0			0	0	varies	0		800	0
Machine Room			900	0			0	0	varies	0		900	0
Flammable Material Storage			60	0			0	0	varies	0		60	0
Carpentry	D3												
Laboratory			4000	0			0	0	varies	0		4000	0
Finishing Room			500	0			0	0	varies	0		500	0
Material Storage			800	0			0	0	varies	0		800	0
Construction - Management	D5												
Laboratory			3000	0			0	0	varies	0		3000	0
CADD Room			400	0			0	0	varies	0		400	0
Construction - Design / Build	D4												
Laboratory			3000	0			0	0	varies	0		3000	0
CADD Room			400	0			0	0	varies	0		400	0
Construction Design and Manageme	***DF***												
Laboratory			***3000***	***0***			***0***	***0***	***varies***	***0***		***3000***	***0***
CADD Room			***400***	***0***			***0***	***0***	***varies***	***0***		***400***	***0***
Engineering Technology	F3												
Laboratory			1500	0			0	0		0		1500	0
CADD Room			400	0			0	0	varies	0		400	0
Food Science and Technology	A4												0
Laboratory			2000	0			0	0	varies	0		2000	0
Freezer			400	0			0	0	varies	0		400	0
Cooler			400	0			0	0	varies	0		400	0
Retail			400	0			0	0	varies	0		400	0
Ground Transportation	***T9***												
Laboratory			***5000***	***0***			***0***	***0***	***varies***	***0***		***5000***	***0***
Engine Storage			***800***	***0***			***0***	***0***	***varies***	***0***		***800***	***0***
Machine Room			***900***	***0***			***0***	***0***	***varies***	***0***		***900***	***0***
Flammable Material Storage			***60***	***0***			***0***	***0***	***varies***	***0***		***60***	***0***
Horticulture	A5												
Laboratory			2000	0			0	0	varies	0		2000	
Retail			400	0			0	0	varies	0		400	
Greenhouse			3000	0			0	0	varies	0		3000	0
Industrial Power Technology	A1												
Laboratory			5000	0			0	0	varies	0		5000	0
Engine Storage			1000	0			0	0	varies	0		1000	0
Flammable Material Storage			200	0			0	0	varies	0		200	0
Total Program Type 6		***0***		***0***	***0***		***0***	***0***		***0***	***0***		***0***

Laboratory and Support Spaces Notes

1: One classroom space is to be allocated for every two program spaces (or fractions thereof) in types 4 through 7.

2: Square footage of changing room determined by total number of approved programs types 5, 6 and 7 times 30 students times 9 SF per student. Changing room to be entered on POR once.

*The Existing SF columns are only to be used in projects where there are to be buildilng additions

Lab & Support Space Worksheet		0 students			Students Type A & C						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	CTE Program Code	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
Manufacturing Occupations	***R7***												***0***
Laboratory			***3500***	***0***			***0***	***0***	***varies***	***0***		***3500***	***0***
CNC Room			***900***	***0***			***0***	***0***	***varies***	***0***		***900***	***0***
Inspection Room			***150***	***0***			***0***	***0***	***varies***	***0***		***150***	***0***
Mechanical, Electrical, and Plumbing	***DE***												
Laboratory			***3000***	***0***			***0***	***0***	***varies***	***0***		***3000***	***0***
CADD Room			***400***	***0***			***0***	***0***	***varies***	***0***		***400***	***0***
Medium/Heavy Truck Technician	T7												
Laboratory			6000	0			0	0	varies	0		6000	0
Engine Storage			800	0			0	0	varies	0		800	
Flammable Material Storage			60	0			0	0	varies	0		60	0
Machine Room			900	0			0	0	varies	0		900	0
Precision Machining	R5												
Laboratory			3500	0			0	0	varies	0		3500	0
CNC Room			900	0			0	0	varies	0		900	0
Inspection Room			150	0			0	0	varies	0		150	0
Structural Systems	***DD***												
Laboratory			***3000***	***0***			***0***	***0***	***varies***	***0***		***3000***	***0***
CADD Room			***400***	***0***			***0***	***0***	***varies***	***0***		***400***	***0***
Wood Product Technologies	DC												
Laboratory			3000	0			0	0	varies	0		3000	0
Finishing Room			500	0			0	0	varies	0		500	0
Material Storage			800	0			0	0	varies	0		800	0
	Total Lab Spaces	***0***			***0***			***0***			***0***		
Related Space - List per Program add rows as needed													
CT-P6-2 Related Classroom	***Note 1***		900	0			0	0	varies	0		900	0
CT-P6-3 Office			120	0			0	0	varies	0		120	0
CT-P6-5 Changing Room	***Note 2***		270	0			0	0	varies	0		270	0
CT-P6-4 Storage			200	0			0	0	varies	0		200	0
CT-P6-6 Tool Crib			550	0			0	0	varies	0		550	0
CT-P6-7 Reference Room			200	0			0	0	varies	0		200	0
CT-P6-8 Toilet Room			68	0			0	0	varies	0		68	0
Total Program Type 6 (Page 1)				0			0			0			0
Total Program Type 6 (Page 1 & 2)				**0**			**0**			**0**			**0**

Laboratory and Support Spaces Notes

1: One classroom space is to be allocated for every two program spaces (or fractions thereof) in types 4 through 7.

2: Square footage of changing room determined by total number of approved programs types 5, 6 and 7 times 30 students times 9 SF per student. Changing room to be entered on POR once.

*The Existing SF columns are only to be used in projects where there are to be buildilng additions

Lab & Support Space Worksheet		0 students			Students Type A & C						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	CTE Program Code	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
Aircraft Maintenance	T0												
Laboratory			13000	0			0	0	varies	0		13000	0
Cleaning Room			400	0			0	0	varies	0		400	0
Parts Storage			300	0			0	0	varies	0		300	0
Hazardous Materials Storage			60	0			0	0	varies	0		60	0
Paint Storage			100	0			0	0	varies	0		100	0
Air Transportation	***TA***												
Laboratory			***13000***	***0***			***0***	***0***	***varies***	***0***		***13000***	***0***
Cleaning Room			***400***	***0***			***0***	***0***	***varies***	***0***		***400***	***0***
Hazardous Materials Storage			***60***	***0***			***0***	***0***	***varies***	***0***		***60***	***0***
Paint Storage			***100***	***0***			***0***	***0***	***varies***	***0***		***100***	***0***
Animal Science & Management (Equine)	A2												
Laboratory			8000	0			0	0	varies	0		8000	0
Stables			6800	0			0	0	varies	0		6800	0
Total Lab Spaces		***0***			***0***			***0***			***0***		
elated Space													
CT-P7-2 Classroom	***Note 1***		900	0			0	0	varies	0		900	0
CT-P7-3 Office			120	0			0	0	varies	0		120	0
CT-P7-4 Storage			200	0			0	0	varies	0		200	0
CT-P7-5 Changing Room	***Note 3***		270	0			0	0	varies	0		270	0
CT-P7-6 Tool Crib			550	0			0	0	varies	0		550	0
CT-P7-7 Reference Room			200	0			0	0	varies	0		200	0
CT-P7-8 Toilet Room			68	0			0	0	varies	0		68	0
Total Program Type 7				**0**			**0**			**0**			**0**

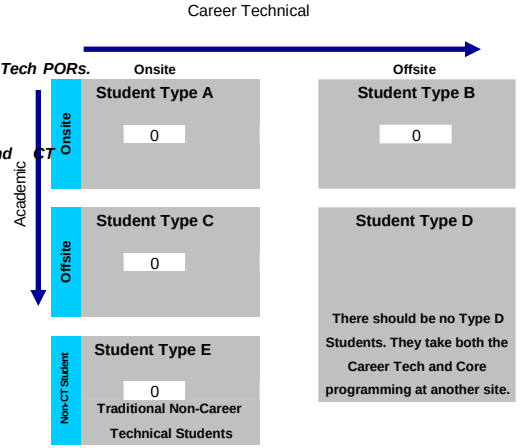
Laboratory and Support Spaces Notes
1: One classroom space is to be allocated for every two program spaces (or fractions thereof) in types 4 through 7.
2: Support will be provided for only the first 10,000 SF for any one program.
3: Square footage of changing room determined by total number of approved programs types 5, 6 and 7 times 30 students times 9 SF per student. Changing room to be entered on POR once.
*The Existing SF columns are only to be used in projects where there are to be buildilng additions

Introduction:
This page is meant to provide the School District and Design Professional with a simple tool for completing a Program of Requ
a Comprehensive 9-12 School including Career Technical Programs. Please follow the directions found below and fill in the "ye

	Career Tech Students			Non-CT	
Grade	A	B	C	E	Totals
9-12					0
Total	0	0	0	0	0

Please indicate in the yellow cells the projected number of students in each type.
This information can be found in the Master Plan or the district's enrollment projections.

The following table is to clarify the connection/labeling between the Enrollment Projection report and the Career Tech PORs.
Note that when the school is a Comp HS the emphasis is on the location of the CT Student.
When the school is a JVS or Coop school the emphasis is on the location of the Academic student.
For example a Type B - CT Off-site Comp HS student is a student that has academic programs on-site and CT programs off-site. A Type B - Acad On-site JVS student is a student that has academic programs on-site and



Comp HS School - Relates to location of CT Students	
Type A - Full time	Acad On-site + CT On-site of Comp HS
Type B - CT Off-s ite	Acad On-site + CT Off-s ite of Comp HS
Type C - CT On-site	Acad Off-s ite + CT On-site of Comp HS

JVS/Compact School - Relates to location of Academic Student s	
Type A - Full time	Acad On-site + CT On-site of JVS
Type B - Acad On-site	Acad On-site + CT Off-site of JVS
Type C - Acad Off-site	Acad Off-s ite + CT On-site of JVS

All student descriptions are in relation to the school being programmed.

Student Type A - Comprehensive Career-Technical Student/Full Time Career Technical Student (Grades 11-12)
Spends entire day at school attending academics and career-technical programming.

Student Type B – Career-Technical Off-Site Student (Grades 11-12)
Attends academic courses at the school and attends career-technical courses at another location, i.e. JVS, comprehensive high school in another district, etc.

Student Type C – Career-Technical On-Site Student (Grades 11-12)
Attends career-technical courses at the school and attends academics at another location, i.e., high school in another district or high school within the same district.

Student Type D – Full-Time Career-Technical Student-Attends all classes off site.
Attends both academic and career-technical courses at a site other than the home high school.

Student Type E – Does not participate in career technical programming. **(9-12 Grades)**
Does not participate in Career Technical programming.

Previously, changes or additions made during the annual update of the Design Manual have been ***"bolded and italicized"*** for easy identification. Changes have been made to the formulas on this sheet which have not been bolded and italicized. The user is advised to carefully review all information.

WORKSHEET

	Career Tech Part Time	Academic Part Time	Academic Full Time Non-CT	SF/Student	Area	
Student Type A (CT)	0	0				Insert numbers into the yellow cell from your Master Plan document.
Student Type B (CT)		0				
Student Type C (CT)	0					
Student Type E - High School Grades 9-12 (non-CT)			0	0	0	
Total Student Enrollment per Student Type	0	0	0		**0**	Total Non-CT Space
Career Technical Core Space			0	0	0	Max. Gross SF - CT Core Space
Career Technical Program Space			0	**varies**		Max. Gross SF - CT Program Space
Total Career Technical Space					**0**	Total CT Space
Total A, B & E Students for Vertical Circulation Calculation		0				
Total Gross Square Footage					**0**	Total Gross Square Footage
SELECT ONE → (•) Single or Two Story Buildings ( ) 3 Stories or greater						
Vert. Circ. Area Allowance (3 Stories or greater)	Vertical Circulation ***(3 Stories or greater)*** refers only to stairways/stair towers, monumental stairs, elevators, and elevator equipment rooms.				0	Vertical Circulation
Total Adjusted POR Gross Square Footage					**0**	**Total Adjusted POR Gross Square Footag**

CORE SPACE ONLY

Core Spaces	Students Type E NEW	Students Type E Existing*	Students Type E TOTAL	Students Type A & B NEW	Students Type A & B Existing*	Students Type A & B TOTAL	Combined Total	OSDM Recommendation
H/CT-AC Academic Core	0	0	0	0	0	0	0	0
H/CT-SE Spec. Ed./Student Svs.	0	0	0	0	0	0	0	0
H/CT-AD Administration	0	0	0	na	na	na	0	0
H/CT-MC Media Center	0	0	0	na	na	na	0	0
H-VA Visual Arts	0	0	0	na	na	na	0	0
H-MU Music	0	0	0	na	na	na	0	0
H-TE Technology Education	0	0	0	na	na	na	0	0
H-BE Business Education	0	0	0	na	na	na	0	0
H-FCS Family and Consumer Science	0	0	0	na	na	na	0	0
H-PE Physical Education	0	0	0	na	na	na	0	0
H/CT-SD Student Dining	0	0	0	na	na	na	0	0
H/CT-FS Food Service	0	0	0	na	na	na	0	0
H/CT-CU Custodial	0	0	0	na	na	na	0	0
Net Core Space	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
H/CT-BS Building Services	0	0	0	na	na	na	0	0
Total Core Space	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Construction Factor (11%)	0	0	0	0		0	0	0
Actual Gross Core Space Developed	**0**	**0**	**0**	**0**	**0**	**0**	**0**	See Note 1 **0**
Minus existing co-funded Oversize Area from Master Plan							**na**	See Note 2
Adjusted Existing Area		**0**			**0**			
Total Adjusted Gross Square Footage Developed (without Oversize Area)			**0**			**0**	**0**	
Maximum Gross Core SF Co-Funded			0			0	0	
Difference			**0**			**0**	**0**	

CAREER TECHNICAL PROGRAM SPACE ONLY

Career Technical Program Spaces	Total Lab Spaces Developed	Students Type A & C NEW	Students Type A & C Existing*	Students Type A & C TOTAL	OSDM Recommendation SF	OSDM Recommendation # of Labs
CT-P1 Program Type 1	0	0	0	0	0	0
CT-P2 Program Type 2	0	0	0	0	0	0
CT-P3 Program Type 3	0	0	0	0	0	0
CT-P4 Program Type 4	0	0	0	0	0	0
CT-P5 Program Type 5	0	0	0	0	0	0
CT-P6 Program Type 6	0	0	0	0	0	0
CT-P7 Program Type 7	0	0	0	0	0	0
Net CT Program Spaces	**0**	**0**	**0**	**0**	**0**	**0**
CT Building Services		0	0	0		
Total CT Program Space		**0**	**0**	**0**		
CT Construction Factor (11%)		0		0		
Actual Gross CT Program Space Developed		**0**	**0**	**0**		
Maximum Gross CT Program SF Co-Funded				0		
Difference				**0**		

Total Gross Square Feet Co-Funded	**0**
Total Gross Square Feet Developed-Core & CT Program	**0**
Difference / Locally Funded Initiative	**0**

Worksheet Notes

1: Existing Gross Square Feet taken from master facility plan.
2: Oversize Area taken from master facility plan.
* Existing SF columns are to be used in projects with building additions or renovations.

The following is an example of a Comprehensive 9-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 372 STUDENTS					
Space		Qty	SF	Area	
H-AC-1	High School Classroom	6	900	5,400	
H-AC-2	Science Classroom - General Physic	1	1,200	1,200	
H-AC-3	Science Classroom - Chemistry	1	1,200	1,200	
H-AC-4	Science Classroom - Biology	1	1,200	1,200	
H-AC-5	Science Prep	2	200	400	See Note 1
H-AC-6	Teacher Prep Area/Workroom	1	300	300	See Note 2
H-AC-7	Individual Restroom	1	60	60	
H-AC-8	Project Classroom	1	1,000	1,000	
H-AC-9	Small Group Room	1	150	150	
H-AC-10	Instructional Material Storage	1	50	50	See Note 3
H-AC-11	Multi-Use Room	0	1,500	0	
H-AC-12	Science Laboratory	0	1,000	0	
H-AC-9a	***Small Group Room***	***0***	***150***	***0***	***See Note 4***
H-AC-13	***Multi-use Studio***	***0***	***1,500***	***0***	***See Note 4***
H-AC-14	***Kinesthetic Learning Studio***	***0***	***1,200***	***0***	***See Note 4***
Academic Core Total				***10,960***	

CAREER TECHNICAL PROGRAM SPACE EXAMPLE		400 Students			600 Students			800 Students			1000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
CT-AC-1	Academic classroom	7	900	6,300	13	900	11,700	17	900	15,300	22	900	19,800	
CT-AC-2	Computer room	1	1,200	1,200	1	1,200	1,200	2	1,200	2,400	2	1,200	2,400	
CT-AC-3	General Science/Physics	1	1,200	1,200	1	1,200	1,200	1	1,200	1,200	2	1,200	2,400	
CT-AC-4	Biology	1	1,200	1,200	1	1,200	1,200	2	1,200	2,400	2	1,200	2,400	
CT-AC-5	Chemistry	1	1,200	1,200	1	1,200	1,200	1	1,200	1,200	1	1,200	1,200	
CT-AC-6	Science Prep	1	300	300	2	300	600	2	300	600	3	300	900	See Note 1
CT-AC-7	Teacher Prep/workroom	3	300	900	4	300	1,200	4	300	1,200	4	400	1,600	See Note 2
CT-AC-8	Individual restroom	2	60	120	2	60	120	4	60	240	4	60	240	
CT-AC-9	Small group room	2	140	280	2	***150***	300	3	***150***	450	3	***150***	450	
CT-AC-10	Instructional material storage	4	50	200	4	75	300	4	100	400	4	120	480	***See Note 3***
CT-AC-11	Multipurpose room	1	1,500	1,500	1	1,500	1,500	1	1,500	1,500	1	1,500	1,500	
CT-AC-12	Science Laboratory	0	1,000	0	0	1,000	0	0		0	0	1,000	0	
Academic Core Total				14,400			20,520			26,890			33,370	

Square Footage Allowance Notes			
Enroll	1	2	3
350-450	300	300	50
451-800	300	300	100
801-1200	400	400	150
1201-1600	400	600	200
Student capacity determines SF			

Academic Core Notes	
Number	*Notes:*
4	*These spaces are provided to encourage the development of student centered learning environments as found in Section 1020. Minimum sizes are: H-AC-9a=150 SF. H-AC-13 Multi-use Studio=1500 SF. H-AC-14 Kinesthetic Studio=1200 SF.*

High School 9-12 Students (non-CT)	0

Academic Core Worksheet		0 HS students - *Students Type E*								0 HS students - *Students Type A & B*								0 COMBINED			OSDM Recommendation		
		New			Existing*			TOTAL			New			Existing			TOTAL			TOTAL				
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H/CT-AC-1	Academic Classroom		900	0			0	0	varies	0		900	0			0	0	varies	0	0	varies	***0***		900	0	
H-AC-2/CT-AC-3	Science Classroom - General Physic s		1,200	0			0	0	varies	0		1,200	0			0	0	varies	0	0	varies	***0***		1,200	0	
H/CT-AC-4	Science Classroom - Chemistry		1,200	0			0	0	varies	0		1,200	0			0	0	varies	0	0	varies	***0***		1,200	0	
H-AC-3/CT-AC-5	Science Classroom - Biology		1,200	0			0	0	varies	0		1,200	0			0	0	varies	0	0	varies	***0***		1,200	0	
H-AC-5/CT-AC-6	Science Prep		300	0			0	0	varies	0		300	0			0	0	varies	0	0	varies	***0***		300	0	See Note 1
H-AC-6/CT-AC-7	Teacher Prep/workroom		300	0			0	0	varies	0		300	0			0	0	varies	0	0	varies	***0***		300	0	See Note 2
H-AC-7/CT-AC-8	Individual restroom		60	0			0	0	varies	0		60	0			0	0	varies	0	0	varies	***0***		60	0	
H/CT-AC-9	Small group room		150	0			0	0	varies	0		150	0			0	0	varies	0	0	varies	***0***		150	0	
H/CT-AC-10	Instructional Material storage		50	0			0	0	varies	0		50	0			0	0	varies	0	0	varies	***0***		***50***	0	***See Note 3***
H/CT-AC-11	Multipurpose room		1,500	0			0	0	varies	0		1,500	0			0	0	varies	0	0	varies	***0***		1,500	0	
H/CT-AC-12	Science Laboratory		1,000	0			0	0	varies	0		1,000	0			0	0	varies	0	0	varies	***0***		1,000	0	
H-AC-8	Project/Classroom		1,100	0			0	0	varies	0										0	varies	***0***		1,100	0	
CT-AC-2	Computer room											1,200	0			0	0	varies	0	0	varies	***0***		1,200	0	
H-AC-9a	***Small Group Room***		***150***	***0***			***0***	***0***	***varies***	***0***		***150***	***0***			***0***	***0***	***varies***	***0***	***0***	***varies***	***0***		***150***	***0***	***See Note 4***
H-AC-13	***Multi-use Room***		***1,500***	***0***			***0***	***0***	***varies***	***0***		***1,500***	***0***			***0***	***0***	***varies***	***0***	***0***	***varies***	***0***		***1,500***	***0***	***See Note 4***
H-AC-14	***Kinesthetic Learning Studio***		***1,200***	***0***			***0***	***0***	***varies***	***0***		***1,200***	***0***			***0***	***0***	***varies***	***0***	***0***	***varies***	***0***		***1,200***	***0***	***See Note 4***
Academic Core Total			***0***				***0***		***0***			***0***			***0***			***0***			***0***			***0***		

Academic Core Notes
* The Existing SF columns are to be used in projects where there are to be building additions or renovations.

The following is an example of a Comprehensive 9-12 School including Career Technical Programs
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 372 STUDENTS					
Space		Qty	SF	Area	
H-SE-1	Self-contained Classroom	1	900	900	See Note 1
H-SE-2	Workroom/Conference	1	150	150	See Note 2
H-SE-3	Restroom/Shower	1	100	100	
H-SE-4	Special Education/Resource	***0***	900	0	See Note 3
H-SE-5	Small Self-contained Classroom	1	600	600	
Special Education Total				**1,750**	

Note: Special Education spaces are determined by using the bracketing table for each type of student.

PROGRAM SPACE EXAMPLE		400 Students			600 Students			800 Students			1000 Students			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
CT-SE-1	Classroom	1	900	900	1	900	900	2	900	1,800	2	900	1,800	See Note 1
CT-SE-2	Workroom/conference	1	150	150	1	150	150	2	150	300	2	150	300	See Note 2
CT-SE-3	Restroom/shower	1	100	100	1	100	100	1	100	100	1	100	100	
CT-SE-4	Career Technical Evaluation	1	1,200	1,200	1	1,200	1,200	1	1,200	1,200	***1***	1,200	1,200	
CT-SE-5	Career Technical Office	1	120	120	1	120	120	1	120	120	2	120	240	
CT-SE-6	Small group room	1	360	360	1	360	360	1	360	360	1	360	360	
CT-SE-7	Job training Office	1	120	120	1	120	120	2	120	240	2	120	240	
CT-SE-8	Resource room	1	900	900	1	900	900	1	900	900	1	900	900	See Note 3
CT-SE-9	Storage	1	150	150	1	150	150	1	150	150	1	150	150	
Spec. Ed./Student Services Total				**4,000**			**4,000**			**5,170**			**5,290**	

High School 9-12 Students (non-CT) 0

Sp. Ed./Stud. Svcs. Worksheet		0 HS students - *Students Type E*							0 HS students - *Students Type A & B*						0 COMBINED			OSDM Recommendation		
		New			Existing*			TOTAL	New			Existing*			TOTAL			TOTAL			
Space		Qty	SF	Area	Qty	SF	Area	Qty SF Area	Qty	SF	Area	Qty	SF	Area	Qty SF Area			Qty	SF	Area	Qty SF	Area	
H/CT-SE-1	***Self-contained Classroom***		900	0			0	0 varies 0		900	0			0	0 varies 0			0	varies	0	900	0	***See Note 1***
H/CT-SE-2	***Workroom/Conference***		150	0			0	0 varies 0		150	0			0	0 varies 0			0	varies	0	150	0	***See Note 2***
H/CT-SE-3	Restroom/shower		100	0			0	0 varies 0		100	0			0	0 varies 0			0	varies	0	100	0	
H-SE-4/CT-SE-	***Resource room***		900	0			0	0 varies 0		900	0			0	0 varies 0			0	varies	0	900	0	***See Note 3***
H-SE-5	Small Self-Contained Classroom		600	0			0	0 varies 0		600	0			0	0 varies 0			0	varies	0	900	0	
CT-SE-4	Career Technical Evaluation									1,200	0			0	0 varies 0			0	varies	0	1,200	0	
CT-SE-5	Career Technical Office									120	0			0	0 varies 0			0	varies	0	120	0	
CT-SE-6	Small group room									360	0			0	0 varies 0			0	varies	0	360	0	
CT-SE-7	Job training Office									120	0			0	0 varies 0			0	varies	0	120	0	
CT-SE-9	Storage									150	0			0	0 varies 0			0	varies	0	150	0	
Spec. Ed./Student Services Total				**0**			**0**	**0**			**0**			**0**	**0**					**0**		**0**	

Special Education Notes	
Number	Notes:
	Self-contained classroom(s) could 'house' various special education programs including, but not limited to, cognitive disability, emotional disturbance, multiple disabilities, etc.
	Workroom/Conference could 'house' orthopedic impairment, autism, speech therapy, occupational therapy, and physical therapy.
	Special Education/Resource could 'house' cognitive disability, hearing impairment, visual impairment, emotional disturbance, orthopedic impairment, autistic, traumatic, brain injury, learning disability, deaf/blindness, etc. See Chapter 1, Section 1110 for more information.
*	*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive 9-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
H-AD-1	Reception Area	1	***250***	250	See Note 1
H-AD-2	Secretarial Area	1	250	250	See Note 2
H-AD-3	Principal's Office	1	150	150	
H-AD-4	Assistant Principal's Office	1	120	120	
H-AD-5	Conference Room	1	250	250	
H-AD-6	Mail/Work/Copy Room	1	200	200	See Note 3
H-AD-7	Administrative Storage	1	***150***	150	See Note 4
H-AD-8	Vault/Records Storage	1	***85***	85	See Note 5
H-AD-9	In-school Suspension	1	***200***	200	See Note 10
H-AD-10	Restroom	1	60	60	
H-AD-11	Guidance Counselor's Office	2	120	240	
H-AD-12	Guidance Records/Storage	1	***100***	100	See Note 6
H-AD-13	Guidance Conference Room	1	***100***	100	See Note 7
H-AD-14	Parent/Volunteer Room	***1***	***200***	200	See Note 8
H-AD-15	Health Clinic (includes restroom)	1	***400***	400	See Note 9
H-AD-16	Itinerant Personnel Office	1	120	120	
H-AD-17	Guidance Conf. & Career Ctr.	1	300	300	See Note 11
Administrative Total				**3,175**	

Administrative Notes											
Student Enrollment	1	2	3	4	5	6	7	8	9	10	11
350-450 Students	200	200	200	150	***85***	100	150	200	400	200	300
451-800 Students	400	400	300	150	***110***	100	200	300	450	325	400
801-1200 Students	500	500	400	200	***145***	200	250	400	500	450	500
1201-1600 Students	600	600	500	200	***175***	200	250	400	550	575	700
Enrollment determines SF allowed											

Note: Non-career technical students and career technical students are combined to determine the bracketing.

High School 9-12 Students (ALL)	0

Administrative Worksheet		0 HS students - COMBINED									OSDM Recommendation			
		New			Existing*			TOTAL						
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H/CT-AD-1	Reception area		200	0			0	0	varies	0		200	0	See Note 1
H/CT-AD-2	Secretarial space		200	0			0	0	varies	0		200	0	See Note 2
H/CT-AD-3	Director/Principal's office		150	0			0	0	varies	0		150	0	
H/CT-AD-4	Asst. Dir./Principal office		120	0			0	0	varies	0		120	0	
H-AD-5/CT-AD-7	Conference room		250	0			0	0	varies	0		250	0	
H-AD-6/CT-AD-8	Mail/work/copy room		200	0			0	0	varies	0		200	0	See Note 3
H-AD-7/CT-AD-9	Administrative Storage		150	0			0	0	varies	0		150	0	See Note 4
H-AD-8/CT-AD-10	Vault/records		***85***	0			0	0	varies	0		***85***	0	See Note 5
H-AD-10/CT-AD-11	Restroom		60	0			0	0	varies	0		***60***	0	
H-AD-11/CT-AD-12	Guidance counselor		120	0			0	0	varies	0		120	0	
H-AD-12/CT-AD-13	Guidance records/storage		100	0			0	0	varies	0		100	0	See Note 6
H-AD-13/CT-AD-14	Guidance conference		150	0			0	0	varies	0		150	0	See Note 7
H-AD-14/CT-AD-15	Parent/volunteer		200	0			0	0	varies	0		200	0	See Note 8
H-AD-15/CT-AD-16	Health clinic (includes restroom)		400	0			0	0	varies	0		400	0	See Note 9
H-AD-16/CT-AD-17	Itinerant personnel		120	0			0	0	varies	0		120	0	
H-AD-09/CT-AD-18	In-school suspension		200	0			0	0	varies	0		200	0	See Note 10
H-AD-17	***Guidance Conf. & Career Ctr.***		***300***	0			0	0	varies	0		300	0	See Note 11
CT-AD-5	Supervisor's office		120	0			0	0	varies	0		120	0	
CT-AD-6	Coordinator's office		120	0			0	0	varies	0		120	0	
Administrative Total				**0**			**0**			**0**			**0**	

Administrative Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive 9-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 372 STUDENTS					
Space		Qty	SF	Area	
H-MC-1	Reading Room/Circulation	1	1,302	1,302	See Note 1
H-MC-2	Media Specialist Office	1	120	120	
H-MC-3	Workroom/Storage	1	250	250	See Note 2
H-MC-4	Main Control/Equipment Rm	1	300	300	
H-MC-5	Conference Room	1	250	250	
H-MC-6	Multimedia Production Room	1	300	300	
H-MC-7	Document Storage	1	100	100	See Note 3
H-AC-9	Small Group Room	1	100	100	***See Note 4***
Media Center Total				**2,722**	

Square Footage Allowance Notes			
Student Enrollment	**2**	**3**	***4***
350-450 Students	300	200	***160***
451-800 Students	400	300	***260***
801-1200 Students	500	300	***280***
1201-1600 Students	600	400	***330***
Enrollment Determines SF Allowed			

Note: Non-career technical students and career technical students are combined to determine the bracketing.

High School 9-12 Students (ALL)	0

Media Center Worksheet	**0 HS students - COMBINED**									**OSDM Recommendation**			
	New			**Existing***			**TOTAL**						
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
H/CT-MC-1 Reading Room/Circulation		0	0			0	0	varies	0		0	0	See Note 1
H/CT-MC-2 Media Specialist Office		120	0			0	0	varies	0		120	0	
H/CT-MC-3 Workroom/Storage		300	0			0	0	varies	0		300	0	See Note 2
H/CT-MC-4 Main Control/Equipment Rm		300	0			0	0	varies	0		300	0	
H-MC-5 Conference Room		250	0			0	0	varies	0		250	0	
H-MC-6 Multimedia Production Room		500	0			0	0	varies	0		500	0	
H-MC-7 Document Storage		200	0			0	0	varies	0		200	0	See Note 3
H/CT-AC-9 Small group room		***160***	0			0	0	varies	0		***160***	0	***See Note 4***
Media Center Total			**0**			**0**			**0**			**0**	

Media Center Notes
1: The size of the reading room/circulation space is equal to 10% of the high school student ***enrollment*** multiplied by 35 SF per student.
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive 9-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces

EXAMPLE - 372 STUDENTS				
Space	**Qty**	**SF**	**Area**	
H-VA-1 High School Art Room	1	1,200	1,200	See Note 1
H-VA-2 Kiln/Ceramic Storage	1	150	150	See Note 2
H-VA-3 Art Material Storage	1	150	150	See Note 3
Visual Arts Total			**1,500**	

Visual Art SF Allowance Notes			
Student Enrollment	**1**	**2**	**3**
350-450 Students	1200	100	200
451-800 Students	1200	200	300
801-1200 Students	1400	200	300
Above 1200 Students	1400	200	300
Enrollment Determines SF Allowed			

Note: Only non-career technical students are used to determine the bracketing.

High School 9-12 Students (non-CT)	0

Visual Art Worksheet	**0**	**HS students - *Students Type E***								**OSDM Recommendation**			
	New			**Existing***			**TOTAL**						
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
H-VA-1 Art Room		1,200	0			0	0	varies	0		1,200	0	See Note 1
H-VA-2 Kiln/Ceramic Storage		100	0			0	0	varies	0		100	0	See Note 2
H-VA-3 Art Material Storage		200	0			0	0	varies	0		200	0	See Note 3
Visual Arts Total			**0**			**0**			**0**			**0**	

Visual Art Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive 9-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 372 STUDENTS				
Space	**Qty**	**SF**	**Area**	
H-MU-1 Instrumental Room	1	1,800	1,800	See Note 1
H-MU-2 Instrument Storage	1	350	350	See Note 2
H-MU-3 Orchestra Storage	0	250	0	See Note 3
H-MU-4 Instrumental Music Office/Library	1	120	120	
H-MU-5 Uniform Storage	0	200	0	See Note 4
H-MU-6 Vocal Room	***0***	1,150	0	See Note 5
H-MU-7 Vocal Storage	0	200	0	See Note 6
H-MU-8 Vocal Music Office/Library	1	120	120	
H-MU-9 Ensemble Room	1	200	200	See Note 7
H-MU-10 Practice Room	1	80	80	
Music Total			**2,670**	

MusicSquare Footage Allowance Notes							
Student Enrollment	**1**	**2**	**3**	**4**	**5**	**6**	**7**
350-450 Students	1800	400	200	150	1200	150	200
451-800 Students	2000	500	250	200	1200	200	300
801-1200 Students	2500	600	250	300	1200	300	300
1201-1600 Students	3000	700	350	300	1500	300	300
Enrollment Determines SF Allowed							

Note: Only non-career technical students are used to determine the bracketing.

High School 9-12 Students (non-CT)	0

Music Worksheet

0 HS students - *Students Type E*

Space	New Qty	New SF	New Area	Existing* Qty	Existing* SF	Existing* Area	TOTAL Qty	TOTAL SF	TOTAL Area	OSDM Recommendation Qty	OSDM Recommendation SF	OSDM Recommendation Area	
H-MU-1 Instrumental Room		1,800	0			0	0	varies	0		1,800	0	See Note 1
H-MU-2 Instrument Storage		400	0			0	0	varies	0		400	0	See Note 2
H-MU-3 Orchestra Storage		200	0			0	0	varies	0		200	0	See Note 3
H-MU-4 Instrumental Music Office/Library		120	0			0	0	varies	0		120	0	
H-MU-5 Uniform Storage		150	0			0	0	varies	0		150	0	See Note 4
H-MU-6 Vocal Room		1,200	0			0	0	varies	0		1,200	0	See Note 5
H-MU-7 Vocal Storage		150	0			0	0	varies	0		150	0	See Note 6
H-MU-8 Vocal Music Library		120	0			0	0	varies	0		120	0	
H-MU-9 Ensemble Room		200	0			0	0	varies	0		200	0	See Note 7
H-MU-10 Practice Room		80	0			0	0	varies	0		80	0	
Music Total			**0**			**0**			**0**			**0**	

Music Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive 9-12 School including Career Technical Programs
The example is intended to assist in the development of the summary of spaces

EXAMPLE - 372 STUDENTS				
Space	Qty	SF	Area	
H-TE-1 Modular Technology Lab	1	1,800	1,800	
H-TE-1a Ag-Ed Lab	0	1,800	0	
H-TE-2 Storage	1	***150***	150	See Note 1
H-TE-3 CAD Lab	0	1,200	0	
H-TE-4 Production Lab	0	1,600	0	
Technology Education Total			**1,950**	

HS or 6-12 SF Allowance Notes	
Student Enrollment	1
350-450 Students	150
451-800 Students	200
801-1200 Students	200
1201-1600 Students	200
Enrollment Determines SF Allowe	

Note: Only non-career technical students are used to determine the bracketing.

High School 9-12 Students (non-CT)	0

Tech. Ed. Worksheet — **0 HS students - *Students Type E***

	New			Existing*			TOTAL			OSDM Recommendation			
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-TE-1 Modular Technology Lab		1,800	0			0	0	varies	0		1,800	0	
or													
H-TE-1a Ag-Ed Lab		1,800	0			0	0	varies	0		1,800	0	
H-TE-2 Storage		150	0			0	0	varies	0		150	0	See Note 1
H-TE-3 CADD Lab		1,200	0			0	0	varies	0		1,200	0	
H-TE-4 Production Lab		1,600	0			0	0	varies	0		1,800	0	
Technology Education Total			**0**			**0**			**0**			**0**	

Technology Education Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

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The following is an example of a Comprehensive 9-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 372 STUDENTS				
Space	**Qty**	**SF**	**Area**	
H-BE-1 Computer and Business Classroom	0	1,200	0	
H-BE-2 Marketing Classroom	0	900	0	
H-BE-3 Workroom/Storage	0	100	0	See Note 1
Business Education Total			**0**	

Square Footage Allowance Note	
Student Enrollment	**1**
350-450 Students	100
451-800 Students	200
801-1200 Students	250
1201-1600 Students	300
Enrollment Determines SF Allowe	

Note: Only non-career technical students are used to determine the bracketing.

High School 9-12 Students (non-CT)	0

Bus. Ed. Worksheet	**0**	**HS students - *Students Type E***							**OSDM Recommendation**			
	New			**Existing***			**TOTAL**					
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
H-BE-1 Computer and Business Classroom		1,200	0			0	0	varies	0		1,200	0	
H-BE-2 Marketing Classroom		900	0			0	0	varies	0		900	0	
H-BE-3 Workroom/Storage		100	0			0	0	varies	0		100	0	See Note 1
Business Education Total			**0**			**0**			**0**			**0**	

Technology Education Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive 9-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 372 STUDENTS					
Space		Qty	SF	Area	
H-FCS-1	Life Skills Lab	1	1,200	1,200	
H-FCS-2	Life Skills Storage	1	200	200	See Note 1
H-FCS-3	Laundry	1	150	150	
H-FCS-4	Child Development	0	1,200	0	
Family and Consumer Science Total				**1,550**	

Square Footage Allowance Note	
Student Enrollment	1
350-450 Students	200
451-800 Students	250
801-1200 Students	300
1201-1600 Students	350
Enrollment Determines SF Allowe	

Note: Only non-career technical students are used to determine the bracketing.

High School 9-12 Students (non-CT)	0

F & C Sci. Worksheet	0 HS students - *Students Type E*									OSDM Recommendation			
		New			Existing*			TOTAL					
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H-FCS-1	Life Skills Lab		1,200	0			0	0	varies	0		1,200	0	
H-FCS-2	Life Skills Storage		200	0			0	0	varies	0		200	0	See Note 1
H-FCS-3	Laundry		150	0			0	0	varies	0		150	0	
H-FCS-4	Child Development		1,200	0			0	0	varies	0		1,200	0	
Family and Consumer Science Total				**0**			**0**			**0**			**0**	

Family & Consumer Science Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive 9-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 372 STUDENTS					
Space		Qty	SF	Area	
H-PE-1	Gymnasium	1	***9,300***	9,300	See Note 1
H-PE-2	Auxiliary Gymnasium	0	7,000	0	See Note 2
H-PE-3	Student Locker Room	2	550	1,100	See Note 3
H-PE-4	Student Restroom/Shower	2	***200***	400	See Note 4
H-PE-5	Physical Education Storage	1	400	400	See Note 5
H-PE-6	P.E./Athletic Office	2	75	150	
H-PE-7	Staff Shower	2	75	150	
H-PE-8	Athletic Director's Office	0	120	0	
H-PE-9	Lobby Services	1	***100***	100	See Note 6
H-PE-10	Training Room	***0***	***200***	0	See Note 7
H-PE-11	Physical Health Classroom	0	750	0	See Note 8
H-PE-12	Multi-use P.E. Room	0	***1,400***	0	See Note 9
Physical Education Total				**11,600**	

Square Footage Allowance Notes								
Student Enrollment	1	3	4	5	6	7	8	9
350-450 Students	***9300***	550	200	400	100	200	750	***1400***
451-800 Students	***10700***	650	250	600	200	300	1500	***1400***
801-1200 Students	***12400***	700	300	800	200	400	1500	***1600***
1201-1600 Students	***14000***	850	350	1000	200	500	2000	***1800***
Enrollment Determines SF Allowed								

Note: Only non-career technical students are used to determine the bracketing.

High School 9-12 Students (non-CT)	0

Phys. Ed. Worksheet	**0**	**HS students - *Students Type E***							**OSDM Recommendation**			
	New			**Existing***			**TOTAL**					
Space	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	
H-PE-1 Gymnasium		***9,300***	0			0	0	varies	0		***9,300***	0	See Note 1
H-PE-2 Auxiliary Gymnasium		7,000	0			0	0	varies	0		7,000	0	See Note 2
H-PE-3 Student Locker Room		550	0			0	0	varies	0		550	0	See Note 3
H-PE-4 Student Restroom/Shower		200	0			0	0	varies	0		200	0	See Note 4
H-PE-5 Physical Education Storage		400	0			0	0	varies	0		400	0	See Note 5
H-PE-6 P.E./Athletic Office		75	0			0	0	varies	0		75	0	
H-PE-7 Staff Shower		75	0			0	0	varies	0		75	0	
H-PE-8 Athletic Director's Office		120	0			0	0	varies	0		120	0	
H-PE-9 Lobby Services		100	0			0	0	varies	0		100	0	See Note 6
H-PE-10 Training Room		200	0			0	0	varies	0		200	0	See Note 7
H-PE-11 Physical Health Classroom		750	0			0	0	varies	0		750	0	See Note 8
H-PE-12 Multi-use P.E. Room		***1,400***	0			0	0	varies	0		***1,400***	0	See Note 9
Physical Education Total			**0**			**0**			**0**			**0**	

Physical Education Notes
2: Auxiliary gymnasium is 7,000 SF regardless of the number of students.
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive 9-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
H-SD-1	Student Dining	1	3,792	3,792	See Note 1
H-SD-2	Stage	1	1,000	1,000	See Note 2
H-SD-7	Staff Dining	0	***250***	0	See Note 3
H-SD-8	Table Storage	1	***300***	300	See Note 4
H-SD-3	Scene Shop and Storage	1	350	350	See Note 5
H-SD-4	Make-up/Dressing Rooms	2	200	400	See Note 6
H-SD-5	Theatrical Control Room	1	150	150	
H-SD-6	Drama Storage	1	150	150	See Note 7
H-SD-9	Family Restroom	1	80	80	
Student Dining Total				**6,222**	

Square Foot Allowance Notes		
Student Enrollment	**3**	**4**
350-500 Students	250	300
501-700 Students	400	400
701-900 Students	550	500
Above 901 Students	700	600
Enrollment Determines SF Allowed		

Square Foot Allowance Notes			
Student Enrollment	**5**	**6**	**7**
350-450 Students	400	200	200
451-800 Students	450	250	400
801-1200 Students	500	250	500
Above 1201 Student	600	300	600
Enrollment Determines SF Allowed			

Note: Non-career technical students and career technical students are combined to determine the bracketing.

High School 9-12 Students (ALL)	0

Student Dining Worksheet

0 HS students - COMBINED

		New			Existing*			TOTAL			OSDM Recommendation			
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H/CT-SD-1	Student Dining		3,000	0			0	0	varies	0		3,000	0	See Note 1
H/CT-SD-2	Stage		1,000	0			0	0	varies	0		1,000	0	See Note 2
H-SD-7/CT-SD-3	Staff Dining		250	0			0	0	varies	0		250	0	See Note 3
H-SD-8/CT-SD-4	Table Storage		300	0			0	0	varies	0		300	0	See Note 4
H-SD-3	Scene Shop and Storage		400	0			0	0	varies	0		400	0	See Note 5
H-SD-4	Make-up/Dressing Rooms		200	0			0	0	varies	0		200	0	See Note 6
H-SD-5	Theatrical Control Room		200	0			0	0	varies	0		200	0	
H-SD-6	Drama Storage		200	0			0	0	varies	0		200	0	See Note 7
H-SD-9/CT-SD-5	Family Restroom		80	0			0	0	varies	0		80	0	
Student Dining Total				**0**			**0**			**0**			**0**	

Student Dining Notes
1: The size of the student dining space is equal to one-third of the student***enrollment*** multiplied by 17.5 SF per student or 3000 SF, whichever is greater.
2: The size of the stage equals student***enrollment*** multiplied by 2.0 SF, or 1,000 SF, whichever is greater.
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive 9-12 School including Career Technical Programs
The example is intended to assist in the development of the summary of spaces

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
H-FS-0	Warming Kitchen	0	1,300	0	*See Note 1 & Kit. Area Note*
H-FS-1	Kitchen (total)	1		2,275	*See Note 2*
H-FS-1a	Preparation Area	1	819		*See Kit. Area Note*
H-FS-1b	Serving Area	1	774		*See Kit. Area Note*
H-FS-1c	Dry Food Storage	1	250		*See Kit. Area Note*
H-FS-1d	Cooler/Freezer	1	228		*See Kit. Area Note*
H-FS-1e	Ware Washing	1	205		*See Kit. Area Note*
H-FS-2	Dietician Office	1	75	75	
H-FS-3	Restroom / Locker Room	1	140	140	
Food Service Total				**2,490**	

Kitchen Area Sizes					
Food Service Area	Enroll	X	SF per Student	x	%
Preparation Area	Enroll	x	3.5	x	36%
Serving Areas	Enroll	x	3.5	x	34%
Dry Food Storage	Enroll	x	3.5	x	11%
Cooler/Freezer	Enroll	x	3.5	x	10%
Ware Washing Area	Enroll	x	3.5	x	9%
Warming Kitchen	Enroll	x	2.0		
Multiply Enrollment x SF/Student x % to achieve size of area					

Note: Non-career technical students and career technical students are combined to determine the bracketing.

High School 9-12 Students (ALL)	0

Food Service Worksheet		0 HS students - COMBINED								OSDM Recommendation			
		New			Existing*			TOTAL					
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
H/CT-FS-0	Warming Kitchen		0	0			0	0	varies	0		0	0	*See Note 1 & Kit. Area Not*
H/CT-FS-1	Kitchen (total)			0			0	0	varies	0			0	*See Note 2*
H/CT-FS-1a	Preparation area		0						varies			0		*See Kit. Area Note*
H/CT-FS-1b	Serving area		0						varies			0		*See Kit. Area Note*
H/CT-FS-1c	Dry food storage		0						varies			0		*See Kit. Area Note*
H/CT-FS-1d	Cooler/freezer		0						varies			0		*See Kit. Area Note*
H/CT-FS-1e	Ware washing		0						varies			0		*See Kit. Area Note*
H/CT-FS-2	Dietician Office		75	0			0	0	varies	0		75	0	
H/CT-FS-3	Restroom / Locker Room		140	0			0	0	varies	0		140	0	
Food Service Total				**0**			**0**			**0**			**0**	

Food Services Notes
1: The size of the kitchen is equal to the sum of preparation area, serving area, dry food storage area, cooler/freezer area, and ware washing area.
2 : Only one of the two kitchens is to be used - either ***H/CT-FS-0 or H/CT-FS-1*** - not both.
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

The following is an example of a Comprehensive 9-12 School including Career Technical Programs
The example is intended to assist in the development of the summary of spaces

EXAMPLE - 650 students					
Space		Qty	SF	Area	
H-CU-1	Workroom	1	400	400	See Note 1
H-CU-2	Custodial Office	1	100	100	
Custodial Total				**500**	

Square Footage Allowance Note	
Student Enrollment	**1**
Up to 400 Students	200
401-600 Students	300
Above 600 Students	400
Enrollment Determines SF Allowe	

Note: Non-career technical students and career technical students are combined to determine the bracketing.

High School 9-12 Students (ALL)	0

Custodial Worksheet	0 HS students - COMBINED									OSDM Recommendation			
	New			Existing*			TOTAL						
Space	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	
M/H/CT-CU-1 Workroom		200	0			0	0	varies	0		200	0	See Note
M/H/CT-CU-2 Custodial Office		100	0			0	0	varies	0		100	0	
Custodial Total			**0**			**0**			**0**			**0**	

Custodial Services Notes
*The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

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The following is an example of a Comprehensive 9-12 School including Career Technical Programs.
The example is intended to assist in the development of the summary of spaces.

EXAMPLE - 650 STUDENTS					
Space		Qty	SF	Area	
H-BS-1	Large Group Restrooms		2,470	2,470	See Build Svc Area Sizes
H-BS-2	Custodial Closet	2	50	100	
H-BS-3	Electrical Closet	2	50	100	
H-BS-4	Telecommunications Room (TR)	2	64	128	See Note 1
H-BS-5	Corridors		14,116	14,116	See Build Svc Area Sizes
H-BS-6	Mechanical Rooms/Decks		4,870	4,870	See Build Svc Area Sizes
H-BS-7	Storage Area	1	200	200	See SF Allowance Notes
H-BS-8	Central Storage Area	1	200	200	See Central Storage-CT Notes
H-BS-9	Loading/Receiving Area	1	120	120	
H-BS-10	Restroom	0	60	0	
H-BS-11	Recycling Room	1	100	100	See SF Allowance Notes
Building Services Total				**22,404**	

Note: Non-career technical students and career technical students are combined to determine the bracketing.

Bldg. Services Sq. Ft. Allowance Notes			
Student Enrollment	Stor	*Ctl Stor-Non CT*	*Recycle*
350-450 Students	150	170	80
451-800 Students	200	200	100
801-1200 Students	250	220	130
Above 1201 Students	250	240	160
Enrollment Determines SF Allowed			

Central Storage-CT Notes	
Student Enrollment	Ctl Stor CT
Up to 400 Students	7.5 SF/Student
400-600 Students	6.6 SF/Student
600-800 Students	5.8 SF/Student
Above 800 Students	5 SF/Student
Enrollment Determines SF Allowed	

High School 9-12 Students (ALL)	0

Building Svcs. Worksheet		0 HS students - COMBINED										
		New			Existing*			TOTAL			OSDM Recommendation		
Space		Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
H-BS-1/***CT-GS-1***	***Large Group Restrooms***	-	0	0	-		0	-	varies	0	-	0	0
H-BS-2/CT-GS-2	Custodial Closet		50	0			0	0	varies	0		50	0
H-BS-3/CT-GS-3	Electrical Closet		50	0			0	0	varies	0		50	0
H-BS-4/CT-GS-4	Telecommunications Room		64	0			0	0	varies	0		64	0
H-BS-5	Corridors - Non-CT	-	0	0	-		0	varies		0	-	0	0
CT-BS-1	Corridors - CT	-	0	0	-		0	varies		0	-	0	0
	Vertical Circulation	-	***0***	0	-		0	varies		0	-	0	0
H-BS-6	Mechanical/Electrical Space/Decks - Non-CT	-	0	0	-		0	varies		0	-	0	0
CT-BS-2	Mechanical/Electrical Space/Decks - CT	-	0	0	-		0	varies		0	-	0	0
H-BS-7/CT-GS-5	Storage Area		150	0			0	0	varies	0		150	0
H-BS-8	Central Storage Area: Non-CT		170	0			0	0	varies	0		170	0
CT-GS-6	Central Storage Area: CT Only		0	0			0	0	varies	0		0	0
H-BS-9/H-GS-7	Loading/Receiving Area		120	0			0	0	varies	0		120	0
H-BS-10	Restroom		60	0			0	0	varies	0		60	0
H-BS-11	Recycling Room		80	0			0	0	varies	0		80	0
Building Services - Non-CT Total				0			0			0			0
Building Services - CT Total				***0***			***0***			***0***			***0***
Building Services Grand Total				0			0			0			0

Building Services Notes	
Number	Notes:
	Size of Telecommunications Room varies with size of high school. See page 6114-4.
	Vertical Circulation refers only to the following: Stairways/stairtowers, monumental stairs, elevators and elevator equipment room. The total size of the Vertical Circulation is equal to the sum of the program areas, excluding building services, multiplied by 2.5%.
*	The Existing SF columns are to be used in projects where there are to be buildilng additions or renovations.

Building Services Area Sizes			
Building Services Areas	Prog	X	%
Large Group Restrooms-Non CT & CT	Prog	x	3.5
Corridors-Non-CT	Acad Prog	x	20.0
Corridors-CT	CT Prog	x	14.0
Mech./Elec. Space/Decks-Non-CT	Acad Prog	x	6.9
Mech./Elec. Space/Decks-CT	CT Prog	x	5.0
Multiply Sum of Prog. Areas - Build. Svcs. x % to achieve size of area			

Lab & Support Space Worksheet		0 students			Students Type A & C						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	CTE Program Code	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
Accounting	G0		1200	0				0	varies	0		1200	0
Administrative and Professional Support	C0		1200	0				0	varies	0		1200	0
Automation & Robotics	R0		1800	0				0	varies	0		1800	0
Aviation Occupations	T4		1500	0				0	varies	0		1500	0
Business Management	C1		1200	0				0	varies	0		1200	0
Electronics	R1		1800	0				0	varies	0		1500	0
Financial Services	G1		1200	0				0	varies	0		1500	0
Information Support and Services	N0		1200	0				0	varies	0		1800	0
Interactive Media	N1		1200	0				0	varies	0		1000	0
Legal Management and Support	C2		1200	0				0	varies	0		1200	0
Medical Management and Support	C3		1200	0				0	varies	0		1200	0
Network Systems	N2		1200	0				0	varies	0		1200	0
Programming & Software Development	N3		1200	0				0	varies	0		1200	0
Telecommunications	F5		1200	0				0	varies	0		1200	0
Travel and Tourism	L2		1200	0				0	varies	0		1200	0
Visual Design and Imaging	B2		1200	0				0	varies	0		1200	0
Total Lab Spaces		0			0			0			0		
Related Spaces													
CT-P1-2 Office			120	0				0	varies	0		120	0
CT-P1-3 Storage			200	0				0	varies	0		200	0
Total Program Type 1				**0**						**0**			**0**

Laboratory and Support Spaces Notes
*The Existing SF columns are only to be used in projects where there are to be buildilng additions

2014 - 429

Lab & Support Space Worksheet		0 students			Students Type A & C						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	CTE Program Code	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
Allied Health & Nursing	***JM***		***1500***	***0***				***0***	***varies***	***0***		***1500***	***0***
Biomedical Science	***F0***		***1500***	***0***				***0***	***varies***	***0***		***1500***	***0***
Biotechnology for Food, Plant, Animal Science	A3		1500	0				0	varies	0		1500	0
Community Health Aide	J2		1500	0				0	varies	0		1500	0
Criminal Science Technology	P2		1500	0				0	varies	0		1500	0
Dental Laboratory Technology	J4		1500	0				0	varies	0		1500	0
Emergency Medical Technician	P3		1500	0				0	varies	0		1500	0
Energy Science	F1		1500	0				0	varies	0		1500	0
Engineering Science	***F2***		***1500***	***0***				***0***	***varies***	***0***		***1500***	***0***
Engineering and Design	***F6***		***1500***	***0***				***0***	***varies***	***0***		***1500***	***0***
Exercise Science and Sports Medicine	J6		1500	0				0	varies	0		1500	0
Health Information Management	J7		1500	0				0	varies	0		1500	0
Health Support Pathway	J8		1500	0				0	varies	0		1500	0
Health Unit Coordinator	J9		1500	0				0	varies	0		1500	0
Home Health	JA		1500	0				0	varies	0		1500	0
Medical Bioscience	J0		1500	0				0	varies	0		1500	0
Medical Laboratory Technology	JC		1500	0				0	varies	0		1500	0
Pharmacy Technician	JG		1500	0				0	varies	0		1500	0
Practical Nursing	JJ		1500	0				0	varies	0		1500	0
Therapeutic Pathway	JL		1500	0				0	varies	0		1500	0
	Total Lab Spaces	**0**			**0**			**0**			**0**		
Related Space													
CT-P2-2 Office			120	0				0	varies	0		120	0
CT-P2-3 Storage			200	0				0	varies	0		200	0
CT-P2-4 Changing Room			450	0				0	varies	0		450	0
Total Program Type 2				**0**						**0**			**0**

Laboratory and Support Spaces Notes

The Existing SF columns are only to be used in projects where there are to be building additions

2014 - 430

Lab & Support Space Worksheet		0 students			Students Type A & C						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	CTE Program Code	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
Supply Chain Management	S0												
Laboratory			1500	0		0	0	0	varies	0		1500	0
Early Childhood Education	E0												
Laboratory			1500	0		0	0	0	varies	0		1500	0
Observation			120	0		0	0	0	varies	0		120	0
Infants			700	0		1	0	0	varies	0		700	0
Kitchenette/Break room			350	0		0	0	0	varies	0		350	0
Reception			500	0		0	0	0	varies	0		500	0
Workroom			150	0		0	0	0	varies	0		150	0
Toddler Restroom			60	0		0	0	0	varies	0		60	0
Playground Area													
Entrepreneurship	S1												
Laboratory			1000	0		0	0	0	varies	0		1000	0
Bookstore			800	0		0	0	0	varies	0		800	0
Display			100	0		0	0	0	varies	0		100	0
Ground Operations	T5												
Laboratory			1500	0		0	0	0	varies	0		1500	0
Reference Room			150	0		0	0	0	varies	0		150	0
Lodging	L1												
Laboratory			1500	0		0	0	0	varies	0		1500	0
Banquet Room			800	0		0	0	0	varies	0		800	0
Marketing Communications	S3												
Laboratory			900	0		0	0	0	varies	0		900	0
Bookstore			800	0		0	0	0	varies	0		800	0
Display			100	0		0	0	0	varies	0		100	0
Marketing Management	S4												
Laboratory			900	0		0	0	0	varies	0		900	0
Bookstore			800	0		0	0	0	varies	0		800	0
Display			100	0		0	0	0	varies	0		100	0
Total Lab Spaces		**0**			**0**			**0**			**0**		
Related Space													
CT-P3-2 Office			120	0		0	0	0	varies	0		120	0
CT-P3-3 Storage			200	0		0	0	0	varies	0		200	0
Total Program Type 3				***0***			***0***			***0***			***0***

Laboratory and Support Spaces Notes

The Existing SF columns are only to be used in projects where there are to be build

Lab & Support Space Worksheet		0 students			*Students Type A & C*						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	***CTE Program Code***	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**
Animal Science and Management	A2												
Laboratory (small animal)			1000	0			0	0	varies	0		1000	0
Pet shop			1200	0			0	0	varies	0		1200	0
Clinic			350	0			0	0	varies	0		350	0
Grooming			350	0			0	0	varies	0		350	0
Animal Room			200	0			0	0	varies	0		200	0
Animal Room			600	0			0	0	varies	0		600	0
Kennel			250	0			0	0	varies	0		250	0
Career Paths for the Law Profession	P0												
Laboratory			1200	0			0	0	varies	0		1200	0
Weight Room			800	0			0	0	varies	0		800	0
Interrogation Room			150	0			0	0	varies	0		150	0
Clinical Health Services	J1												
Laboratory			1200	0			0	0	varies	0		1200	0
Training Restroom			120	0			0	0	varies	0		120	0
Laundry Room			120	0			0	0	varies	0		120	0
Cosmetology	M1												
Laboratory			1600	0			0	0	varies	0		1600	0
Dispensary			175	0			0	0	varies	0		175	0
Laundry Room			150	0			0	0		0		150	0
Facial Room			200	0			0	0	varies	0		200	0
Manicure Room			200	0			0	0	varies	0		200	0
Customer Toilet			60	0			0	0	varies	0		60	0
Criminal Justice	P1												
Laboratory			1200	0			0	0	varies	0		1200	0
Weight Room			800	0			0	0	varies	0		800	0
Interrogation Room			150	0			0	0	varies	0		150	0
Culinary and Food Service Operations	L0												
Laboratory			1800	0			0	0	varies	0		1800	0
Restaurant			1500	0			0	0	varies	0		1500	0
Dry Storage			150	0			0	0	varies	0		150	0
Total Program Type 4 (Page 1)		**0**		**0**	**0**		**0**	**0**		**0**	**0**		**0**

Laboratory and Support Spaces Notes
1: One classroom space is to be allocated for every two program spaces (or fractions thereof) in types 4 through 7.
*The Existing SF columns are only to be used in projects where there are to be buildilng additions

Lab & Support Space Worksheet		0 students			*Students Type A & C*						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	***CTE Program Code***	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**	**Qty**	**SF**	**Area**
Dental Assistant	J3												
Laboratory			1500	0			0	0 varies		0		1500	0
X-ray Room			80	0			0	0 varies		0		80	0
Darkroom			80	0			0	0 varies		0		80	0
Diagnostic Pathway	J5												
Laboratory			1200	0			0	0 varies		0		1200	0
Exam Room			200	0			0	0 varies		0		200	0
Firefighting and Emergency Medical Services	***P6***												
Laboratory			***1500***	***0***			***0***	***0 varies***		***0***		***1500***	***0***
Weight Room			***800***	***0***			***0***	***0 varies***		***0***		***800***	***0***
Fire Fighter Training	P4												
Laboratory			1500	0			0	0 varies		0		1500	0
Weight Room			800	0			0	0 varies		0		800	0
Media Arts	B0												
Laboratory			1500	0			0	0 varies		0		1500	0
Media Arts Control Room/Edit			450	0			0	0 varies		0		450	0
Vestibule			84	0			0	0 varies		0		84	0
Medical Assistant	JB												
Laboratory			1200	0			0	0 varies		0		1200	0
Training Restroom			120	0			0	0 varies		0		120	0
Laundry Room			120	0			0	0 varies		0		120	0
Nurse Assisting	JD												
Laboratory			1200	0			0	0 varies		0		1200	0
Training Restroom			120	0			0	0 varies		0		120	0
Laundry Room			120	0			0	0				120	0
Optometric Occupations	JE												
Laboratory			1200	0			0	0 varies		0		1200	0
Exam Room			100	0			0	0 varies		0		100	0
Patient Care Technician	JF												
Laboratory			1500	0			0	0 varies		0		1500	0
Training Restroom			120	0			0	0 varies		0		120	0
Laundry Room			120	0			0	0 varies		0		120	0
Performing Arts	B1												
Laboratory			1500	0			0	0 varies		0		1500	0
Practice Room			150	0			0	0 varies		0		150	0
Private Security	P5												
Laboratory			1200	0			0	0 varies		0		1200	0
Weight Room			800	0			0	0 varies		0		800	0
Interrogation Room			150	0			0	0 varies		0		150	0
Surgical Technology	JK												
Laboratory			1000	0			0	0 varies		0		1000	0
Operating Room			800	0			0	0 varies		0		800	0
Instrument Room			700	0			0	0 varies		0		700	0
Scrub Room			500	0			0	0 varies		0		500	0
Total Lab Spaces		**0**			**0**			**0**			**0**		
Related Space													
CT-P4-2 Classroom	***Note 1***		900	0			0	0 varies		0		900	0
CT-P4-3 Office			120	0			0	0 varies		0		120	0
CT-P4-4 Storage			200	0			0	0 varies		0		200	0
CT-P4-5 Changing Room			450	0			0	0 varies		0		450	0
Total Program Type 4 (Page 1)				0			0			0			0
Total Program Type 4 (Page 1 & 2)				**0**			**0**			**0**			**0**

Laboratory and Support Spaces Notes

1: One classroom space is to be allocated for every two program spaces (or fractions thereof) in types 4 through 7.
*The Existing SF columns are only to be used in projects where there are to be buildilng additions

Lab & Support Space Worksheet		0 students			Students Type A & C						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	CTE Program Code	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
Agribusiness and Production	A0												
Laboratory			4500	0			0	0	varies	0		4500	0
Greenhouse			1000	0			0	0	varies	0		1000	0
Auto Specilization	T2		3500	0			0	0	varies	0		3500	0
Brick, Block, and Cement Masonry	D0		3500	0			0	0	varies	0		3500	0
Building and Property Maintenance	D1		3000	0			0	0	varies	0		3000	0
Building Technology	D2		3000	0			0	0	varies	0		3000	0
Custodial Services	D6		2500	0			0	0	varies	0		2500	0
Electrical Trades	D7		3000	0			0	0	varies	0		3000	0
Environmental Control Technologies	D8		3000	0			0	0	varies	0		3000	0
Heavy Equipment Operations	D9		4500	0			0	0	varies	0		4500	0
Integrated Systems Technology	R2		3500	0			0	0	varies	0		3500	0
Interior Design Applications	DA		3000	0			0	0	varies	0		3000	0
Manufacturing Design and Development	R3		4500	0			0	0	varies	0		4500	0
Natural Resource Management	A6												
Laboratory			3000	0			0	0	varies	0		3000	0
Greenhouse			1000	0			0	0	varies	0		1000	0
Plumbing and Pipefitting	DB		3000	0			0	0	varies	0		3000	0
Power Equipment Technology	T8		3500	0			0	0	varies	0		3500	0
Power Transmission	F4		3500	0			0	0	varies	0		3500	0
Welding and Cutting	R6		3500	0			0	0	varies	0		3500	0
Total Lab Spaces		**0**			**0**			**0**			**0**		
Related Space - List per Program add rows as nee													
CT-P5-2 Classroom	***Note 1***		900	0			0	0	varies	0		900	0
CT-P5-3 Office			120	0			0	0	varies	0		120	0
CT-P5-4 Storage			200	0			0	0	varies	0		200	0
CT-P5-5 Changing Room	***Note 2***		270	0			0	0	varies	0		270	0
CT-P5-6 Tool Crib			550	0			0	0	varies	0		550	0
CT-P5-7 Reference Room			200	0			0	0	varies	0		200	0
CT-P5-8 Toilet Room			68	0			0	0	varies	0		68	0
Total Program Type 5				**0**			**0**			**0**			**0**

Laboratory and Support Spaces Notes

1: One classroom space is to be allocated for every two program spaces (or fractions thereof) in types 4 thr ough 7.

2: Square footage of changing room determined by total number of approved programs types 5, 6 and 7 tim es 30 students times 9 SF per student. Changing room to be entered on POR once.

*The Existing SF columns are only to be used in projects where there are to be buildilng additions

Lab & Support Space Worksheet		0 students			Students Type A & C						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	CTE Program Code	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
Auto Collision Repair	T1												
Laboratory			5000	0			0	0	varies	0		5000	0
Auto Parts Storage			300	0			0	0	varies	0		300	0
Auto Technology	T3												
Laboratory			5000	0			0	0	varies	0		5000	0
Engine Storage			800	0			0	0	varies	0		800	0
Machine Room			900	0			0	0	varies	0		900	0
Flammable Material Storage			60	0			0	0	varies	0		60	0
Carpentry	D3												
Laboratory			4000	0			0	0	varies	0		4000	0
Finishing Room			500	0			0	0	varies	0		500	0
Material Storage			800	0			0	0	varies	0		800	0
Construction - Management	D5												
Laboratory			3000	0			0	0	varies	0		3000	0
CADD Room			400	0			0	0	varies	0		400	0
Construction - Design / Build	D4												
Laboratory			3000	0			0	0	varies	0		3000	0
CADD Room			400	0			0	0	varies	0		400	0
Construction Design and Management	***DF***												
Laboratory			***3000***	***0***			***0***	***0***	***varies***	***0***		***3000***	***0***
CADD Room			***400***	***0***			***0***	***0***	***varies***	***0***		***400***	***0***
Engineering Technology	F3												
Laboratory			1500	0			0	0		0		1500	0
CADD Room			400	0			0	0	varies	0		400	0
Food Science and Technology	A4												0
Laboratory			2000	0			0	0	varies	0		2000	0
Freezer			400	0			0	0	varies	0		400	0
Cooler			400	0			0	0	varies	0		400	0
Retail			400	0			0	0	varies	0		400	0
Ground Transportation	***T9***												
Laboratory			***5000***	***0***			***0***	***0***	***varies***	***0***		***5000***	***0***
Engine Storage			***800***	***0***			***0***	***0***	***varies***	***0***		***800***	***0***
Machine Room			***900***	***0***			***0***	***0***	***varies***	***0***		***900***	***0***
Flammable Material Storage			***60***	***0***			***0***	***0***	***varies***	***0***		***60***	***0***
Horticulture	A5												
Laboratory			2000	0			0	0	varies	0		2000	
Retail			400	0			0	0	varies	0		400	
Greenhouse			3000	0			0	0	varies	0		3000	0
Industrial Power Technology	A1												
Laboratory			5000	0			0	0	varies	0		5000	0
Engine Storage			1000	0			0	0	varies	0		1000	0
Flammable Material Storage			200	0			0	0	varies	0		200	0
Total Program Type 6 (Page 1)		***0***		**0**	***0***		**0**	***0***		**0**	***0***		**0**

Laboratory and Support Spaces Notes
1: One classroom space is to be allocated for every two program spaces (or fractions thereof) in types 4 through 7.
2: Square footage of changing room determined by total number of approved programs types 5, 6 and 7 times 30 students times 9 SF per student. Changing room to be entered on POR once.
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Lab & Support Space Worksheet		0 students			Students Type A & C						OSDM Recommendation		
		New			Existing*			TOTAL					
Laboratory Space	CTE Program Code	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
Manufacturing Occupations	***R7***												***0***
Laboratory			***3500***	***0***			***0***	***0***	***varies***	***0***		***3500***	***0***
CNC Room			***900***	***0***			***0***	***0***	***varies***	***0***		***900***	***0***
Inspection Room			***150***	***0***			***0***	***0***	***varies***	***0***		***150***	***0***
Mechanical, Electrical, and Plumbing	***DE***												
Laboratory			***3000***	***0***			***0***	***0***	***varies***	***0***		***3000***	***0***
CADD Room			***400***	***0***			***0***	***0***	***varies***	***0***		***400***	***0***
Medium/Heavy Truck Technician	T7												
Laboratory			6000	0			0	0	varies	0		6000	0
Engine Storage			800	0			0	0	varies	0		800	
Flammable Material Storage			60	0			0	0	varies	0		60	0
Machine Room			900	0			0	0	varies	0		900	0
Precision Machining	R5												
Laboratory			3500	0			0	0	varies	0		3500	0
CNC Room			900	0			0	0	varies	0		900	0
Inspection Room			150	0			0	0	varies	0		150	0
Structural Systems	***DD***												
Laboratory			***3000***	***0***			***0***	***0***	***varies***	***0***		***3000***	***0***
CADD Room			***400***	***0***			***0***	***0***	***varies***	***0***		***400***	***0***
Wood Product Technologies	DC												
Laboratory			3000	0			0	0	varies	0		3000	0
Finishing Room			500	0			0	0	varies	0		500	0
Material Storage			800	0			0	0	varies	0		800	0
Total Lab Spaces		***0***			***0***			***0***			***0***		
Related Space - List per Program add rows as needed													
CT-P6-2 Related Classroom	***Note 1***		900	0			0	0	varies	0		900	0
CT-P6-3 Office			120	0			0	0	varies	0		120	0
CT-P6-5 Changing Room	***Note 2***		270	0			0	0	varies	0		270	0
CT-P6-4 Storage			200	0			0	0	varies	0		200	0
CT-P6-6 Tool Crib			550	0			0	0	varies	0		550	0
CT-P6-7 Reference Room			200	0			0	0	varies	0		200	0
CT-P6-8 Toilet Room			68	0			0	0	varies	0		68	0
Total Program Type 6 (Page 1)				0			0			0			0
Total Program Type 6 (Page 1 & 2)				***0***			***0***			***0***			***0***

Laboratory and Support Spaces Notes
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*The Existing SF columns are only to be used in projects where there are to be buildilng additions

Lab & Support Space Worksheet			0 students			Students Type A & C						OSDM Recommendation		
			New			Existing*			TOTAL					
Laboratory Space	CTE Program Code	Subject Code	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area	Qty	SF	Area
Aircraft Maintenance	T0	17.0401												
Laboratory				13000	0				0	varies	0		13000	0
Cleaning Room				400	0				0	varies	0		400	0
Parts Storage				300	0				0	varies	0		300	0
Hazardous Materials Storage				60	0				0	varies	0		60	0
Paint Storage				100	0				0	varies	0		100	0
Air Transportation	***TA***													
Laboratory				***13000***	***0***				***0***	***varies***	***0***		***13000***	***0***
Cleaning Room				***400***	***0***				***0***	***varies***	***0***		***400***	***0***
Hazardous Materials Storage				***60***	***0***				***0***	***varies***	***0***		***60***	***0***
Paint Storage				***100***	***0***				***0***	***varies***	***0***		***100***	***0***
Animal Science & Management (Equine)	A2	01.0901												
Laboratory				8000	0				0	varies	0		8000	0
Stables				6800	0				0	varies	0		6800	0
Total Lab Spaces			***0***			***0***			***0***			***0***		
Related Space														
CT-P7-2 Classroom	***Note 1***			900	0				0	varies	0		900	0
CT-P7-3 Office				120	0				0	varies	0		120	0
CT-P7-4 Storage				200	0				0	varies	0		200	0
CT-P7-5 Changing Room	***Note 3***			270	0				0	varies	0		270	0
CT-P7-6 Tool Crib				550	0				0	varies	0		550	0
CT-P7-7 Reference Room				200	0				0	varies	0		200	0
CT-P7-8 Toilet Room				68	0				0	varies	0		68	0
Total Program Type 7					**0**						**0**			**0**

Laboratory and Support Spaces Notes

1: One classroom space is to be allocated for every two program spaces (or fractions thereof) in types 4 through 7.

2: Support will be provided for only the first 10,000 SF for any one program.

3: Square footage of changing room determined by total number of approved programs types 5, 6 and 7 times 30 students times 9 SF per student. Changing room to be entered on POR once.

*The Existing SF columns are only to be used in projects where there are to be buildilng additions

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PURPOSE

The purpose of this chapter is to assist the school district and the Design Professional with purchase and development of a site.

INTRODUCTION

In each case of purchase and development, there are several required criteria to be in compliance with the Ohio Facilities Construction Commission guidelines. If these items are not in compliance, an approval to deviate must be obtained.

SITE SELECTION CRITERIA

The site selection criteria given are not the only factors in selecting a site for a new facility. These criteria have an impact on development and use of a facility, however large or small. The school district and the Design Professional may supplement the criteria, if so desired. Several of the criteria have been determined to be significant enough that they must be complied with during consideration of a site and others must be in compliance prior to purchase of the site.

SITE DESIGN

General site design requirements for new facilities have been developed for all new buildings and are listed in Section 3200. Specific requirements unique to each building category are listed in Section 3300 for Elementary Schools, Section 3400 for Middle Schools, and Section 3500 for High Schools.

Throughout the site design requirements are references to "provide for" and "plan for." Where the term "provide for" is used, the Ohio Facilities Construction Commission will fund these items. Where the term "plan for" is used, the school district will fund, except for the site preparation, which generally are changes in topography.

SITE ACCESS SAFETY IMPROVEMENTS

OFCC Master Planning Guidelines will include the option to provide a designated co-fundable allowance for site access safety improvements (i.e. deceleration lane, center left turn lane, metering, signage, etc.).

A traffic study, which is co-fundable, should be conducted during the planning stage or project phase. If facilities are on new sites, generally the allowance will be included. The Planner/RPC should consult with the District on this decision.

OHIO DEPARTMENT OF TRANSPORTATION

The Ohio Department of Transportation has planning, selection, and design manuals available that may be helpful to the district and Design Professional during the review and selection of an appropriate school facility site. The district or Design Professional may contact the ODOT district offices found on the next page, for access to these references.



District 1
1885 N. McCullough St.
Lima, OH 45801-0040
419-222-9055
fax: 419-222-0438

District 2
317 East Poe Rd.
Bowling Green, OH 43402-1330
419-353-8131
fax: 419-353-1468

District 3
906 Clark Ave.
Ashland, OH 44805-1989
800-276-4188 or 419-281-0513
fax: 419-281-0874

District 4
2088 S. Arlington Rd.
Akron, OH 44306
330-786-3100
fax: 330-786-2232

District 5
9600 Jacksontown Rd.
Jacksontown, OH 43030
740-323-4400
fax: 740-323-3715

District 6
400 East William St.
Delaware, OH 43015
740-833-8000
fax: 740-833-8100

District 7
1001 St. Marys Ave.
Sidney, OH 45365-0969
888-200-9919 or 937-492-1141
fax: 937-497-9734

District 8
505 S. State Route 741
Lebanon, OH 45036-9518
800-831-2142 or 513-932-3030
fax: 513-932-7651

District 9
650 Eastern Ave. PO Box 467
Chillicothe, OH 45601
888-819-8501 or 740-773-2691
fax: 740-775-4889

District 10
338 Muskingum Dr. PO Box 658
Marietta, OH 45750
800-845-0226 or 740-568-3900
fax: 740-373-7317

District 11
2201 Reiser Ave.
New Philadelphia, OH 44663
330-339-6633
fax: 330-308-3942

District 12
5500 Transportation Blvd.
Garfield Heights, OH 44125-5396
800-732-4896 or 216-581-2100
fax: 216-584-2274

Central Office
1980 W. Broad Street
Columbus, OH 43223
614-466-7170
fax: 614-644-8662
ODOT Web Site:
www.transportation.ohio.gov

A. GENERAL

1. Site selection criteria apply to new construction. A review of the site selection criteria is required for additions to existing facilities to determine if the existing site can accommodate the site design requirements. Site selection is to be done by the school district with the assistance of a design professional.

2. Factors to be used for judging the merits of a site under consideration are listed below. The order of the factors does not establish importance or priority of each factor.

2.1 Site Characteristics

a. Proximity to other school district operated facilities
b. Proximity to student population served
c. Site Size
d. Topography
e. Soil Characteristics
f. Site Utilities
g. Site Preparation ***Requirements***
h. Codes and Zoning
i. Adjacent Property
j. Easements/Rights-of-Way***/Set-backs***
k. Environmental Restrictions/Impact
l. Testing
m. Aesthetic Considerations

2.2 Transportation And Access
Pedestrian Access
Bicycle Access
Vehicular Access
Emergency Vehicle Access
Community Connectivity
Access to Public Transportation

3. Sustainable Site Design Factors:
Following are a few of the factors to be considered when developing a sustainable site design. Additional factors can be found in the USGBC LEED for Schools reference guide.

a. Building orientation for daylighting and natural ventilation
b. Minimize site development impact
c. Minimize impervious surface
d. Site and athletic field maintenance using integrated pest management and water efficient irrigation systems

4. Where requirements differ between local/state authorities and Ohio Facilities Construction Commission guidelines, the project must comply with the greater of the two. Every site is unique, and situations may arise that are unforeseen by these guidelines. In the event that a special exception to these guidelines should be considered, the proposed variance to the guidelines should be discussed early in the planning process with the Ohio Facilities Construction Commission.

SITE SIZE

The site sizes given attempt to accommodate a range of available site sizes. It is also recognized that not all sites will be able to accommodate a new or replacement facility, even with the smallest site size recommended in this Design Manual. It is therefore incumbent on the District and it's Architect to analyze site sizes and determine the size that best meets the needs of the District. In order to assist the District in determining the best site size, the following recommended site sizes given:

Elementary School:	10 acres plus 1 acre per 100 students
Middle School:	20 acres plus 1 acre per 100 students
High School:	35 acres plus 1 acre per 100 students

Combination Schools:

K-12 School: 40 acres plus 1 acre per 100 students K-8 School: 20 acres plus 1 acre per 100 students 6-12 School: 35 acres plus 1 acre per 100 students

Career-Technical School ***and Comprehensive High Schools:*** 35 acres plus 1 acre per 100 students

URBAN SITE SIZE

In Urban areas, it may be necessary to reduce the size of the school site due to numerous existing and future development factors. A list of possible site size reductions is provided below for the ***District*** and Design Professional to analyze the different options. The list is not all-inclusive and all decisions need to involve all interested parties prior to deleting or reducing a program. ***Refer to paragraph C. URBAN SITE INTRODUCTION, for information on Urban site guidelines.***

Decrease the footprint percentages from the ideal target sizes identified in the Proposed Building Footprint chart in paragraph D that follows.

Decrease the amount of visitor and staff parking to be provided.

Decrease the amount of student parking provided.

Decrease the amount of mechanical yard space to be provided.

Delete the bus drop-off and parent drop-off areas and provide a curbside service only.

Reduce/decrease the size/number of playfields/ playgrounds to be provided.

URBAN SITE INTRODUCTION

The following site size recommendations are intended as guidelines for evaluating the facilities required for schools of certain grade levels and student populations.

The design professional should review the recommended site sizes with the local school district with regard to their educational program, community needs, availability of existing recreational facilities within the community and other extenuating circumstances.

Paragraph D presents the building sizes recommended for various grade levels and student populations. Paragraph D also indicates what portion of that area should be reflected in the footprint of the building, i.e., what portion should remain on the first floor of the building.

After evaluation of all possible factors affecting the size of the new or existing site, the Design Professional shall submit the itemized evaluation to the OFCC for review and approval.

Paragraph E presents total parking spaces recommended for various grade levels and student populations.

Paragraphs F, G, and H present the total site area recommended for elementary schools of various student populations.

Paragraphs I, J, and K present the total site area recommended for middle schools of various student populations.

Paragraphs L, M, N and O present the total site area recommended for high schools of various student populations.

Paragraph P presents total area required for each type of outdoor athletic or recreation facility, and is intended as a guideline in adjusting recommended site sizes.

URBAN BUILDING FOOTPRINT

The following chart is intended to assist with building footprint size selection:

Percentage of Building Footprint to Total Area (GSF)								
Building Size	GSF	40%	50%	60%	70%	80%	90%	100%
ELEMENTARY SCHOOLS								
400 students	50,000							50,000
550 students	64,520				45,164	51,616		
700 students	80,920				56,644	64,736		
MIDDLE SCHOOLS								
450 students	67,950				47,565	54,360		
600 students	85,725			51,435	60,007			
750 students	105,750			63,450	74,025			
HIGH SCHOOLS								
450 students	81,000				56,700	64,800		
800 students	***132,800***			***79,680***	***92,960***			
1200 students	***198,000***		***99,000***	***118,800***				
1600 students	***259,200***		***129,600***	***155,520***				

PARKING

The following chart is intended to assist in the development of the minimum parking for new facilities.

Provide the required accessible parking within quantities allocated.

Confirm minimum parking quantities with all local building, planning and zoning ordinances, requirements and codes. Verify that the minimum required parking equals or exceeds the requirements of all local building, planning and zoning ordinances and codes. Maximum co-funded parking is determined by the total of staff, visitor, and student parking or by required zoning, whichever is greater. Co-fundable parking quantities are based upon zoning requirements for educational uses only and not assembly uses. Parking quantities exceeding those required for educational use ***only*** will be a locally funded initiative (LFI).

Refer to section 3204 for additional parking information.

Description	**Elementary Schools**						**Middle Schools**						**High Schools**					
Building Capacity	400	550	700	1000	1500	2000	450	600	750	1000	1500	2000	450	800	1200	1600	2400	
Teaching Stations	16	22	28	40	60	80	***21***	***28***	***35***	***47***	***71***	***94***	***21***	***38***	***56***	***75***	***113***	Note 1
Staff Parking																		
Teachers	16	22	28	40	60	80	***21***	***28***	***35***	***47***	***71***	***94***	***21***	***38***	***56***	***75***	***113***	Note 2
Ancillary Staff	8	11	14	20	30	40	9	12	15	20	30	40	5	8	12	16	24	Note 3
Administration	6	8	10	14	20	27	7	10	12	16	24	31	6	11	16	22	32	Note 4
Custodial/Maintenance	3	4	5	7	10	14	3	4	5	7	10	14	3	6	8	11	16	Note 5
Food Service	4	5	6	8	12	16	4	5	6	8	12	16	4	7	10	13	20	Note 6
Total Staff Parking	37	50	63	89	132	177	***44***	***59***	***73***	***98***	147	***195***	***39***	***70***	***102***	***137***	***205***	
OTHER	19	27	35	51	78	103	***31***	***41***	***52***	***70***	***107***	***141***	***36***	***66***	***98***	***131***	***199***	Note 7
Total Visitor	8	11	14	20	30	40	9	12	15	20	30	40	9	16	24	32	48	Note 8
HS Student Parking													90	160	240	320	480	Note 9
Maximum Co-funded Parking	64	88	112	160	240	320	***84***	***112***	***140***	***188***	***284***	***376***	***174***	***312***	***464***	***620***	***932***	Note 10

Note 1: ***Traditional ES teaching stations equal the total student enrollment divided by 25. Traditional MS and HS teaching stations equal the total student enrollment divided by 25 at a utilization factor of 85%.***
Calculation: Elementary School - Total ES student enrollment/25 = Teaching Stations.
Middle and High School - Total (student enrollment / 25) / 0.85 = Teaching Stations

Note 2: Teachers are calculated at the following utilization of teaching stations:
Elementary School - 100%; Middle School - 85%; High School - 85%.
Traditional ES teachers equal the total student enrollment divided by 25.
Traditional MS and HS teachers equal the total student enrollment divided by 25 at a utilization factor of 85%.
Calculation: Elementary School – Total Student Enrollment/25 = Number of Teachers
Middle and High School - (Total Student Enrollment / 25) / 0.85 = Number of Teachers

Note 3: Ancillary staff includes teaching aides, media center specialist, special education s taff,etc. Total is calculated as percentage of the student population as follows: Elementary-2%; Middle-2%; High-1%.

Note 4: Administration includes principals, secretarial, and itinerant staff. Quantities of parking spaces indicated are based upon number of administrative personnel developed in the POR's for each grade configuration and student enrollment.

Note 5: Custodial/maintenance staff includes full-time staff for regular school hours. Calculation: 1 staff per 150 students.

Note 6: Food service staff is calculated at 1 staff per 100 meals served with 80% building capacity participation for a full-service kitchen. Satellite kitchen would reduce staff by approximately 50-75%.

Note 7: "OTHER" parking spaces are defined as the quantity of additional parking spaces to be co-funded to meet the minimum local zoning requirements.

Note 8: Visitor parking is calculated at 2% of building student capacity.

Note 9: Student parking is calculated at 20% of all High School students.

Note 10: Total co-funded parking is determined by the total of staff, visitor, student, and other parking or by required zoning if greater than calculated quantities.

PARKING SUMMARY WORKBOOKS

The following four (4) PARKING SUMMARY worksheets contain examples of Elementary School, Middle School, High School and Combination School facilities co-fundable parking quantities. Interactive spreadsheets for calculating the number of co-funded parking quantities based on student enrollment are available.

The following is an example of six sizes of elementary schools with the associated co-funded parking.

DESCRIPTION	EXAMPLES					
Elementary School Student Enrollment	**400**	**550**	**700**	**1000**	**1500**	**2000**
Teaching Stations *(**Note 1a**)*	**16**	**22**	**28**	**40**	**60**	**80**
Staff Parking						
Teachers *(Note 2)*	16	22	28	40	60	80
Ancillary Staff *(Note 3)*	8	11	14	20	30	40
Administration	6	8	10	14	20	27
Custodial / Maintenance *(Note 4)*	3	4	5	7	10	14
Food Service *(Note 5)*	4	5	6	8	12	16
Total Staff Parking	**37**	**50**	**63**	**89**	**132**	**177**
Other	19	27	35	51	78	103
Total Visitor *(Note 6)*	8	11	14	20	30	40
High School Parking *(Note 7)*	na	na	na	na	na	na
TOTAL CO-FUNDED ES PARKING	**64**	**88**	**112**	**160**	**240**	**320**

WORKSHEET

DESCRIPTION	
Elementary Student Enrollment	**550**
Teaching Stations *(**Note 1a**)*	**22**
Staff Parking	
Teachers *(Note 2)*	22
Ancillary Staff *(Note 3)*	11
Administration	8
Custodial / Maintenance *(Note 4)*	4
Food Service *(Note 5)*	5
Total Staff Parking	**50**
Other	27
Total Visitor *(Note 6)*	11
High School Parking *(Note 7)*	na
TOTAL CO-FUNDED ES PARKING	**88**

Enter Student Enrollment

Administration includes principals, secretarial, and itinerant staff. Quantities of parking spaces indicated are based upon number of administrative personnel developed by the POR's for each configuration and student enrollment.

Other parking spaces are defined as the quantity of additional parking spaces to be co-funded to meet the minimum local zoning requirements.

Total parking is determined by the total of staff, visitor, student, and other parking or by required zoning if greater than calculated quantities.

Form ulas					
Notes					**Quantities**
1a	***ES Student Enrollment***	***/ 25***		**=**	***ES Teaching Stations***
1b	***M S Student Enrollment***	***/ 25***	***/ .085***	**=**	***M S Teaching Stations***
1c	***HS Student Enrollment***	***/ 25***	***/ .085***	**=**	***HS Teaching Stations***
2	***ES Student Enrollment***	***/ 25***		=	ES Teacher Parking
2	***M S Student Enrollment***	***/ 25***	***/ .085***	=	MS Teacher Parking
2	***HS Student Enrollment***	***/ 25***	***/ .085***	=	HS Teacher parking
3	ES Student Enrollment	x	2%	=	ES Ancillary Staff Parking
3	MS Student Enrollment	x	2%	=	MS Ancillary Staff Parking
3	HS Student Enrollment	x	1%	=	HS Ancillary Staff Parking
4	Student Enrollment	/	150	=	Custodial / Maintenance Parking
5	(Full Service Kitchen) Student Enrollment x 80%	/	100	=	Food Service Staff Parking
5	(Satellite Kitchen) Student Enrollment x 80%	/	100 x 65%	=	Food Service Staff Parking
6	Student Enrollment	x	2%	=	Visitor Parking
7	HS Student Enrollment	x	20%	=	HS Student Parking

MIDDLE SCHOOL

CHAPTER 3: SCHOOL SITE

PARKING SUMMARY

The following is an example of six sizes of middle schools with the associated co-funded parking.

DESCRIPTION	EXAMPLES					
Middle School Student Enrollment	**450**	**600**	**750**	**1000**	**1500**	**2000**
Teaching Stations *(Note 1)*	***21***	***28***	***35***	***47***	***71***	***94***
Staff Parking						
Teachers *(Note 2)*	***21***	***28***	***35***	***47***	71	***94***
Ancillary Staff *(Note 3)*	9	12	15	20	30	40
Administration	7	10	12	16	24	31
Custodial / Maintenance *(Note 4)*	3	4	5	7	10	14
Food Service *(Note 5)*	4	5	6	8	12	16
Total Staff Parking	***44***	***59***	***73***	***98***	**147**	***195***
Other	***31***	***41***	***52***	***70***	***107***	***141***
Total Visitor *(Note 6)*	9	12	15	20	30	40
High School Parking *(Note 7)*	na	na	na	na	na	na
TOTAL CO-FUNDED MS PARKING	**84**	**112**	**140**	**188**	**284**	**376**

WORKSHEET

DESCRIPTION	
Middle School Student Enrollment	**1500**
Teaching Stations *(Note 1)*	***71***
Staff Parking	
Teachers *(Note 2)*	71
Ancillary Staff *(Note 3)*	30
Administration	24
Custodial / Maintenance *(Note 4)*	10
Food Service *(Note 5)*	12
Total Staff Parking	**147**
Other	***107***
Total Visitor *(Note 6)*	30
High School Parking *(Note 7)*	na
TOTAL CO-FUNDED MS PARKING	***284***

Enter Student Enrollment

Administration includes principals, secretarial, and itinerant staff. Quantities of parking spaces indicated are based upon number of administrative personnel developed by the POR's for each configuration and student enrollment.

Other parking spaces are defined as the quantity of additional parking spaces to be co-funded to meet the minimum local zoning requirements.

Total parking is determined by the total of staff, visitor, student, and other parking or by required zoning if greater than calculated quantities.

Form ulas					
Notes					**Quantities**
1a	***ES Student Enrollment***	***/ 25***		=	***ES Teaching Stations***
1b	***M S Student Enrollment***	***/ 25***	***/ 0.85***	=	***M S Teaching Stations***
1d	***HS Student Enrollment***	***/ 25***	***/ 0.85***	=	***HS Teaching Stations***
2	***ES Student Enrollment***	***/ 25***		=	ES Teacher Parking
2	***M S Student Enrollment***	***/ 25***	***/ 0.85***	=	MS Teacher Parking
2	***HS Student Enrollment***	***/ 25***	***/ 0.85***	=	HS Teacher parking
3	ES Student Enrollment	x	2%	=	ES Ancillary Staff Parking
3	MS Student Enrollment	x	2%	=	MS Ancillary Staff Parking
3	HS Student Enrollment	x	1%	=	HS Ancillary Staff Parking
4	Student Enrollment	/	150	=	Custodial / Maintenance Parking
5	(Full Service Kitchen) Student Enrollment x 80%	/	100	=	Food Service Staff Parking
5	(Satellite Kitchen) Student Enrollment x 80%	/	100 x 65%	=	Food Service Staff Parking
6	Student Enrollment	x	2%	=	Visitor Parking
7	HS Student Enrollment	x	20%	=	HS Student Parking

SITE SELECTION CRITERIA
SITE/SIZE

HIGH SCHOOL

PARKING SUMMARY

The following is an example of five sizes of high schools with the associated co-funded parking.

DESCRIPTION	EXAMPLES				
High School Student Enrollment	**450**	**800**	**1200**	**1600**	**2400**
Teaching Stations (Note 1)	***21***	***38***	***56***	***75***	***113***
Staff Parking					
Teachers *(Note 2)*	**21**	38	***56***	***75***	113
Ancillary Staff *(Note 3)*	5	8	12	16	24
Administration	6	11	16	22	32
Custodial / Maintenance *(Note 4)*	3	6	8	11	16
Food Service *(Note 5)*	4	7	10	13	20
Total Staff Parking	***39***	**70**	***102***	***137***	**205**
Other	***36***	***66***	***98***	***131***	***199***
Total Visitor *(Note 6)*	9	16	24	32	48
High School Parking *(Note 7)*	90	160	240	320	480
TOTAL CO-FUNDED HS PARKING	**174**	**312**	**464**	**620**	**932**

WORKSHEET

DESCRIPTION	
High School Student Enrollment	**800**
Teaching Stations *(Note 1)*	***38***
Staff Parking	
Teachers *(Note 2)*	38
Ancillary Staff *(Note 3)*	8
Administration	11
Custodial / Maintenance *(Note 4)*	6
Food Service *(Note 5)*	7
Total Staff Parking	**70**
Other	***66***
Total Visitor *(Note 6)*	16
High School Parking *(Note 7)*	160
TOTAL CO-FUNDED HS PARKING	***312***

Enter Student Enrollm ent

Administration includes principals, secretarial, and itinerant staf f. Quantities of parking spaces indicated are based upon number of administrative personnel developed by the POR's for each configuration and student enrollment.

Other parking spaces are defined as the quantity of additional parking spaces to be co-funded to meet the minimum local zoning requirements.

Total parking is determined by the total of staff , visitor, student, and other parking or by required zoning if greater than calculated quantities.

Form ulas					
Notes					**Quantities**
1a	***ES Student Enrol lment***	***/ 25***		=	***ES Teaching Stations***
1b	***M S Student Enrollment***	***/ 25***	***/ .085***	=	***M S Teaching Stations***
1c	***HS Student Enrollment***	***/ 25***	***/ .085***	=	***HS Teaching Stations***
2	***ES Student Enrol lment***	***/ 25***		=	ES Teacher Parking
2	***M S Student Enrollment***	***/ 25***	***/ .085***	=	MS Teacher Parking
2	***HS Student Enrollment***	***/ 25***	***/ .085***	=	HS Teacher parking
3	ES Student Enrollment	x	2%	=	ES Ancillary Staff Parking
3	MS Student Enrollment	x	2%	=	MS Ancillary Staf f Parking
3	HS Student Enrollment	x	1%	=	HS Ancillary Staf f Parking
4	Student Enrollment	/	150	=	Custodial / Maintenance Parking
5	(Full Service Kitchen) Student Enrollment x 80%	/	100	=	Food Service Staf f Parking
5	(Satellite Kitchen) Student Enrollment x 80%	/	100 x 65%	=	Food Service Staf f Parking
6	Student Enrollment	x	2%	=	Visitor Parking
7	HS Student Enrollment	x	20%	=	HS Student Parking

COMBINATION SCHOOL

CHAPTER 3: SCHOOL SITE

PARKING SUMMARY

DESCRIPTION		
Elementary School Student Enrollment	**550**	**Enter Student Enrollm ent**
Teaching Stations (Note 1a)	**22**	
Staff Parking		
Teachers *(Note 2)*	22	
Ancillary Staff *(Note 3)*	11	
Administration	8	**Administration** includes principals, secretarial, and itinerant staff. Quantities of parking spaces indicated are based upon number of administrative personnel developed by the POR's for each conf iguration and student enrollment.
Custodial / Maintenance *(Note 4)*	4	
Food Service *(Note 5)*	5	
Total Staff Parking	**50**	
Other	27	**Other** parking spaces are def ined as the quantity of additional parking spaces to be co-funded to meet the minimum local zoning requirements.
Total Visitor *(Note 6)*	11	
High School Parking *(Note 7)*	na	
TOTAL CO-FUNDED ES PARKING	**88**	**Total parking** is determined by the total of staf f, visitor, student, and other parking or by required zoning if greater than calculated quantities.

MIDDLE SCHOOL PORTION WORKSHEET

DESCRIPTION		
Middle School Student Enrollment	**300**	**Enter Student Enrollm ent**
Teaching Stations (Note 1b)	***14***	
Staff Parking		
Teachers *(Note 2)*	***14***	
Ancillary Staff *(Note 3)*	6	
Administration	***5***	**Administration** includes principals, secretarial, and itinerant staff. Quantities of parking spaces indicated are based upon number of administrative personnel developed by the POR's for each conf iguration and student enrollment.
Custodial / Maintenance *(Note 4)*	2	
Food Service *(Note 5)*	3	
Total Staff Parking	**30**	
Other	***20***	**Other** parking spaces are def ined as the quantity of additional parking spaces to be co-funded to meet the minimum local zoning requirements.
Total Visitor *(Note 6)*	6	
High School Parking *(Note 7)*	na	
TOTAL CO-FUNDED MS PARKING	***56***	**Total parking** is determined by the total of staf f, visitor, student, and other parking or by required zoning if greater than calculated quantities.

HIGH SCHOOL PORTION WORKSHEET

DESCRIPTION		
High School Student Enrollment	***400***	**Enter Student Enrollm ent**
Teaching Stations *(Note 1)*	***19***	
Staff Parking		
Teachers *(Note 2)*	***19***	
Ancillary Staff *(Note 3)*	***4***	
Administration	***6***	**Administration** includes principals, secretarial, and itinerant staff. Quantities of parking spaces indicated are based upon number of administrative personnel developed by the POR's for each conf iguration and student enrollment.
Custodial / Maintenance *(Note 4)*	***3***	
Food Service *(Note 5)*	***4***	
Total Staff Parking	***36***	
Other	***32***	**Other** parking spaces are def ined as the quantity of additional parking spaces to be co-funded to meet the minimum local zoning requirements.
Total Visitor *(Note 6)*	***8***	
High School Parking *(Note 7)*	***80***	
TOTAL CO-FUNDED HS PARKING	***156***	**Total parking** is determined by the total of staf f, visitor, student, and other parking or by required zoning if greater than calculated quantities.

COMBINATION SCHOOL

CHAPTER 3: SCHOOL SITE

PARKING SUMMARY

TOTAL COMBINATION SCHOOL PARKING WORKSHEET

DESCRIPTION	
Total Combination School Enrollment	**1849**
Teaching Stations (Note 1a, 1b, and 1c)	**74**
Staff Parking	
Teachers *(Note 2)*	85
Ancillary Staff *(Note 3)*	27
Administration	29
Custodial / Maintenance *(Note 4)*	13
Food Service *(Note 5)*	15
Total Staff Parking	**169**
Other	92
Total Visitor *(Note 6)*	37
High School Parking *(Note 7)*	200
TOTAL CO-FUNDED PARKING	**496**

Administration includes principals, secretarial, and itinerant staff. Quantities of parking spaces indicated are based upon number of administrative personnel developed by the POR's for each configuration and student enrollment.

Other parking spaces are defined as the quantity of additional parking spaces to be co-funded to meet the minimum local zoning requirements.

Total parking is determined by the total of staff, visitor, student, and other parking or by required zoning if greater than calculated quantities.

Form ulas					
Notes					**Quantities**
1a	***ES Student Enrollment***	***/ 25***		**=**	***ES Teaching Stations***
1b	***M S Student Enrollment***	***/ 25***	***/ .085***	**=**	***M S Teaching Stations***
1c	***HS Student Enrollment***	***/ 25***	***/ .085***	**=**	***HS Teaching Stations***
2	***ES Student Enrollment***	***/ 25***		=	ES Teacher Parking
2	***M S Student Enrollment***	***/ 25***	***/ .085***	=	MS Teacher Parking
2	***HS Student Enrollment***	***/ 25***	***/ .085***	=	HS Teacher parking
3	ES Student Enrollment	x	2%	=	ES Ancillary Staff Parking
3	MS Student Enrollment	x	2%	=	MS Ancillary Staff Parking
3	HS Student Enrollment	x	1%	=	HS Ancillary Staff Parking
4	Student Enrollment	/	150	=	Custodial / Maintenance Parking
5	(Full Service Kitchen) Student Enrollment x 80%	/	100	=	Food Service Staff Parking
5	(Satellite Kitchen) Student Enrollment x 80%	/	100 x 65%	=	Food Service Staff Parking
6	Student Enrollment	x	2%	=	Visitor Parking
7	HS Student Enrollment	x	20%	=	HS Student Parking

URBAN ELEMENTARY SCHOOL – 400 students

Building Footprint (One-Story)	50,000 SF	1.15 acres
K-2/3-5 Playgrounds (see Note 1)	20,000 SF	0.46 acre
Parking and Drives (see Note 2)	17,600 SF	0.40 acre
Play Fields (see Note 3):		
One multipurpose field (360' x 250'), one softball field (200' outfield), and one basketball court	117,340 SF	2.69 acres
Subtotal	204,940 SF	4.70 acres
Add 20% Greenspace (see Note 4)	40,988 SF	0.94 acre
TOTAL	245,928 SF	5.64 acres
Recommended site size		5.75 acres

Note 1: This space footage, based on 50 SF per student, allows for a hard surface play area and a soft surface play equipment area for each playground.

Note 2: This estimate of area, based on 400 SF per car, allows for drives, a drop-off/pick-up zone, and a service area drive.

Note 3: Softball fields may partially overlap multipurpose field.

Note 4: 20% of the site square footage requirements as greenspace ensures adequate space for separation of the various elements located on each site. Includes site landscaping.

URBAN ELEMENTARY SCHOOL – 550 students

Building Footprint (Two-Story)	51,616 SF	1.19 acres
K-2/3-5 Playgrounds (see Note 1)	27,500 SF	0.63 acre
Parking and Drives (see Note 2)	24,000 SF	0.55 acre
Play Fields (see Note 3):		
One multipurpose field (360' x 250'), one softball field (200' outfield), and one basketball court	117,340 SF	2.69 acres
Subtotal	220,456 SF	5.06 acres
Add 20% Greenspace (see Note 4)	44,091 SF	1.02 acres
TOTAL	264,547 SF	6.07 acres
Recommended site size		6.25 acres

Note 1: This space footage, based on 50 SF per student, allows for a hard surface play area and a soft surface play equipment area for each playground.

Note 2: This estimate of area, based on 400 SF per car, allows for drives, a drop-off/pick-up zone, and a service area drive.

Note 3: Softball fields may partially overlap multipurpose field.

Note 4: 20% of the site square footage requirements as greenspace ensures adequate space for separation of the various elements located on each site. Includes site landscaping.

URBAN ELEMENTARY SCHOOL – 700 students

Building Footprint (Two-Story)	64,736 SF	1.49 acres
K-2/3-5 Playgrounds (see Note 1)	35,000 SF	0.80 acre
Parking and Drives (see Note 2)	30,400 SF	0.70 acre
Play Fields (see Note 3): One multipurpose field (360' x 250'), Two softball fields (200' outfield), and one basketball court	139,040 SF	3.19 acres
Subtotal	269,176 SF	6.18 acres
Add 20% Greenspace (see Note 4)	53,835 SF	1.24 acre
TOTAL	323,011 SF	7.42 acres
Recommended site size		7.50 acres

Note 1: This space footage, based on 50 SF per student, allows for a hard surface play area and a soft surface play equipment area for each playground.

Note 2: This estimate of area, based on 400 SF per car, allows for drives, a drop-off/pick-up zone, and a service area drive.

Note 3: Softball fields may partially overlap multipurpose field.

Note 4: 20% of the site square footage requirements as greenspace ensures adequate space for separation of the various elements located on each site. Includes site landscaping.

J. URBAN MIDDLE SCHOOL – 450 students

Building Footprint (Two-Story)	54,360 SF	1.25 acres
Parking and Drives (see Note 1)	21,200 SF	0.48 acre
Play Fields (see Note 2): One six-lane running track, One soccer/football and events field in track interior, One baseball field (350' outfield), One softball field (200' outfield), and one basketball court	363,300 SF	8.34 acres
Subtotal	438,860 SF	10.07 acres
Add 30% Greenspace (see Note 3)	131,658 SF	3.02 acres
TOTAL	570,518 SF	13.09 acres
Recommended site size		13.25 acres

Note 1: This estimate of area, based on 400 SF per car, allows for drives, a drop-off/pick-up zone, and a service area drive.

Note 2: Pole vault is not included at track.

Note 3: 30% of the site square footage requirements as greenspace ensures adequate space for separation of the various elements located on each site. Includes site landscaping.

K. URBAN MIDDLE SCHOOL – 600 students

Building Footprint (Two-Story)	60,007 SF	1.38 acres
Parking and Drives (see Note 1)	28,000 SF	0.64 acre
Play Fields (see Note 2): One six-lane running track, One soccer/football and events field in track interior, One baseball field (350' outfield), Two softball fields (200' outfield), and two basketball courts	407,191 SF	9.35 acres
Subtotal	495,198 SF	11.37 acres
Add 30% Greenspace (see Note 3)	148,559 SF	3.41 acres
TOTAL	643,757 SF	14.78 acres
Recommended site size		15.00 acres

Note 1: This estimate of area, based on 400 SF per car, allows for drives, a drop-off/pick-up zone, and a service area drive.

Note 2: Pole vault is not included at track.

Note 3: 30% of the site square footage requirements as greenspace ensures adequate space for separation of the various elements located on each site. Includes site landscaping.

L. URBAN MIDDLE SCHOOL – 750 students

Building Footprint (Two-Story)	74,025 SF	1.70 acres
Parking and Drives (see Note 1)	34,800 SF	0.80 acre
Play Fields (see Note 2): One six-lane running track, One soccer/football and events field in track interior, One baseball field (350' outfield), Two softball fields (200' outfield), and two basketball courts	407,191 SF	9.35 acres
Subtotal	516,016 SF	11.85 acres
Add 30% Greenspace (see Note 3)	154,805 SF	3.55 acres
TOTAL	670,821 SF	15.40 acres
Recommended site size		15.50 acres

Note 1: This estimate of area, based on 400 SF per car, allows for drives, a drop-off/pick-up zone, and a service area drive.

Note 2: Pole vault is not included at track.

Note 3: 30% of the site square footage requirements as greenspace ensures adequate space for separation of the various elements located on each site. Includes site landscaping.

M. URBAN HIGH SCHOOL – 450 students

Building Footprint (Two-Story)	64,800 SF	1.49 acres
Parking and Drives (see Note 1)	56,000 SF	1.29 acres
Play Fields (see Note 2): One six-lane running track, One soccer/football and events field in track interior, One practice football field, One baseball field (400' outfield), One softball field (250' outfield), Four tennis courts, and two basketball courts	439,231 SF	10.08 acres
Subtotal	560,031 SF	12.86 acres
Add 35% Greenspace (see Note 3)	196,010 SF	4.50 acres
TOTAL	756,041 SF	17.36 acres
Recommended site size		17.50 acres

Note 1: This estimate of area, based on 400 SF per car, allows for drives, a drop-off/pick-up zone, and a service area drive.

Note 2: Pole vault is not included at track.

Note 3: 35% of the site square footage requirements as greenspace ensures adequate space for separation of the various elements located on each site. Includes site landscaping.

N. URBAN HIGH SCHOOL – 800 students

Building Footprint (Two-Story)	92,960 SF	2.13 acres
Parking and Drives (see Note 1)	98,000 SF	2.25 acres
Play Fields (see Note 2): One eight-lane running track, One soccer/football and events field in track interior, One practice football field, One practice soccer field, One baseball field (400' outfield), One softball field (250' outfield), Six tennis courts, and four basketball courts	532,839 SF	12.23 acres
Subtotal	723,799 SF	16.61 acres
Add 35% Greenspace (see Note 3)	253,330 SF	5.82 acres
TOTAL	977,129 SF	22.43 acres
Recommended site size		22.50 acres

Note 1: This estimate of area, based on 400 SF per car, allows for drives, a drop-off/pick-up zone, and a service area drive.

Note 2: Pole vault is not included at track.

Note 3: 35% of the site square footage requirements as greenspace ensures adequate space for separation of the various elements located on each site. Includes site landscaping.

URBAN HIGH SCHOOL – 1,200 students

Building Footprint	118,800 SF	2.73 acres
Parking and Drives (see Note 1)	146,400 SF	3.36 acres
Play Fields (see Note 2): One eight-lane running track, One soccer/football and events field in track interior, One practice football field, One practice soccer field, Two baseball fields (400' outfield), Two softball fields (250' outfield), Ten tennis courts, and six basketball courts	775,823 SF	17.81 acres
Subtotal	1,041,023 SF	23.90 acres
Add 35% Greenspace (see Note 3)	364,358 SF	8.36 acres
TOTAL	1,405,381 SF	32.26 acres
Recommended site size		32.50 acres

Note 1: This estimate of area, based on 400 SF per car, allows for drives, a drop-off/pick-up zone, and a service area drive.

Note 2: Pole vault is not included at track.

Note 3: 35% of the site square footage requirements as greenspace ensures adequate space for separation of the various elements located on each site. Includes site landscaping.

URBAN HIGH SCHOOL – 1,600 students

Building Footprint	155,520 SF	3.57 acres
Parking and Drives (see Note 1)	194,000 SF	4.45 acres
Play Fields (see Note 2): One eight-lane running track, One soccer/football and events field in track interior, One practice football field, One practice soccer field, Two baseball fields (400' outfield), Three softball fields (250' outfield), Ten tennis courts, and six basketball courts	821,908 SF	18.87 acres
Subtotal	1,171,428 SF	26.89 acres
Add 35% Greenspace (see Note 3)	410,000 SF	9.41 acres
TOTAL	1,581,428 SF	36.30 acres
Recommended site size		36.50 acres

Note 1: This estimate of area, based on 400 SF per car, allows for drives, a drop-off/pick-up zone, and a service area drive.

Note 2: Pole vault is not included at track.

Note 3: 35% of the site square footage requirements as greenspace ensures adequate space for separation of the various elements located on each site. Includes site landscaping.

SPACE REQUIREMENTS FOR OUTDOOR ATHLETIC AND RECREATION FIELDS

The following information is intended as a guideline in adjusting the recommended site sizes by adding or deleting playing fields.

The designer should note that paragraphs F through O of this chapter use some overlap of recreational fields in determining total area required for all fields at each site.

The designer must consider configuration of each field in determining the actual area to add or delete for each field. Refer to design guidelines for court and field dimensions.

The designer should also consider drainage, circulation, access, and the need for bleacher seating.

Baseball: Estimate is based on 350' radius to centerfield and 300' radius to right and left outfield with 60' offset from baseline to sideline fence. 135,806 SF 3.12 acres

Softball:
One field with outfield overlapping multi-purpose field:
(includes 360' x 195' multi-purpose field)
91,200 SF 2.09 acres
One field – no overlap 53,824 SF 1.24 acres

Soccer/multipurpose field: 70,200 SF 1.61 acres

Track & field events:
6-lane track, with interior field (no events)
146,000 SF 3.35 acres
6-lane track, with interior field and discus/shot-put combo:
173,222 SF 3.98 acres
8-lane track, with interior field & events
187,500 SF 4.30 acres

Tennis: 10 courts 66,530 SF 1.53 acres
4 courts 24,480 SF 0.56 acre

Basketball: Courts are 84' x 50'. Courts in quantity of 1-2 have 5' surrounding and between courts. Courts in quantity of 3 and up have 10' on ends and 5' to sides and between courts.

1 court	5,640 SF	0.13 acre
2 courts	10,810 SF	0.25 acre
4 courts	23,400 SF	0.54 acre
6 courts	34,840 SF	0.80 acre

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TOPOGRAPHY

A level area is required to accommodate buildings, perimeter walks, vehicular circulation, mechanical/service yard, parking areas, outdoor student playgrounds, and physical education areas.

There should be sufficient slope across the site to allow for positive drainage to a storm sewer outlet, legal storm drain, or other discharge point.

Significant changes in topography increase site development costs if retaining walls, steps, and ramps are required to create level areas.

A preliminary site topography survey can be obtained from the 7.5 minute quadrangle series maps produced by the United States Geological Survey. This information can provide necessary preliminary topography information.

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ACCESS

The site shall be accessible from collector, rural, or arterial roads that are suitable for ***pedestrians, bicycles, cars,*** buses, ***and*** service vehicles.

A careful study of ***pedestrian, bicycle, and vehicular*** traffic must be performed to reduce the potential hazards of merging, crossing, and turning traffic. For example, limited access roads that are congested at peak times of arrival and dismissal of students from the school site should not be considered.

A traffic study may be required by the authorities having jurisdiction to predict the impact of the school at peak times of arrival and dismissal.

Review site distances along the roadway from existing or proposed entry/entrance.

Consult local street or highway department having jurisdiction for turn lane, passing blister, drive width, and radius requirements for allowable entry/exit point locations.

Two or three entry/exit points into the site are recommended to provide the appropriate separation of car and bus traffic. A high volume of cars at special events may necessitate more than one entry/exit point for safe and efficient circulation.

Review opportunities for regional transportation improvement funding from FHWA, ODOT, ***Ohio Public Works Commission,*** ODOT Safe Routes to School, Metropolitan Planning Organization's (MPO's), county, township, and/or municipality.

Minimize the amount of impervious material associated with vehicle access and parking.

Where appropriate, provide access for pedestrians and bike riders entering school property.

Provide sidewalks around the perimeter of the site where required by local agencies.

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SOIL CHARACTERISTICS

Soil conditions and characteristics may impact total building design. A county soil survey may be obtained from the local soil conservation service for review.

Soil characteristics will determine foundation design, pavement design, storm sewer design, and excavation requirements.

Soil drainage characteristics and the presence of high ground water may result in the need for an under drainage system.

Presence of high ground water or seasonally wet soils can adversely affect the cost of construction. Lime or other soil stabilization may be necessary to correct wet soil conditions.

Erosion characteristics will affect the need for temporary devices, such as silt fence, and permanent devices, such as erosion control blanket and riprap, to prevent topsoil and subsoil loss.

Avoid sites that may require rock excavation.

Analyze soil characteristics for ground water recharge capability.

Evaluate wet soils or seasonal high water profiles for surface water feature potential – ponds, swales, etc.

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STORM SEWER

Storm water must be detained on site and released at a rate that will not exceed current runoff rates and meets requirements of the authority having jurisdiction.

A storm sewer line, legal drain, or other approved outlet should be located close to the site.

Consider opportunities for multiple, low-volume detention basins (in lieu of single large-volume basin).

Look for site design opportunities that will handle storm water on site, recharge the local aquifers, and minimize the load on the civil infrastructure. ***Consider opportunities for below-ground collection, detention, and retention of stormwater runoff where applicable.***

Investigate alternative ways of handling parking lot discharge, including the use of the area under the paved surfaces.

SANITARY SEWER

An evaluation of the expected sewage impact from the new facility is required. The following values are typically used:

Elementary School:	15 x gallons per student per day
Middle School:	20 x gallons per student per day
High School:	20 x gallons per student per day
Career-Technical:	20 x gallons per student per day

Sewage from school buildings shall be discharged into an approved sewage system. If a public sewage system is not available, an on-site sewage treatment facility will be required.

DOMESTIC WATER

A domestic water system is required from either a local water company or an on-site well.

Coordination with the local water company will be necessary.

A flow test will provide data on the available flow in gallons per minute (gpm), static pressure available, and available residual pressure for fire protection systems.

It should be noted that local fire departments or water companies may have additional requirements for the incoming service that are specific to that particular community and must be fully investigated by the Site Design Professional.

If a local water service is not available, an on-site well system is required. The on-site well system shall be required to provide water for domestic use and fire protection systems. When a well is considered, a test well is to be drilled. The Environmental Protection Agency must be contacted to make an evaluation of the proposed well system.

GAS SERVICE

The Site Design Professional is required to evaluate the need and method to provide gas service to the building. If natural gas service is not available, the installation of liquid propane (LP) gas should be investigated.

ELECTRICAL

Adequate electrical service must be evaluated for all sites under consideration. The ***voltage shall be 208-volt, 3-phase service***, or 480-volt, 3-phase service.

PHONE

Coordination with the local Service Provider (SP) will be necessary.

Underground Conduit(s) will be required from the SP's facilities or between buildings located on the same campus.

Depending on the length of the conduit(s), underground splice points or pulling points (hand-holes or man-holes) may be required.

CATV

Coordination with the local Service Provider (SP) will be necessary.

Underground Conduit(s) will be required from the SP's facilities or between buildings located on the same campus.

Depending on the length of the conduit(s), underground splice points or pulling points (hand-holes or man-holes) may be required.

FIBER/DA-Site

Coordination with the local Service Provider (SP) will be necessary.

Underground Conduit(s) will be required from the SP's facilities or between buildings located on the same campus.

Depending on the length of the conduit(s), underground splice points or pulling points (hand-holes or man-holes) may be required.

SITE DEMOLITION

Demolition of existing improvements such as buildings, pavement, and vegetation will be required to develop the proposed site plan and should be kept at a minimum.

Refer to Section 3111, Testing, for demolition of underground tanks and asbestos.

Look for ways to salvage or recycle material resulting from the deconstruction of existing buildings and the proposed site.

From demolition of existing buildings, consider using clean, hard fill consisting only of reinforced or non- reinforced concrete, asphalt concrete, brick, block, tile, or stone for site fill. Clean, hard fill must not be contaminated (Ohio EPA).

CONSTRUCTION STAGING

Adequate space should be available on site for construction staging--location for soil stockpiles, portable field offices, storage of construction materials, and equipment.

GEOGRID SYSTEMS

Subsurface Drainage Geotextiles: Nonwoven, needle- punched geotextile made from polyolefins or polyesters used for subsurface drainage applications.

Separation Geotextiles: Woven geotextile fabric manufactured for separation applications, made from polyolefins or polyesters.

Reinforcing Geotextile: For subgrade treatment and subgrade stabilization, made from polypropylene. Used for road base course reinforcement and subgrade improvement. Also used to reinforce earth-fill scope, wall and base layer construction.

CHEMICAL STABILIZATION

Chemical stabilization using lime as a traditional solution when soft or expansive clay subgrade soils are encountered. For lime-treated areas, care must be taken for the rate of application, depth of treatment, uniformity of mixture into the soil, and soil type consistency. Other binders are used.

Cement, flyash, and ground blast furnace slag.

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CODES AND ZONING

Incompatible or nonconforming zoning may necessitate a zoning change variance or a special exception land use permit.

Zoning ordinance restrictions such as building height, setback, fence height, landscaping, screening requirements, placement and design of site signage, and size of parking spaces can affect site development costs and flexibility.

The process of requesting a variance or zoning change can slow the planning process.

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ADJACENT PROPERTY

The use of adjacent properties should be reviewed for their potential to enhance or detract from the school site.

Screening of noise and views may be required.

Screening of site lighting may be required.

Consider the safety of children walking ***and bicycling*** to and from the school site and during use of outdoor athletic and play facilities.

Adjacent railroad rights-of-way or busy streets may require the use of earth berms, landscaping, and/or fencing.

Consider site location within the school district boundaries and proximity to residential areas it will serve.

Proximity to manufacturing and industrial districts may be a concern for pollution or safety.

Consider proximity to adjacent land-owners utilities including domestic water wells (and aquifer).

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EASEMENTS/RIGHTS-OF-WAY

Easements and rights-of-way for roads, sewers, gas, power, water, and oil lines should be researched for potential development restrictions.

Consult local, county, and state highway departments for proposed rights-of-way that are required with the development of a new school.

Acquisition of additional rights-of-way may be required to accommodate left turn lanes, tapers, passing blisters, and utility extensions.

Presence of an existing legal storm water drain through the site may require replacement or relocation. A legal drain may impact building location on the site.

Contact ODOT regional office representative and review ODOT “State Highway Access Management Manual” criteria when improving site adjacent or in close proximity to a state highway.

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ENVIRONMENTAL RESTRICTIONS

Site location within an existing flood plain or floodway may limit the site development and is subject to approval by the Army Corps of Engineers, Ohio Department of Natural Resources, Ohio Environmental Protection Agency, United States Fish and Wildlife Service, State Historical Preservation Office, and other authorities having jurisdiction.

Wetland delineation must be performed if the presence of a wetland is suspected.

A designated wetland may prevent site development.

Mitigation will be required if a wetland must be disturbed. Replacement ratios will be higher than the wetland being impacted. The most pristine wetlands are considered "unmitigable" -- not allowed to be disturbed or replaced.

For erosion control measures, earth-disturbing activities of 5 or more acres during construction will be subject to review and approval by the Division of Surface Water with the Ohio Environmental Protection Agency, Environmental Protection Agency District Office, County Soil and Water Conservation District, or other authorities having jurisdiction.

Prior to the purchase of new land for a new school facility or related site improvements, soil borings should be obtained for a soils investigation report to determine suitability.

Unusual or potentially expensive site development costs for a new site should be discussed with the School Facilities Commission.

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TESTING

Prior to the purchase of any site, a Phase I Environmental Assessment should be completed to evaluate the potential for environmental liabilities associated with current and past property use and to assess regulatory compliance.

Perform a site investigation and records search of hazardous materials used, stored, or disposed of on the property; proximity to landfills; adjoining property uses; proximity to properties listed on the United States Environmental Protection Agency, Comprehensive Environmental Response, Compensation, and Liability Information System; and Ohio Environmental Protection Agency “Master Sites List.”

A Phase II Environmental Assessment may be required for areas of the site which indicate the potential for asbestos and other contaminants.

Site demolition costs will be increased if underground tanks, landfill, asbestos, or other buried materials are present.

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A. AESTHETIC CONSIDERATION

1. It is preferable to choose a site with mature trees and other natural features compatible and complementary to the proposed building and site development.

2. A predominantly wooded site on which the majority of trees will need to be removed is not favorable.

3. Water features such as lakes, ponds, rivers, and creek frontage, while aesthetic and valuable for the interactive teaching features, could be a potential liability and safety problem.

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A. GENERAL

1. The site design requirements in this section apply to all new school building sites, including Career-Technical.

2. Additional requirements are in the following sections:

a.	Elementary School	Section 3300
b.	Middle School	Section 3400
c.	High School	Section 3500

3. The design requirements are:

a. ***Pedestrian*** circulation
b. ***Bicycle*** circulation
c. ***V***ehicle access
d. ***Emergency vehicle*** circulation
e. Storm drainage
f. Sanitary sewerage
g. Directional signage
h. Physical education
i. Playgrounds
j. Fencing
k. Lighting
l. Mechanical/electrical yard
m. Landscaping
n. Site furnishings
o. Exterior security provisions
p. Snow storage

4. This chapter, in addition to stating design requirements, indicates items the school district and the Design Professional should 'plan for' for future improvements. Items indicated to be planned for future improvements are not funded by the Ohio Facilities Construction Commission.

B. ODOT TRAFFIC IMPACT STUDY

The school district is encouraged to contact the local Ohio Department of Transportation District office as early as possible in the site selection process. The local ODOT representative can assist in conducting a pre-study to determine the impact of ODOT guidelines and requirements on the selection of appropriate school sites. A list of ODOT district offices is included on page 3000-2.

B. TRAFFIC IMPACT STUDY [cont'd]

District should have a traffic impact study (TIS) early in the process and immediately after a site has been chosen in order to determine the serviceability of the adjacent roadway or street system, including all intersections in the area***. A traffic engineer, who has been pre-qualified by ODOT to conduct ODOT traffic impact studies, should complete the TIS in accordance with the ODOT Highway Access Management Manual Section 5.6.***

The TIS should include a signal input warrant analysis; turn lane analysis, an opening day traffic count, and a build-out (20 year) traffic count.

The TIS and a conceptual site plan should be submitted to the local authority over the roads or streets upon which the site in located.

A. BUS LOADING AND UNLOADING

1. Maintain separate car and bus circulation.

2. Buses should not be required to back up.

3. Diagonal bus parking spaces should be 12 feet to 13 feet wide by the length of the bus. Spaces should be aligned at a 45-degree to 60-degree angle to the curb. See Figure A-1 and Figure A-2 for minimum dimensions to the curb for “peel-off” or “free access” departure.

4. Angle diagonal bus parking spaces so the bus exit door will allow children to exit in front of the adjacent bus.

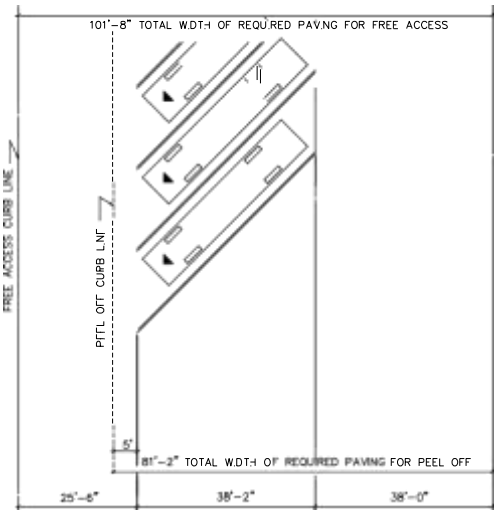
5. Turning radius at the end of the bus lot is to be sized to allow one smooth turn.

6. Locate bus-parking spaces close to a main building classroom entry***, but no closer than 25 feet to building wall.***

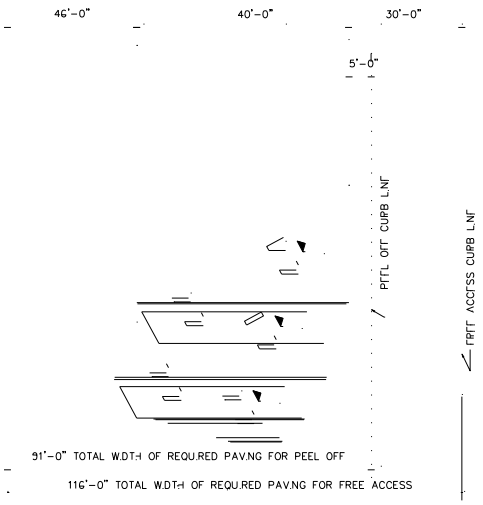
7. Provide a curbed sidewalk along the bus drop-off/pick-up lane and in front of the diagonal bus parking spaces.

8. Bus pavement shall be heavy-duty.

9. This paved area can have a “dual-use,” utilized for playground use when the buses are not present. Refer to Chapter 3, Section 3301, Elementary School Site Design; Section 3401, Middle School Site Design; and Section 3501, High School Site Design for special requirements. Refer to Section 3201, Paragraph E, for Special Event Parking.



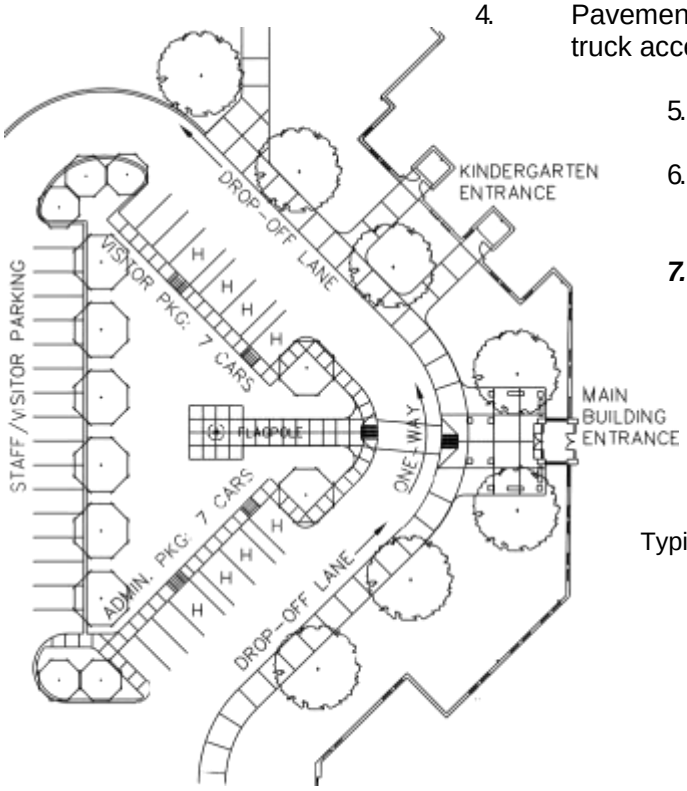
45 Degree Diagonal Bus Parking
Figure A-1



60 Degree Diagonal Bus Parking
Figure A-2

B. VEHICLE DROP-OFF/PICK-UP DRIVE

1. Maintain separation from bus circulation patterns.
2. Maintain one-way traffic.
3. Locate near main building entrance, close to administration office, but no closer than 25 feet to building wall.
4. Pavement is to be standard-duty if there is no bus or delivery truck access on this drive.
5. The drive width is to be a minimum of 24 feet.
6. Refer to specific requirements for Elementary School Site Design, Chapter 3, Section 3301.
7. ***Refer to ADAAG 4.6.6 for accessibility requirements.***



Typical Vehicle Drop-Off/
Pick-up Drive
Figure B-1

C. VISITOR PARKING

1. Locate near main building entrance, close to administration office.
2. Minimum recommended parking space is 9-feet wide by 19-feet long.
3. Accessible Parking Spaces: Refer to Chapter 3, Section 3201, Paragraph G.
4. Check local building code for recommended number of parking spaces and dimensions that may override this standard.
5. Refer to Chapter 3, Section 3301, Elementary School Site Design; Section 3401, Middle School Site Design; and Section 3501, High School Site Design.

D. STAFF PARKING

1. ***Provide parking spaces for Teachers, Ancillary Staff, Administration, Custodial / Maintenance and Food Service Personnel as shown in section 3101, E, PARKING. Refer to the notes included in section 3101, E, PARKING for more information.***

2. ***Locate staff parking near other parking and adjacent to building access for economy of pavement design where possible. Staff parking can be located to one side of the bus parking lot in the area not required for bus traffic.***

3. Parking space dimensions are a minimum of 9 feet by 19 feet with 24-foot wide aisles.

4. Refer to Chapter 3, Section 3201, Paragraph G, for Accessible Parking Spaces.

E. SPECIAL EVENT PARKING

1. Over-stripe bus parking lot with car parking spaces for use in after school hours Special Event Parking.

2. Striping for car parking shall be 4-inch wide, white lines.

3. Striping for bus parking shall be 4-inch wide, yellow lines.

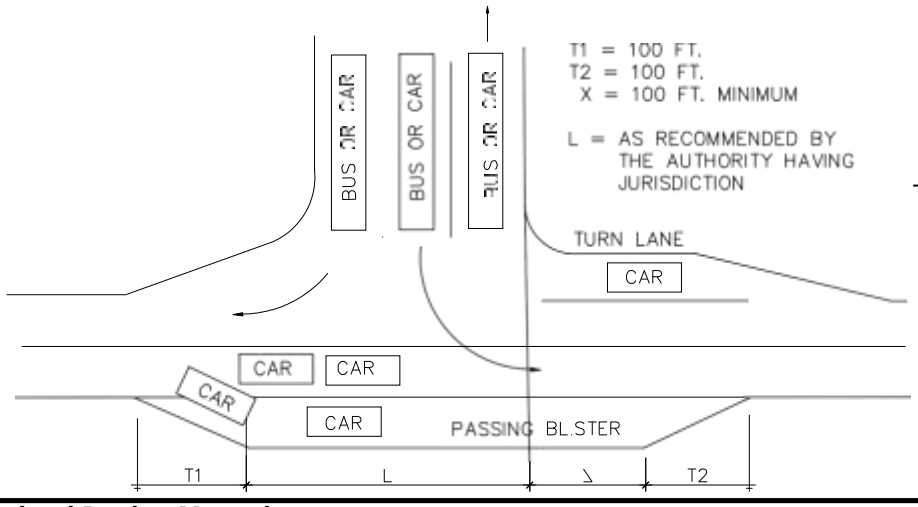
4. Striping for handicap shall be 4-inch wide, blue lines.

F. DRIVEWAY ENTRANCE

1. Design passing blisters with extended turn lanes.

2. Provide left turn lanes and taper lanes as directed by the authority having jurisdiction. See Figure F-1.

3. Provide 2 outgoing lanes and 1 incoming lane for bus exit drive. The minimum width is 30 feet.



Typical Turn Lane
Figure F-1

G. ACCESSIBLE PARKING SPACES

1. Comply with the authorities having jurisdiction. Codes may exceed or override the minimum recommendations. Comply with the Americans with Disabilities Act guidelines.

2. ***The number of parking spaces required to be accessible shall be calculated separately for each parking facility, according to Table 1106.1 of the Ohio Building Code.***

3. Locate parking space on shortest accessible route of travel to an accessible building entrance.

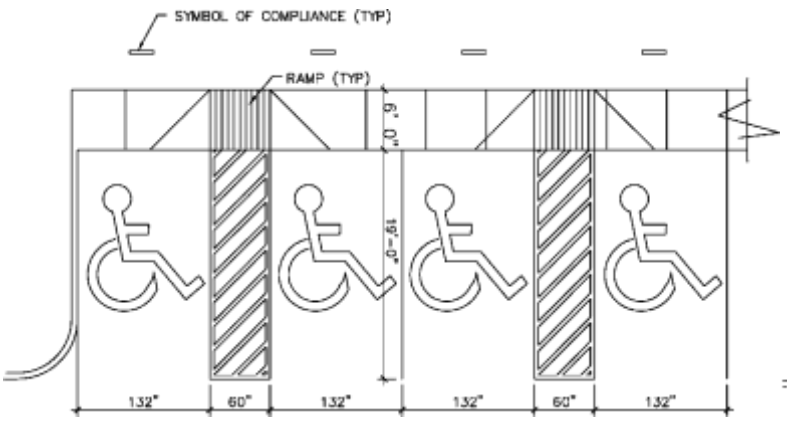
4. Accessible pedestrian routes should not cross drives or vehicular parking areas, where possible. If necessary, provide crosswalk painted on pavement and signs to designate pedestrian rights-of-way.

5. Provide universal parking space for all accessible spaces as shown in Figure G-1 or provide typical car parking spaces to be 96 inches with 60-inch wide aisle and van parking spaces to be 96 inches with 96-inch wide aisle as shown in Figure G-2.

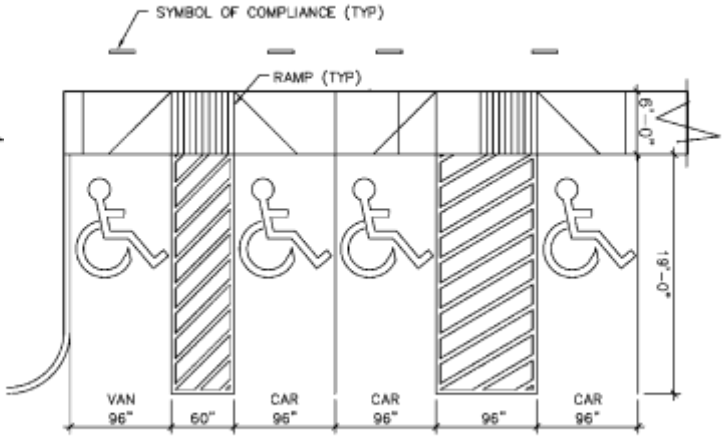
6. Provide 1 van parking space for every 8 accessible spaces if universal space is not used.

7. Two adjacent parking spaces may share common access aisle.

8. Provide sign with international symbol at each accessible parking space. Refer to Chapter 3, Section 3207, for signage requirements of typical parking, van parking, and universal parking spaces.



ADA: Universal Parking Space
Figure G-1



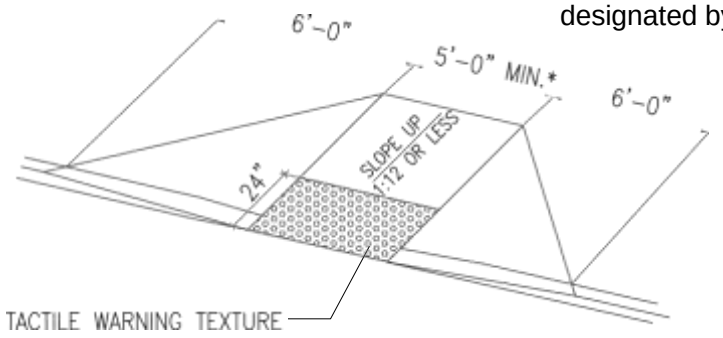
ADA: Typical Car/Van Parking Space
Figure G-2

G. ACCESSIBLE PARKING SPACES (cont.)

9. Provide curb ramps along accessible route. Ramp is to be a minimum of 5-foot wide with a maximum 1:12 slope, and a maximum 6-inch rise. Flared ramp sides shall not exceed 1:10. If the distance to the back of the ramp is less than 4 feet, sides shall not exceed a 1:12 slope. See Figure G-3.

10. The accessible route is not to exceed a 1:20 slope.

11. Ramp surface is to have medium broom finish, and include detectable warning surface per ADAAG, if not otherwise designated by local codes.



NOTE: Install tactile warning texture at the top of all exterior steps and ramped walks that exceed 1:20 slope, in a band 3'-0" deep x width of walk

Typical Curb Ramp
Figure G-3

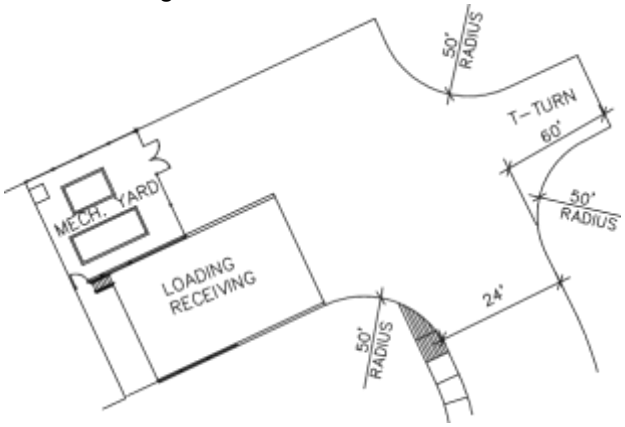
H. TRASH PICK-UP AND SERVICE DRIVE

1. Pavement is to be heavy-duty with a concrete pad area for dumpster approach of truck front or rear axle to reinforce area subject to loading when dumpster is lifted.

2. Locate adjacent to bus parking for economy of pavement design, where possible.

3. Provide T-turn with 50-foot radius for maneuvering of large trucks. See Figure H-1.

4. Trash dumpster shall not be located within 25 feet of any wall of the building.



T-turn at End of Service Drive
Figure H-1

I. PERIMETER CURBS

1. Provide 6-inch high curb to separate car and pedestrian circulation routes.

2. Locate curbs as required to direct flow of storm water toward storm sewer inlets.

3. Provide curb at planted islands.

4. Provide curbs along drives adjacent to storm detention ponds or other abrupt slopes adjacent to drive.

5. Provide wheel stops where parking is perpendicular to edge of pavement and curbs are not used. Do not use wheel stops in front of curbs.

6. Straight curb or curb and gutter may be used.

A. PEDESTRIAN CIRCULATION

1. Sidewalks provide a connection to the surrounding community and should be coordinated with existing walks and if applicable future development.

2. Provide sidewalks from the building to public sidewalks if public sidewalks serve the school site. This is a minor connecting walk.

3. Sidewalks should be provided from all site access points (i.e. student drop-off) to the school building.

4. Ohio Department of Transportation delineates surface sidewalks by its use. For example, a sidewalk would be used by pedestrians only. If the surface is designed to be used by pedestrians and bicyclists, it would be considered a path. Paths are typically secondary circulation and used for Par Courses, nature walks, and play area access.

5. Provide sidewalks a minimum of 8-foot wide and a maximum of 12-foot wide from major drop-off drives to major entrances. Refer to Chapter 3, Section 3203, Paragraph A, Emergency Vehicle Circulation, for additional requirements.

6. Minor connecting sidewalks are to be a minimum of 6-foot wide.

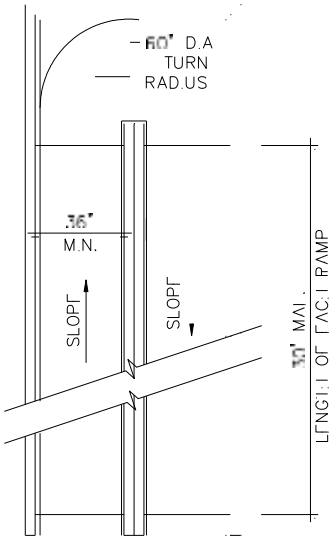
7. Major connecting sidewalks at building entrance and along bus loading and unloading area are to be a minimum of 8-foot wide.

8. Sidewalks are to be reinforced concrete, a minimum of 4-inches thick, with light broom finish.

9. Sidewalk slope is to be a minimum of 100:1 (1%) and a maximum of 20:1 (5%). If walk exceeds 20:1, it shall be designed as a ramp. The slope of a ramp is between 5% and 8.33%.

10. Paths should be a minimum of 6-feet wide and may be constructed of concrete or asphalt.

B. RAMPS



Typical Ramp with Landing
Figure B-1

1. Verify with authorities having jurisdiction that may exceed or override these minimum recommendations.

2. The maximum slope is 12:1 (8.33%) with a maximum 30-inch rise per ramp segment.

3. The minimum width is 36 inches. There shall be a 36-inch clearance between handrails.

4. At the top and bottom of each ramp segment, there is to be a landing at least as wide as the ramp section leading to it. Landing length is a minimum of 60 inches clear. If the direction of the ramp changes, provide a 60-inch diameter wheelchair turning radius. See Figure B-1.

5. Handrails are to be 1 1/4 inches in diameter, and a minimum of 34 inches to a maximum of 38 inches above the ramp surface. Provide handrails on both sides of ramp and extend the handrails a minimum of 12 inches beyond the top and bottom of each ramp segment. Handrails are to be parallel to the ramp surface.

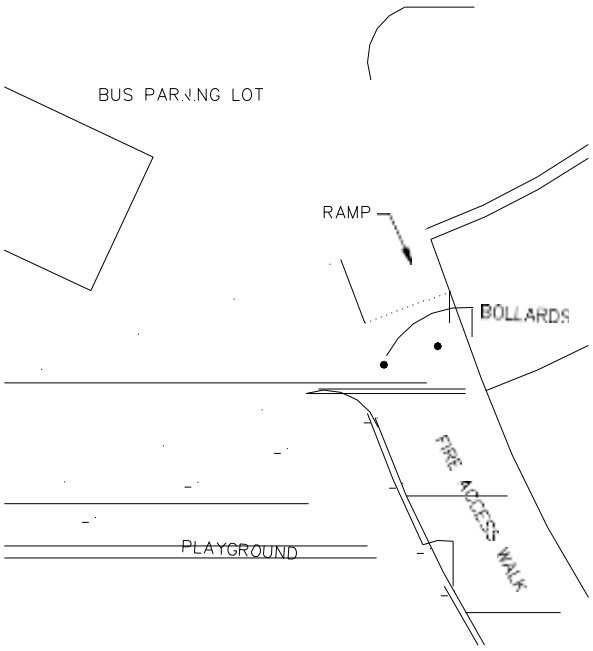
6. The ramp surface is to be nonslip.

A. EMERGENCY VEHICLE CIRCULATION

1. Walks or paths are to accommodate emergency vehicles around the perimeter of the building where vehicular drives are not present.

2. Review emergency vehicle circulation and construction with authorities having jurisdiction.

3. Provide removable or hinged bollards at the end of the emergency access path where it meets vehicular drives to prevent use of path by other than emergency vehicles. Space bollards to be a minimum of 5 foot on center. See Figure A-1.



Typical Location for Bollards at End
of Emergency Access Path
Figure A-1

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A. BICYCLE CIRCULATION

1. Provide future bicycle parking where there is the potential for safe bicycle access to the site by way of designated routes.

2. Locate bicycle parking adjacent to a pedestrian walk near a building entry, but away from a main ***parent/bus drop-off.***

3. Provide ***an adequate pad for*** future racks or loops for bicycles to be secured with a lock.

4. Provide curb ramps along the bicycle route. Refer to Chapter 3, Section 3201, Figure G-3.

5. Maintain highest/maximum separation from pedestrian and vehicular routes.

6. If a bicycle route is to be adjacent to a vehicular route, pavement is to be striped pavement. Plan for signage to designate the bicycle lane.

7. Minimum width of 8 feet is required for a bicycle route.

8. Reference AASHTO guidelines when designing bikeways integral to regional transportation systems.

9. Consider the USGBC LEED for Schools Reference Guide for guidelines regarding accommodation of bicycles as alternative transportation.

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A. STORM SEWER SYSTEM

1. Create positive drainage away from the building. Visibly slope grade within 10 feet of building foundation.

2. Slope the site grades to allow natural drainage of storm water toward inlets and detention area.

3. Collect storm water in a series of inlets or swales to be detained on site.

4. Connect the building site storm drainage system by means of downspouts or roof drains to the building storm drainage system.

5. All storm piping shall be designed using the 10-year return period and intensity-duration curves consistent with the region.

6. All castings shall be heavy-duty for both paved and lawn areas. No “beehive” or “dome” castings are to be used.

7. All manholes shall be lettered “storm.”

8. All storm piping and culverts shall have a smooth interior. All pipe with a diameter greater than 24 inches shall be concrete***,*** aluminized steel, or HDPE. For pipes 24 inch and smaller, see page ***9133-5, Section 334000.***

9. All storm pipe jointing shall be water and silt tight.

10. Runoff from adjoining properties must be verified and the storm sewer system shall be designed to accommodate the runoff.

11. All castings are to comply with the Americans with Disabilities Act guidelines and be bicycle safe.

B. DISCHARGE REQUIREMENTS

1. All discharge rates shall meet the requirements of the authorities having jurisdiction over release rates.

2. Regardless of the authority having jurisdiction over release rates, the downstream capacity of the storm sewer, legal drain, or approved outlet must be verified by the Site Design Professional, and downstream capacity must not be exceeded.

C. DETENTION POND DESIGN

Detention ponds are to be designed to prevent storm water from flowing off the site at a rate greater than permitted by the authorities having jurisdiction. Detention ponds are normally dry except after rainfalls.

1. Side slopes shall not exceed 4:1 and may be increased to 2:1 in the immediate vicinity of headwalls or other discharge control devices.

2. Headwalls shall be graded and conform to the side slopes of the pond.

3. All detention ponds which serve an area greater than 15 acres shall be designed using an appropriate hydrograph method. The inflow hydrograph shall be routed through the pond using standard engineering methods to obtain the discharge hydrograph.

4. Provide riprap or other erosion control measures at inlet and outlet of pond.

D. STORM RETENTION POND

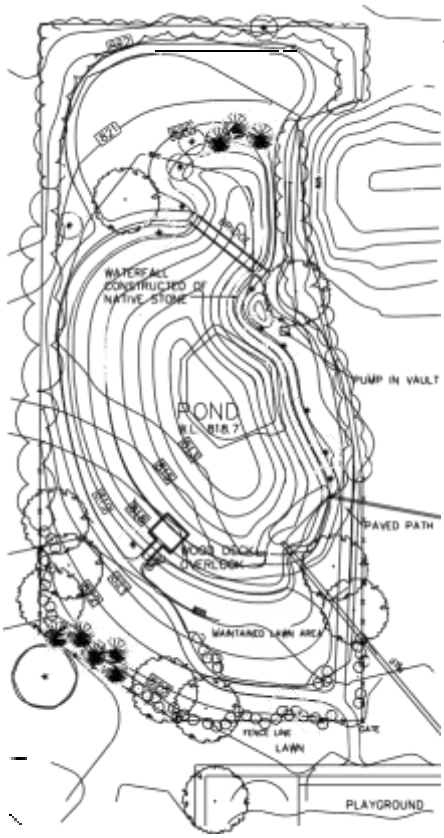
Retention ponds serve the same function as detention ponds (see Section 3205) and normally retain a level of water.

1. If it is desired as part of the educational program, the pond can be designed to retain water 3-foot to 8-foot deep and used as a “Nature Area.” See Figure D-1.

2. The fringe edge of the pond will accommodate the fluctuating water level with each storm event. If the pond is designed to retain water, provide fencing to surround pond.

3. Plan for future “Nature Area,” if a part of educational program, with paved walkways, wood deck overlooks, bridges, or other access to pond. Plan for future waterfall, fountain, or other means of keeping water aerated.

4. If the soil type is not conducive to retaining water, a pond liner may be required.



Storm Retention Pond
Figure D-1

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A. SANITARY SEWERAGE

1. Provide sanitary sewerage disposal for the facility.

2. The method for the treatment of sanitary sewerage on site shall be approved by the Ohio Environmental Protection Agency and the local health department.

3. The disposal of sanitary sewerage to the local utility shall be approved by the local authority having jurisdiction.

4. Appropriate methods for the disposal or treatment of sanitary sewerage consists of conventional gravity sewer, force main, septic with leach field system, or sand filter and on-site treatment plants.

5. Evaluate the ability to capture, filter, and reuse grey water.

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A. BUILDING IDENTIFICATION SIGN

1. Provide sign on building face if it is visible from the road, or provide independent sign near entry drive or center sign between entrance drives.

2. Sign should be readable from an appropriate distance along the major access road to the site, but should not block view of cars entering or exiting site.

3. Verify with authorities having jurisdiction over signage for any limitations or requirements that may override these design parameters.

B. DIRECTIONAL SIGNAGE

1. Provide adequate signage to direct separation of bus loading and unloading areas, staff parking, visitor parking, and vehicle drop-off/pick-up drive.

2. Signage shall provide direction to delivery trucks and other service vehicles.

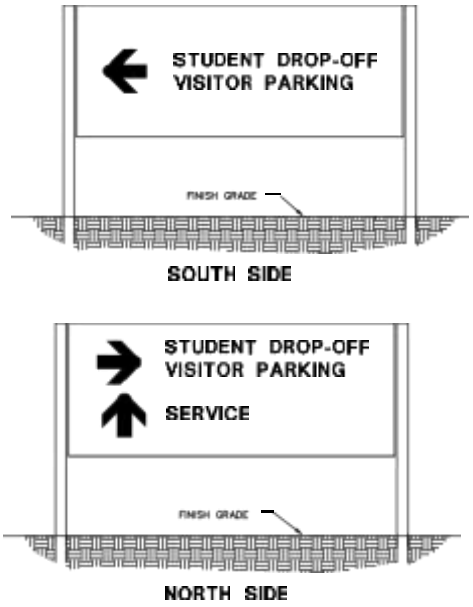
3. Graphics are to be reflective white on a contrasting background.

4. The design shall be post and panel, low profile.

5. The minimum letter height is 3 inches.

6. Verify with authorities having jurisdiction over signage for any limitations or requirements that may override these design parameters.

7. Use materials with a high recycled content.



Example of Directional Signage
Figure B-1

C. TRAFFIC REGULATORY SIGNAGE

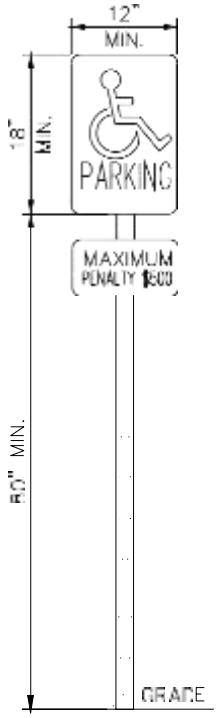
1 Provide "Stop," "Yield," "No Parking," "One-Way," "Do Not Enter," or other signs as necessary to maintain a fluid traffic stream.

2 Signs, and the installation of signs, are to meet the requirements of the authority having jurisdiction.

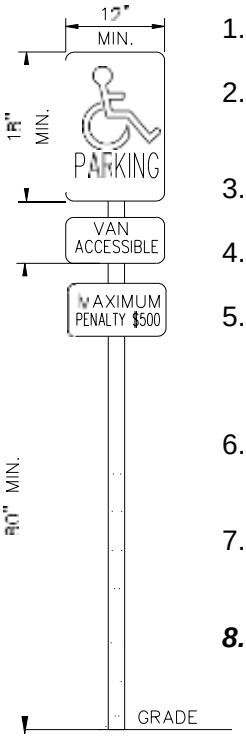
D. SIGN PLACEMENT

1 All signs placed at all intersections should be checked using appropriate sight distance requirements in accordance with the American Association of State Highway and Transportation Officials Design Guide.

E. ACCESSIBLE PARKING SIGNS



Sign for Car Parking or "Universal" Parking Space
Figure E-1



Sign for Van Parking Space
Figure E-2

1. Provide 1 sign for each accessible parking space.
2. Mount signs on posts and locate out of accessible route of travel, centered on each parking space.
3. The minimum height of signs is 80 inches above grade.
4. The minimum sign size is 12 inches wide by 18 inches high.
5. If the universal parking space design is not used, an additional sign will be required at each van accessible space to read "Van Accessible." See Figure E-1 and Figure E-2.
6. All signage and pavement markings should be in accordance with the *Manual of Uniform Traffic Control Devices*.
7. 6" x 12", 18 gauge steel sign with lettering "Maximum Penalty $500".
8. ***Use materials with a high recycled content.***

A. DIMENSIONS AND NUMBERS OF PHYSICAL EDUCATION FIELDS

1. Refer to specific requirements in Chapter 3, Section 3302, Elementary School Site Design; Section 3402, Middle School Site Design; and Section 3502, High School Site Design.

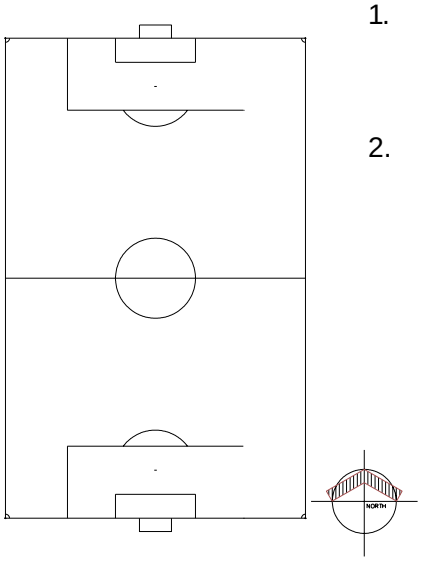
2. Provide necessary grading and seeding for physical education fields only. All other improvements such as bleacher/grandstand seating, fencing, etc., are for reference and planning purposes only.

3. The import of fill material for the purpose of constructing athletic and physical education fields is not funded by the Ohio Facilities Construction Commission.

B. PHYSICAL EDUCATION FIELD ORIENTATION

1. Football, soccer, basketball, and tennis orientation should be north-south along the long axis of the field/court. See Figure B-1.

2. To determine orientation for baseball and softball fields, strike a line from home plate to second base. This line is to run east-northeast. An optional orientation, but less desirable, is north-south with batter facing north.



Typical Orientation:
Soccer Field
Figure B-1

C. FUTURE WATER AND RESTROOM FACILITIES

1. Plan for future drinking water and restrooms for outdoor physical education facilities that are remote from the school building.

D. BLEACHER/GRANDSTAND SEATING

1. Plan space for bleacher/grandstand seating adjacent to physical education facilities.

2. Design of bleacher/grandstand should be certified by an Engineer.

3. Comply with authorities having jurisdiction for code requirements including percentage of elevated seats, aisle width, permissible travel distance to an aisle, number of aisles required, rise:run ratio, enclosed spaces between footboards and seats, guardrail and handrail design, and step and ramp design.

4. Locate bleachers/grandstand so sight lines are not obstructed by dugouts, player bench seating, or light poles.

A. PLAYGROUND DESIGN

1. Refer to specific requirements in Chapter 3, Section 3303, Elementary School Site Design; and Section 3403, Middle School Site Design.

2. Promote permeable surfaces.

3. Specify play surface and equipment with high recycled content materials.

4. Promote the trend toward more natural, less structured play environments ***such as par courses, etc.***

B. PLAY EQUIPMENT

1. Play equipment to be in compliance with "ASTM F 1487-95 or most current version of the Standard Consumer Safety Performance Specification for Playground Equipment for Public Use" and the current guidelines for public play equipment by the United States Consumer Product Safety Commission.

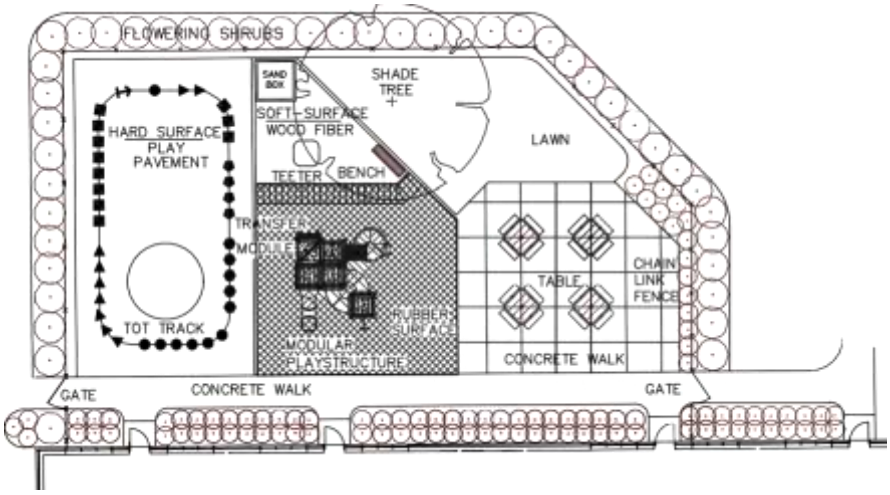
2. The design of play equipment shall comply with Americans with Disabilities Act guidelines.

3. Play equipment located in hard and soft surface areas are funded by the Ohio Facilities Construction Commission.

C. SURFACING FOR PLAY AREAS

1. Provide hard surface and soft surface play areas. See Figure C-1.

2. Provide for games or educational features painted on hard surfaces. A hard surface is light-duty asphalt pavement.



Typical Play Area with Hard and Soft Surface
Figure C-1

C. SURFACING FOR PLAY AREAS (cont.)

3. Provide a firm, stable, slip-resistant, and resilient soft surface under and around play equipment. Depth and type of soft surfaces shall comply with ASTM F 1292-99 or most current version of Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment."

4. Provide an accessible route of travel through soft-surface play area, a minimum of 5-foot wide, with a maximum ***20:1 (5%)*** slope. Choice of surfacing and minimum areas of surfacing required shall comply with Americans with Disabilities Act guidelines.

D. LOCATION OF PLAY AREAS

1. Locate near exit from classrooms for each age group and centrally locate close to student dining.

2. Provide proper separation between hard surface play areas and building walls.

3. Provide noise buffer between classroom windows and playground.

4. Do not obscure view into play areas. Design the play areas to promote careful supervision and quick emergency response.

A. GENERAL

1. Locate fence in curb in high maintenance areas.

2. Top and bottom of fencing selvage shall be knuckled.

B. SITE PERIMETER FENCE

1. Provide fencing at the portion of the site where adjacent to open water, busy street, railroad tracks, and where other safety hazards occur.

C. FENCE INTERIOR TO THE SITE

1. Provide fence to enclose mechanical yards, equipment, trash/service areas, and where other safety hazards occur.

2. Provide fencing around agriculture education area for security. Paved area to be heavy-duty concrete.

3. Provide fencing around lab areas involving work on or with vehicles, equipment, or animals for security and safety.

D. PLAYGROUND FENCING

1. Provide fencing around playground perimeter where there is a potential for children to run out into parking areas, adjacent streets, and/or other hazardous conditions.

2. Provide a minimum of 4-foot high fencing for pre-kindergarten and grade 1 play areas.

3. Provide fencing around perimeter of basketball courts for ball control.

E. PHYSICAL EDUCATION FIELDS

1. Plan for perimeter fencing of tennis courts, track, and baseball/softball fields as described in Chapter 3, Section 3402, Middle School Site Design; and Section 3502, High School Site Design.

2. Plan for 8-foot high fencing around perimeter of physical education fields if there is an admission fee charged for viewing events.

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A. SECURITY LIGHTING

1. Lighting for main building entrances and other entry/exit doors shall comply with the allowable lighting power densities listed in the applicable International Energy Conservation Code (IECC) with references to ASHRAE 90.1. When attempting compliance with LEED Sustainable Sites – Light Pollution Reduction – the allowable power densities shall be reduced by 20 percent.

2. Light fixtures shall be wall-mounted, high-intensity discharge type or compact fluorescent located directly over doors or high-intensity discharge type recessed in overhangs or soffits located directly over doors. Fixtures shall be designed for exterior use and can be LED-type light fixtures. Wall-mounted fixtures shall be vandal resistant.

B. DRIVES & PARKING AREAS

1. Provide an illumination level of 0.5 footcandles at entrance/exit drives.

2. Provide an illumination level of 1.0 footcandles within parking areas and bus drop-off/pick-up areas.

3. Lighting shall be high-intensity discharge or LED-type located on poles with a concrete base ***or direct-embedment foundation. All bases and foundations shall be designed by the project engineer***. Pole height shall be a maximum of 39 feet.

4. Lighting fixtures should be full lateral cut off type to eliminate up lighting from the site.

5. Consider packaged site lighting using photovoltaics.

6. Lighting shall be in conformance with ASHRAE 90.1.

C. CIRCULATION & PEDESTRIAN AREAS

1. Provide an illumination level of 0.5 footcandles at pedestrian routes from parking areas and bus drop-off/pick-up areas to building entrances.

2. Lighting of pedestrian routes shall be of high-intensity discharge or LED-type. Fixture shall be bollard type or pole-mounted type.

3. Lighting shall be in conformance with ASHRAE 90.1.

D. BUILDING IDENTIFICATION

1. Provide an illumination level of 10 footcandles to building identification signage located on the building or to identification sign located on site.

2. Lighting shall be of high-intensity discharge type.

E. CONTROLS

1. The Site Design Professional shall have discussions with the school district to determine light fixture controls for building areas, security lighting, and parking areas.

2. Lighting shall be controlled by photo-sensor, astronomical time clock, or temperature control system.

A. SURFACE

1. Provide 3-inch deep stone over woven geotextile and underdrain tubing between equipment pads in mechanical/electrical yard areas.

B. PERIMETER

1. Provide curb or edging separation between stone and adjacent lawn or pavement areas.

2. Provide fence around perimeter of mechanical/electrical yards.

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A. LAWN

1. Seed or sod all disturbed areas of the site.

2. Do not exceed 3:1 slope on lawn areas where mowing is required.

3. Sod may be utilized in close proximity to primary building entrance and in flow line of storm drainage swales.

4. A fiber mulch seeding and mulching operation may be used when necessary to establish a quick catch for erosion prevention or sediment control.

5. Minimize seeded areas in favor of more robust natural landscape.

B. EROSION CONTROL

1. On slopes greater than 3:1 provide slope controlled vegetation per ODOT standards to retard erosion.

2. Prior to seeding, provide erosion control fabric in disturbed areas where slope is 4:1 or greater.

C. SHADE

1. Provide ***trees for shading*** of parking lots, and playground areas.

D. WIND AND VISUAL SCREEN

1. Provide evergreen trees and shrubs as a wind screen for building and site development.

2. Provide visual screen of service areas and adjacent properties that may be incompatible with school use.

E. MAIN BUILDING ENTRIES

1. Provide low maintenance shrubs and flowering trees to emphasize main building entries.

F. LANDSCAPE

1. Landscape for energy conservation, edible plants, and local wildlife.

2. ***Consider using the "Crime Prevention Thru Environmental Design" (CPTED) guidelines when developing the design of the landscape.***

G. OUTDOOR LEARNING AREAS

1. Consider incorporating natural habitats, wetlands, and areas of specific vegetation as outdoor learning areas for student instruction. For example, garden plots could be used for classroom instruction or by the community areas.

H. EXTERIOR BUILDING PERIMETER

1. Use caution in specifying materials that could be used as projectiles around perimeter of building, at special feature areas, or unprotected utility areas.

A. TREE GRATES

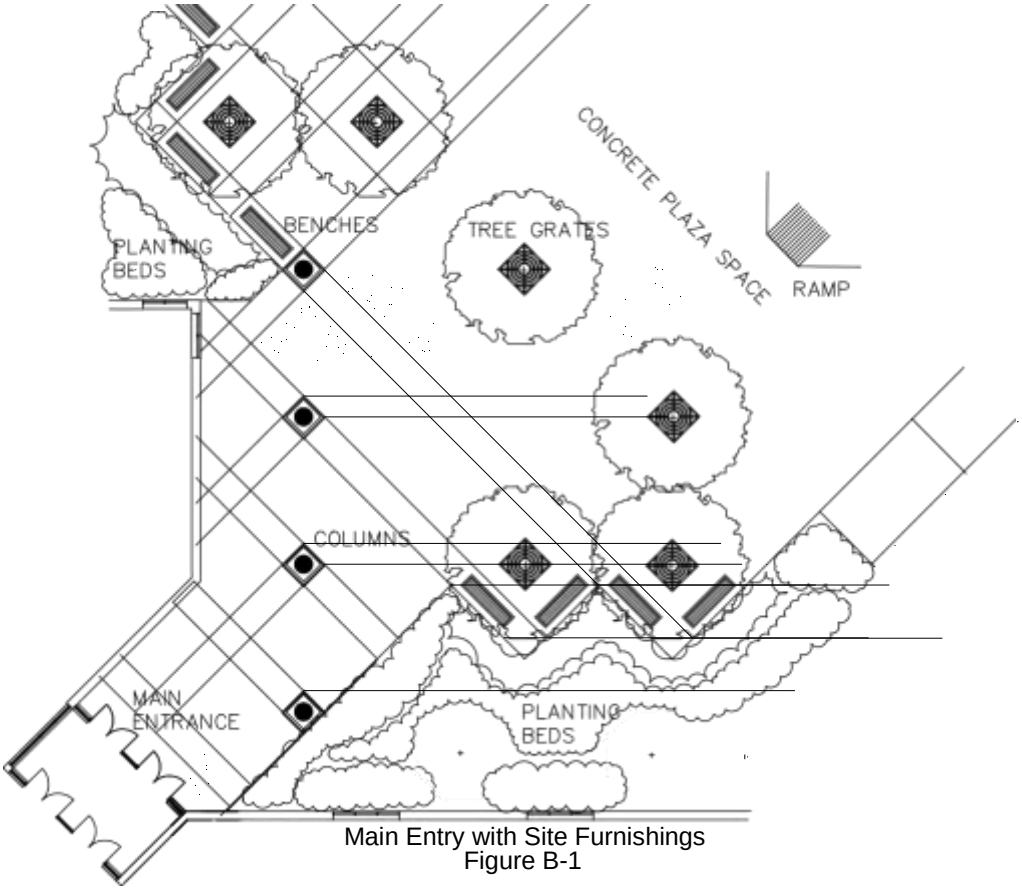
1. Provide tree grates where trees will be planted within pedestrian routes. Openings in grates should meet Americans with Disabilities Act guidelines. See Figure B-1.

B. FURNISHINGS (See Figure B-1)

1. Provide fixed benches and enclosed trash receptacles along walks to main building entrances.

2. Provide fixed tables, benches, and enclosed trash receptacles in playground areas.

3. ***Consider furnishings from materials with high recycled content.***



Main Entry with Site Furnishings
Figure B-1

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A. EXTERIOR PROTECTION

1. Consider providing an exterior perimeter defense system consisting of site fencing, surveillance cameras, and an exterior door access control system.

B. FENCING

1. Consider providing 8' high chain link fence around selected portions of the site with gates to control main vehicular and pedestrian arteries.

C. EXTERIOR DOORS

1. Consider a minimum number of exterior doors to be equipped with access control devices. The system would be on a programmed schedule that automatically unlocks and locks the doors at prearranged times. Refer to Chapter 8.

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A. BUS LOADING AND UNLOADING

1. "Dual-use" of the bus parking lot for playground pavement and special event parking is possible when buses are not present.

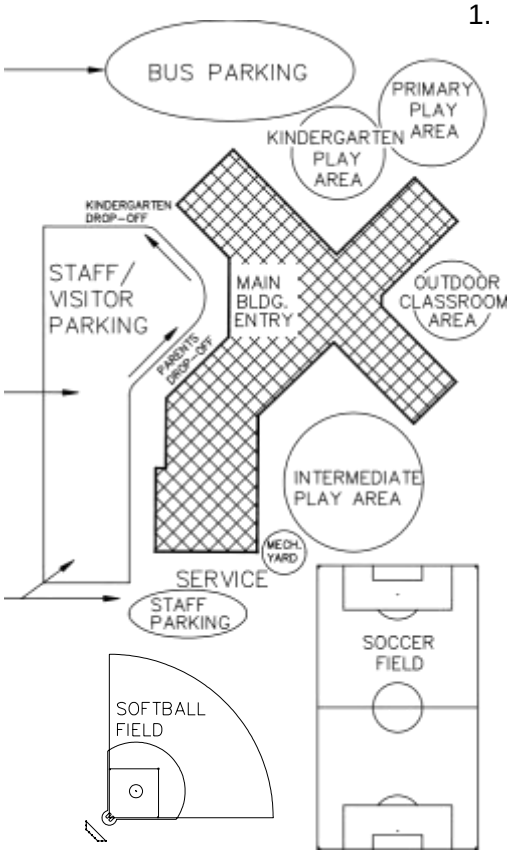
2. Minimize painted games and lines on vehicular pavement areas. Use different color lines for game striping than used for vehicular parking striping.

3. Provide gate(s) at parking lot entrance to prevent use of the lot by vehicles when used for a playground.

4. Locate all drop offs and parking so that idling vehicles are not a source of interior air pollution.

B. VEHICLE DROP-OFF/PICK-UP DRIVE

1. Locate drop-off/pick-up drive close to kindergarten and pre-kindergarten classrooms. See Figure B-1.



Site Design: Elementary School
Figure B-1

C. STAFF AND VISITOR PARKING

1. Refer to page 3101-4 for minimum parking space requirements.

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A. PHYSICAL EDUCATION FIELDS

1. Provide grading only for 1 softball field and 1 multipurpose field where import of fill material is not required.

2. Provide grading of fields with a 1 percent to 1 1/2 percent slope.

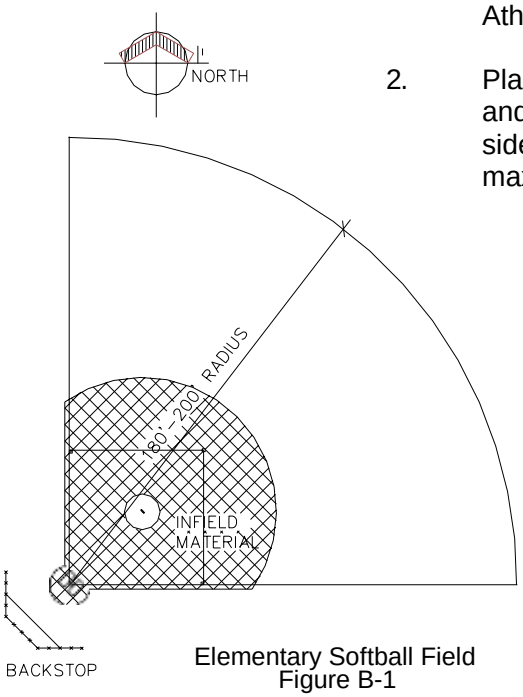
3. Softball field radius shall be 180 feet to 200 feet. See Figure B-1.

4. The multipurpose field size shall be 195 feet wide and 360 feet long.

B. SOFTBALL FIELD

1. Plan for infield area in compliance with the Ohio High School Athletic Association guidelines. See Figure B-1.

2. Plan for a backstop having a 17-foot 6-inch overhang height; and a 10-foot high by 20-foot wide back panel with 10-foot wide side panels. Locate backstop a minimum of 25 feet and a maximum of 30 feet behind home plate.



Elementary Softball Field
Figure B-1

C. MULTIPURPOSE FIELD

1. Grading is to crown at center of field and slope to sidelines.

2. Plan for future under drains and irrigation.

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A. AREA REQUIRED

1. Provide 50-75 square feet of play area per student. This area includes both hard surfaces and soft surfaces.

B. SEPARATION OF PLAY AREAS

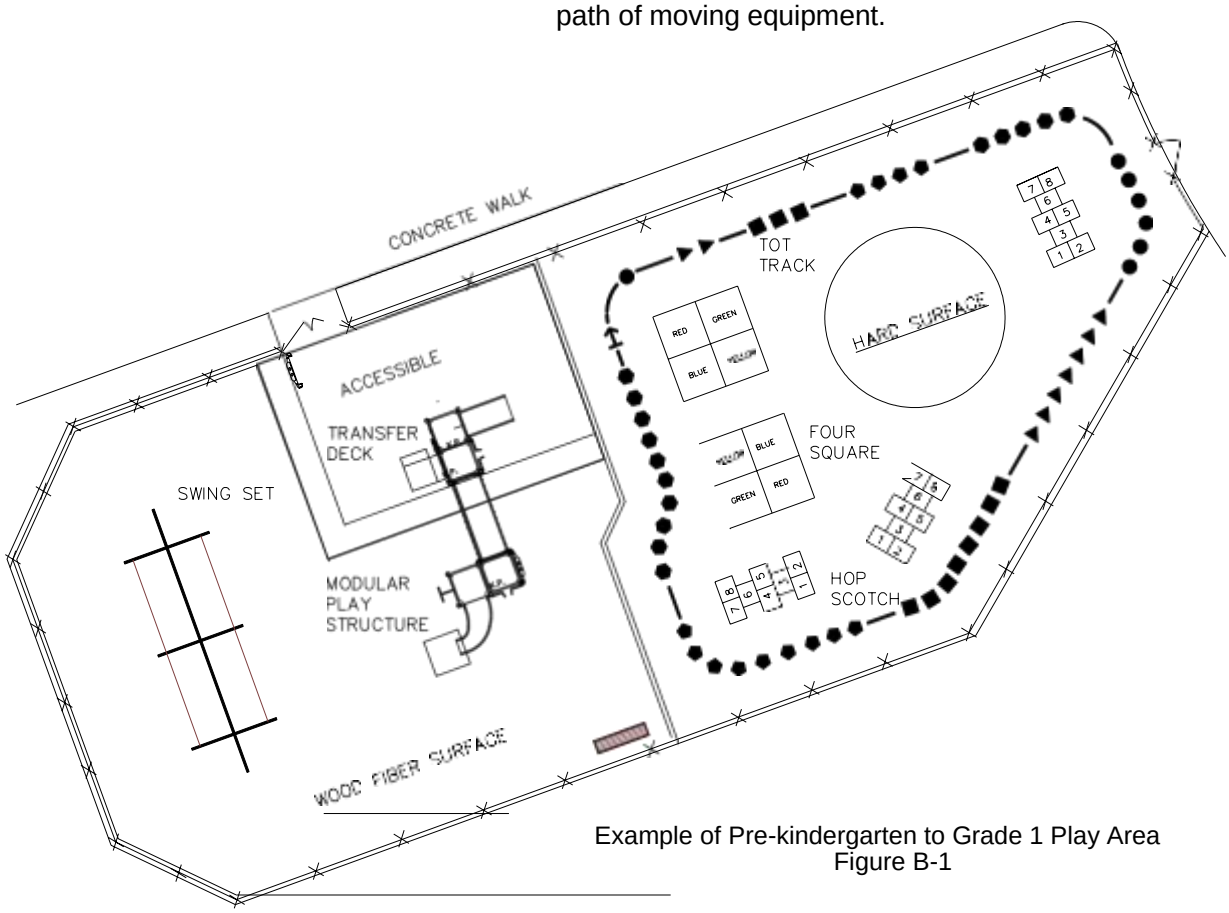
1. Provide playground areas to allow for difference in age, ability, and varying interests.

2. Follow applicable safety guidelines for different age groups.

3. Pre-kindergarten to grade 1 play area. See Figure B-1.

   a. Provide play activities that include rocking, swinging, balancing, climbing, and sliding.

   b. Locate equipment with moving parts, such as swings, at the perimeter of the play area. Use fence or planting beds to prevent children from inadvertently stepping into path of moving equipment.



Example of Pre-kindergarten to Grade 1 Play Area
Figure B-1

B. SEPARATION OF PLAY AREAS (cont.)

4. Primary Play Area (See Figure B-2)

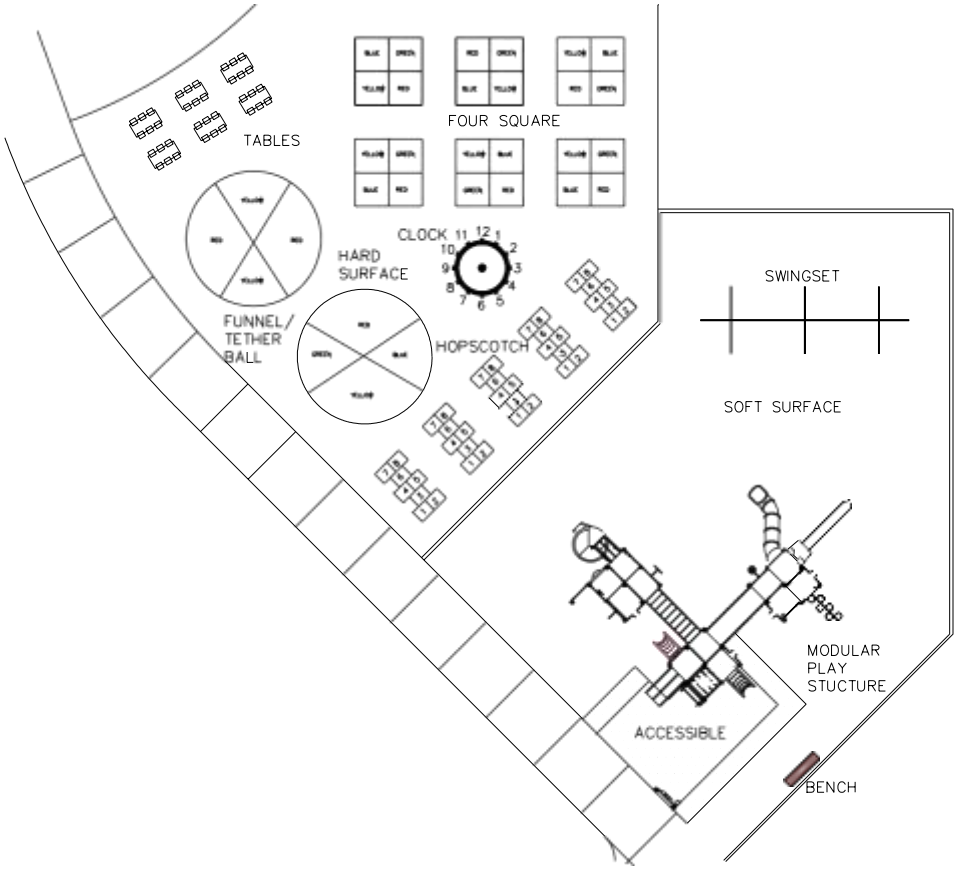
   a. Design for grades 1 through 3.

   b. Provide play activities that include rocking, swinging, balancing, climbing, and sliding.

   c. Provide upper-body strengthening devices such as a parallel bar and overhead ladder play equipment.

   d. Provide half-court basketball and dropshot/funnel ball.

   e. Provide a grouping of tables and benches for use as an outdoor classroom setting.



Example of Primary Play Area
Figure B-2

B. SEPARATION OF PLAY AREAS (cont.)

5. Intermediate Play Area (See Figure B-3)

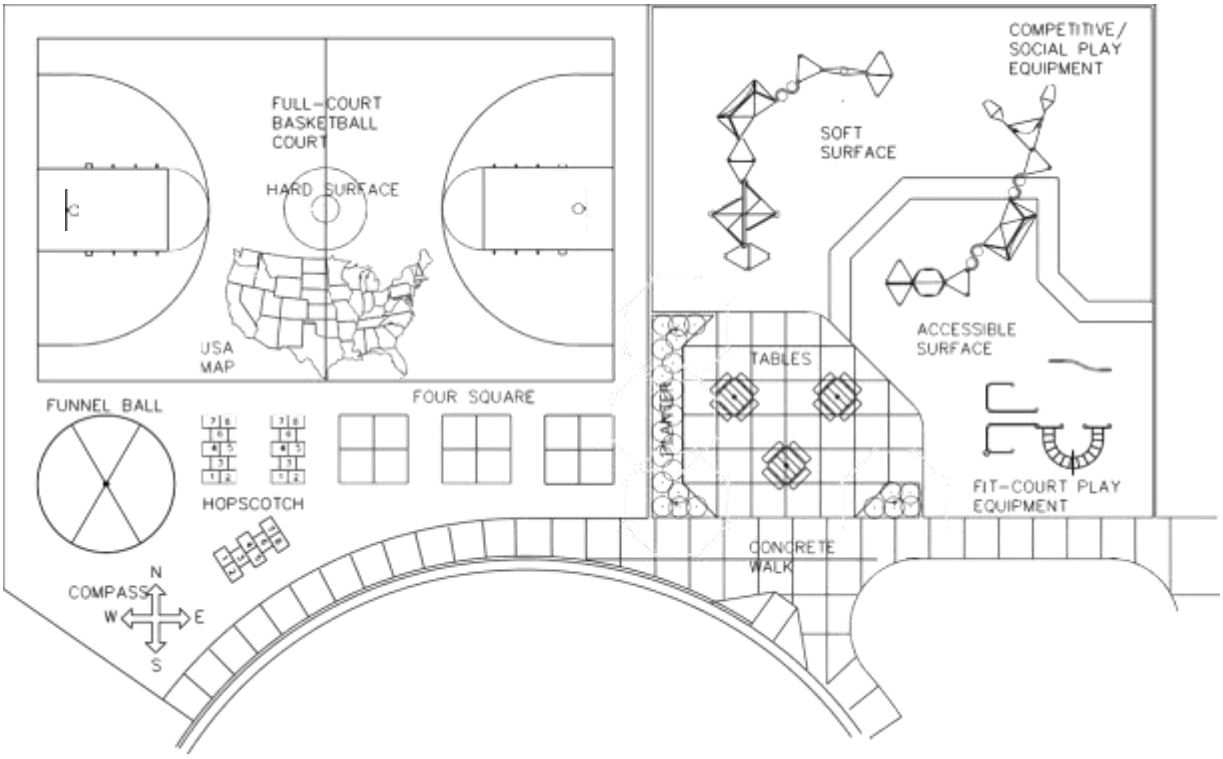
   a. Design for grades 4 and 5.

   b. Intermediate play area may be combined with primary play area.

   c. Provide fitness structures and competitive equipment.

   d. Provide 1 or 2 full basketball courts (50 feet by 84 feet) or 2 half courts (50 feet by 42 feet).

   e. Provide for groupings of benches and tables for social or passive play. This area can also serve as an outdoor classroom.



Example of Intermediate Play Area
Figure B-3

C. HARD SURFACE PLAY AREA

1. Provide paved area for full- or half-court basketball. Locate on bus pavement where possible.

2. Painted games could include four square, hopscotch, tetherball, kickball, dodgeball, games played in a large circle, a tot track with sequenced shapes or perimeter line for running relays or laps.

3. Educational features could include a USA or world map, counting line, compass, and clock.

D. SOFT SURFACE PLAY AREA

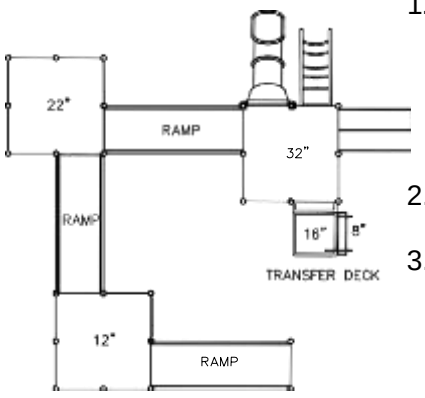
1. Surfacing is to be a nonsplintering surface where children may be crawling. Avoid using black surfacing.

2. Provide edging to keep loose fill soft surface within bounds of the play area. Depress loose fill soft surface material below edging. Provide under drain system and geotextile below loose fill soft surface.

3. Increase the depth of soft surface material in areas of high use such as the base of swings and slides.

4. Provide play structures.

E. ACCESSIBILITY STANDARDS



Typical Ramp and Transfer Deck
Figure E-1

1. Provide ramps and/or transfer points on composite play structures for access to play components on elevated decks. Meet the Americans with Disabilities Act guidelines for percentage of components that are to be accessible by ramp and by transfer deck. See Figure E-1.

2. Provide table and benches along accessible route.

3. Provide future upper-body strengthening devices as appropriate for age group and amount of supervision.

A. BUS LOADING AND UNLOADING

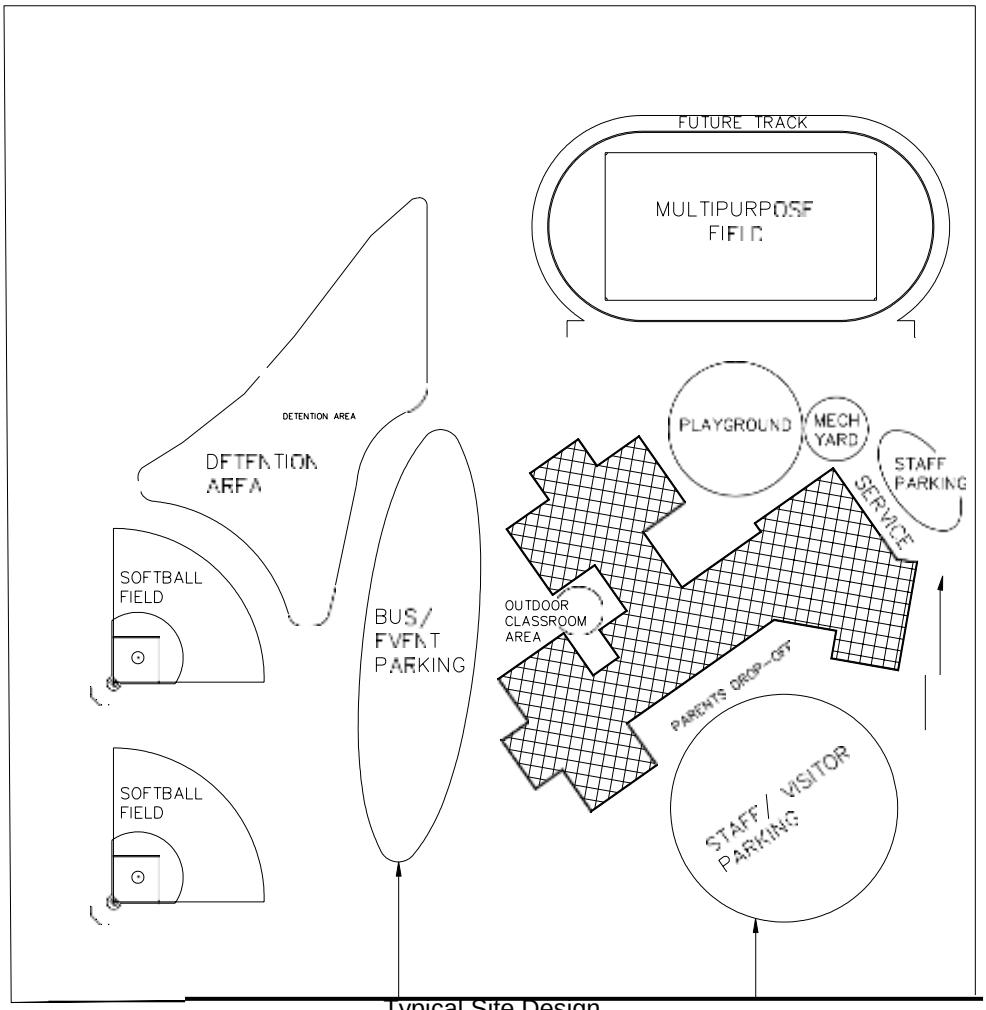
1. "Dual-use" of the bus parking lot for playground pavement and special event parking is possible when buses are not present.

2. Provide gate(s) at "dual-use" parking lot entrance to prevent use of the lot by vehicles when used as a playground.

3. Locate all drop offs and parking so that idling vehicles are not a source of interior air pollution.

B. STAFF AND VISITOR PARKING

1. Refer to page 3101-4 for minimum parking requirements.



Typical Site Design
Figure B-1

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A. PHYSICAL EDUCATION FIELDS

1. Provide grading only for 1 softball field and 1 multipurpose field where import of fill material is not required.

2. Plan for 1 baseball field, 8 to 12 tennis courts, 6- or 8-lane, 400-meter running track/football field, and field events.

3. Provide grading of fields with 1 percent to 1 1/2 percent slope.

4. The multipurpose field is to be 195 feet wide and 360 feet long.

B. SOFTBALL FIELD

1. Softball field radius is 185 feet to 300 feet. See Figure B-1.
   a. 185 feet – 235 feet for female or male fast pitch.
   b. 250 feet – 275 feet for female or male fast pitch.
   c. 275 feet – 300 feet for male slow pitch.

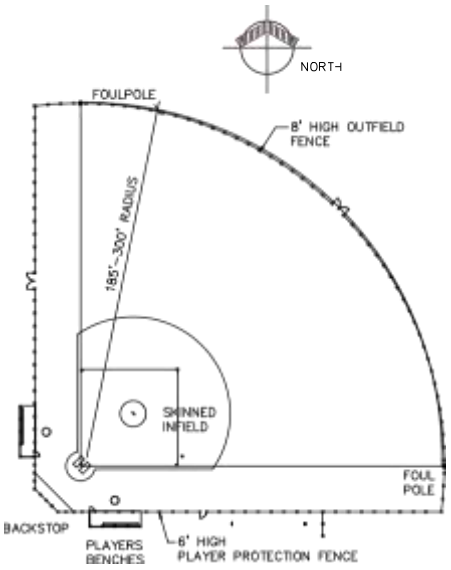
2. Plan for an infield area in compliance with the Ohio High School Athletic Association guidelines. See Figure B-1.

3. Plan for a backstop having a 17-foot 6-inch overhang height; and a 10-foot high by 20-foot wide back panel with 10-foot wide side panels. Locate backstop a minimum of 25 feet and a maximum of 30 feet behind home plate.

4. Plan for 6-foot high chain link, player protection fence.

5. Plan for future 8-foot high chain outfield fencing, foul poles, and top rail protective pad.

6. Plan for player benches, set back from side fence line.

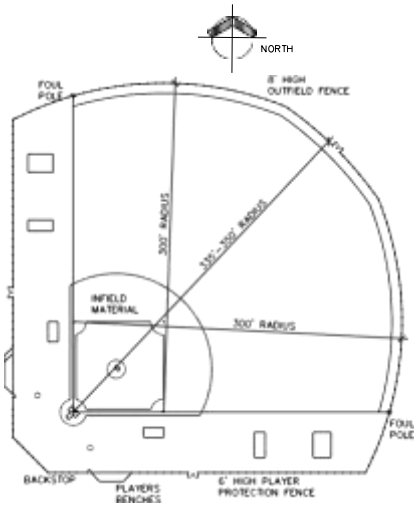


Typical Softball Field
Figure B-1

C. MULTIPURPOSE FIELD

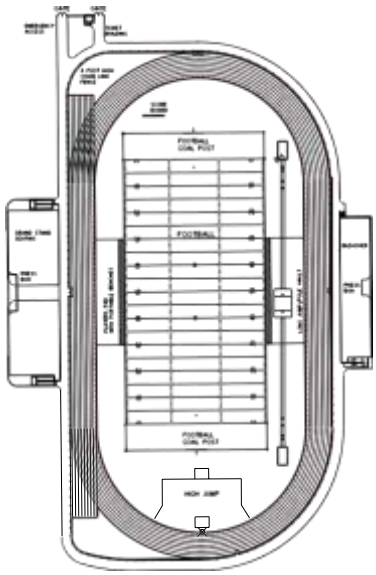
1. Grading is to crown at center of field and slope to sidelines.
2. Plan for future under drains and irrigation.
3. Plan for portable or combination football/soccer goals.

D. FUTURE IMPROVEMENTS



Middle School Baseball Field
Figure D-1

1. Baseball Field
   a. Radius is to be 300 feet/335 feet to 350 feet. See Figure D-1.
   b. Plan for infield area in compliance with Ohio High School Athletic Association guidelines. See Figure D-1.
   c. Plan for 24-foot high backstop a minimum of 60 feet from home plate.
   d. Plan for a protection fence that is 6-foot high chain link fence offset 60 feet from first and third base lines.
   e. Plan for outfield fencing that is 8-foot high chain link fence with top rail protective pad between foul lines. Plan for foul poles.
   f. Plan for player benches, set back from side fence line.



Middle School Track
with Football Field
Figure D-2

2. Running Track/Football Field
   a. Plan for 6- or 8-lane, 400-meter running track/football field. See Figure D-2.
   b. Design track radius to allow for a soccer or football field inside the track.
   c. Plan for field events that include high jump, long/triple jump, discus, and shot-put.
   d. Plan for 4-foot high chain link perimeter fence surrounding track with gates at center field and as needed for maintenance.

D. FUTURE IMPROVEMENTS (cont.)

3. Tennis Courts

a. Plan each court to be 36-foot wide and 78-foot long with a minimum of 21 feet behind each base line to the fence and a minimum of 12 feet from sideline to adjacent court or fence.

b. It is recommended to have no more that 3 courts side-by-side within 1 fenced area.

c. Plan for perimeter fence to be 10-foot to 12-foot high. Fence between adjacent banks of courts should be a minimum of 4-foot high.

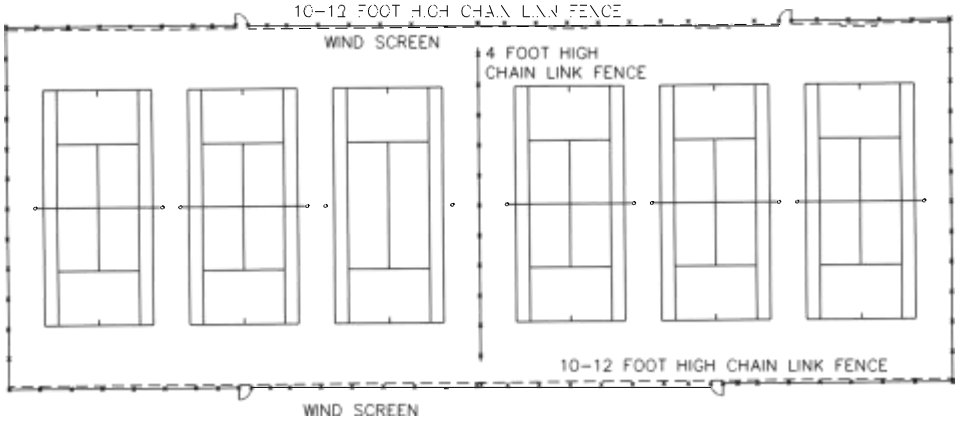
d. Plan to install windscreen on chain link fence for wind reduction and at ends of courts for increased ball visibility.

e. Backboards located on chain link fence at ends of courts for teaching are optional.

f. Plan to modify spacing, depth of footings, and post size of fencing as required for additional wind load of future windscreen or backboard.

g. Recommended slope is 1" in 10' (0.833 percent); maximum 1 percent.

h. The direction of slope in order of preference: 1) side-to-side, 2) end-to-end, and 3) corner-to-corner.



Middle School Tennis Courts
Figure D-3

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A. HARD SURFACE PLAY AREA

1. Provide paved area for basketball full- or half-courts. Locate on bus pavement where possible.

2. Provide grouping of tables and benches for use as an outdoor classroom setting.

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A. BUS LOADING AND UNLOADING

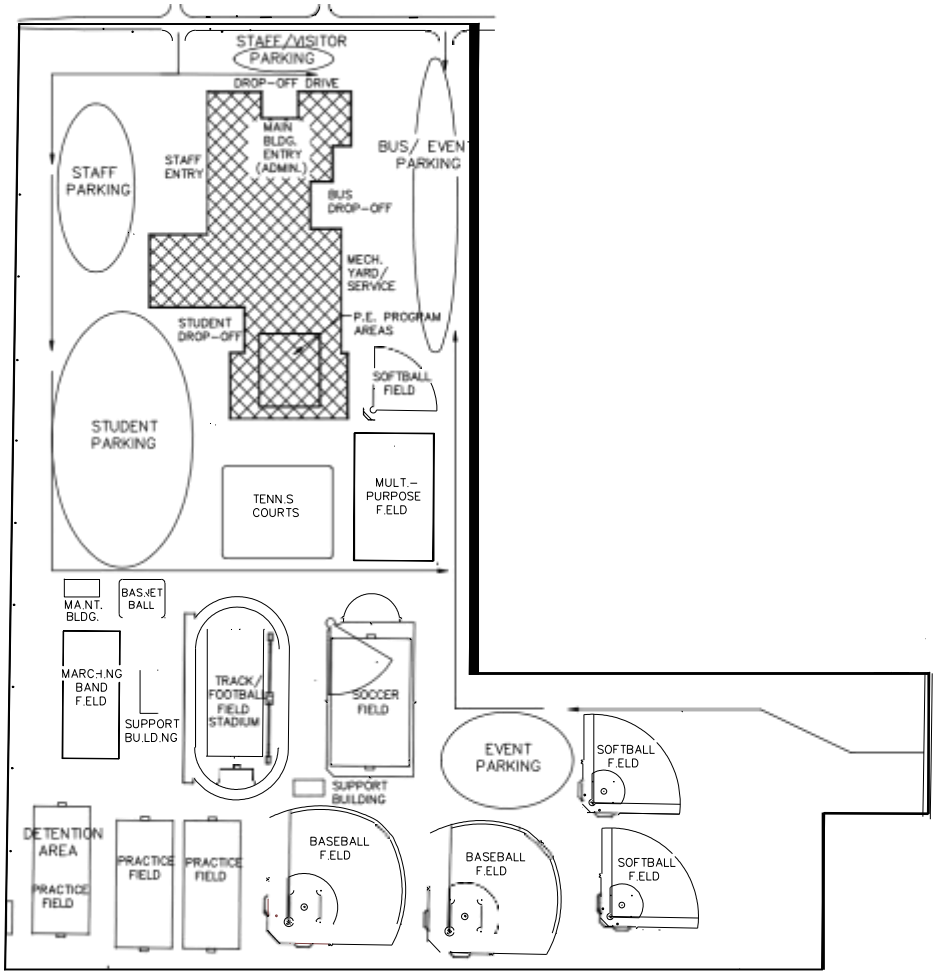
1. "Dual-use" of the bus parking lot for special event parking is possible when buses are not present.

B. *STAFF AND* VISITOR PARKING

1. Refer to page 3101-4 for minimum parking requirements.

C. STUDENT PARKING

1. Student parking area is to be separate from bus and staff parking. Provide ***minimum of spaces for 20% of student capacity.*** See Figure C-1.



Typical Site Design
Figure C-1

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A. PHYSICAL EDUCATION FIELDS

1. Provide grading only for 1 softball field and 1 multipurpose field where import of fill material is not required.

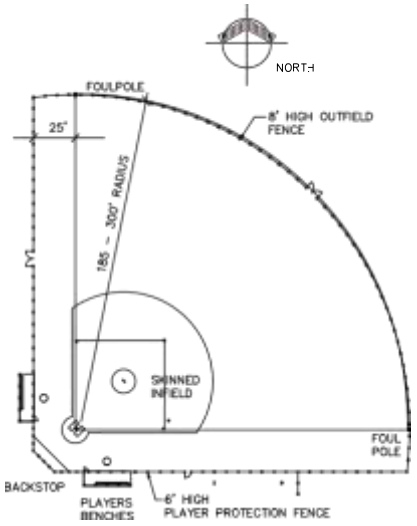
2. Plan for 1 baseball field, 8 to 12 tennis courts, 8-lane, 400-meter running track/football field, and field events, and 2 additional multipurpose fields.

3. Provide grading of fields with 1 percent to 1 1-2 percent slope.

4. The multipurpose field is to be 225-foot wide and 360-foot long.

B. SOFTBALL FIELD

1. The softball field radius is 185 feet to 300 feet. See Figure B-1.
   a. 185 feet - 235 feet for female or male fast pitch
   b. 250 feet - 275 feet for female slow pitch
   c. 275 feet - 300 feet for male slow pitch



Typical Softball Field
Figure B-1

2. Provide infield area in compliance with the Ohio High School Athletic Association guidelines. See Figure B-1.

3. Plan for a backstop having a 17-foot 6-inch overhang height; and a 10-foot high by 20-foot wide back panel with 10-foot wide side panels. Locate backstop a minimum of 25 feet and a maximum of 30 feet behind home plate.

4. Plan for 6-foot high chain link, player protection fence.

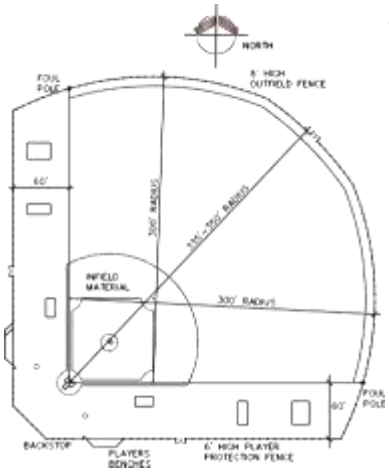
5. Plan for future 8-foot high chain outfield fencing, foul poles, and top rail protective pad.

6. Plan for player benches, set back from side fence line.

C. MULTIPURPOSE FIELD

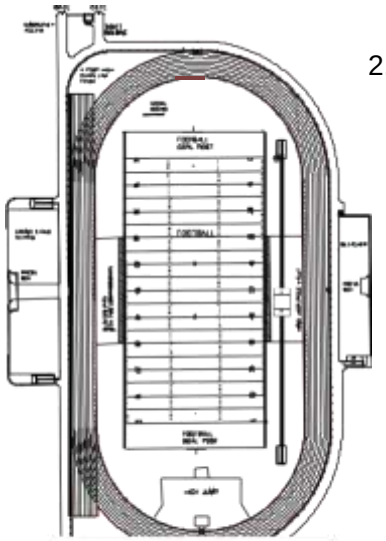
1. Grading is to crown at center of the field and slope to sidelines.
2. Plan for future under drains and irrigation.
3. Plan for portable or combination football/soccer goals.

D. FUTURE IMPROVEMENTS



High School Baseball Field
Figure D-1

1. Baseball Field
   a. Radius is to be 300 feet/335 feet to 350 feet. See Figure D-1.
   b. Plan for infield area in compliance with Ohio High School Athletic Association guidelines. See Figure D-1.
   c. Plan for a 24-foot high backstop a minimum of 60 feet from home plate.
   d. Plan for a protection fence that is 6-foot high chain link fence offset 60 feet from first and third base lines.
   e. Plan for outfield fencing and foul poles that are 8-foot high chain link fence with top rail protective pad between foul lines.
   f. Plan for player benches, set back from side fence line.



High School Track
with Football Field
Figure D-2

2. Running Track/Football Field
   a. Plan for 8-lane, 400-meter running track/football field. See Figure D-2.
   b. Design track radius to allow for a soccer or football field inside the track.
   c. Plan for field events that include high jump, long/triple jump, discus, and shot-put.
   d. Plan for a 4-foot high chain link perimeter fence surrounding track with gates at center field and as needed for maintenance.

D. FUTURE IMPROVEMENTS (cont.)

3. Tennis Courts (See Figure D-3)

a. Plan each court to be 36-foot wide by 78-foot long with a minimum of 21 feet behind each base line to the fence and a minimum of 12 feet from sideline to adjacent court or fence.

b. It is recommended to have no more than 3 courts side-by-side within 1 fenced area.

c. Plan for perimeter fence to be 10-foot to12-foot high. Fence between adjacent banks of courts should be a minimum of 4-foot high.

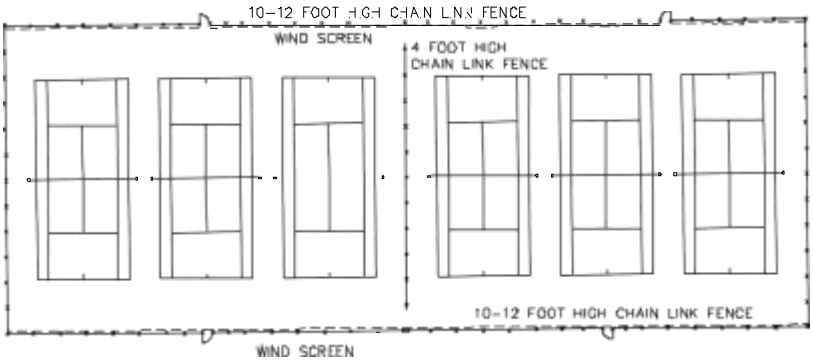
d. Plan to install windscreen on chain link fence for wind reduction and at ends of courts for increased ball visibility.

e. Backboards located on chain link fence at ends of courts for teaching is optional.

f. Plan to modify spacing, depth of footings, and post size of fencing as required for additional wind load of future windscreen or backboard.

g. Recommended slope is 1" in 10' (0.833 percent); maximum 1 percent.

h. The direction of slope in order of preference: 1) side-to-side, 2) end-to-end, and 3) corner-to-corner.



High School Tennis Courts
Figure D-3

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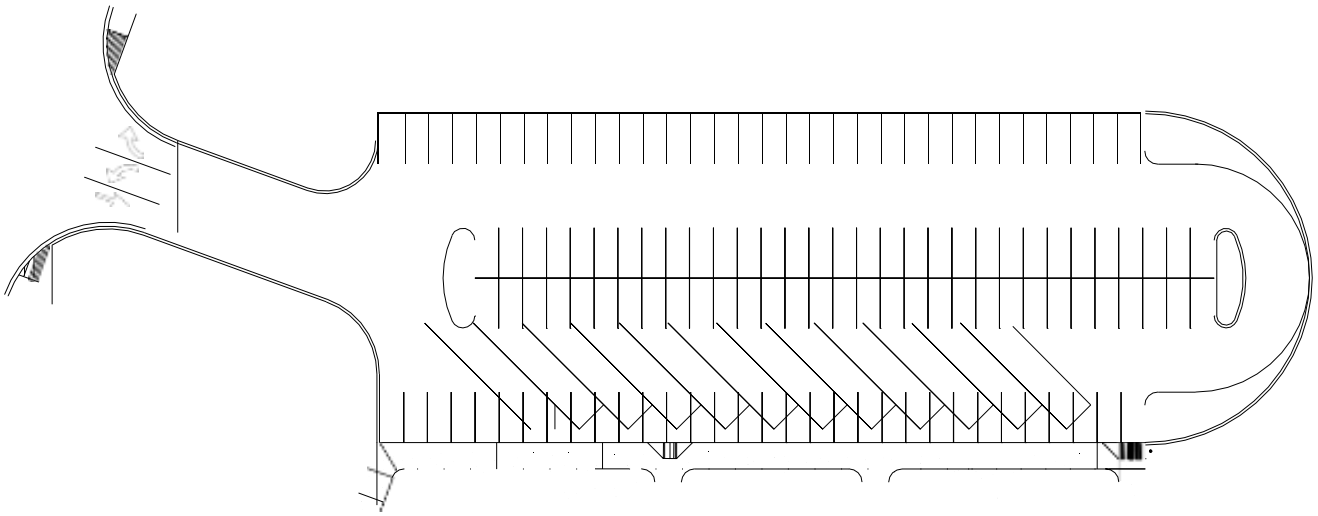
A. BUS LOADING AND UNLOADING

1. "Dual-use" of the bus parking lot for playground pavement and basketball courts is possible when buses are not present.

2. Over-stripe the bus parking lot for special event parking. Design the lot for optimum number of cars by setting the width of the pavement to allow for four rows (two aisles) of cars. See Figure C-1.



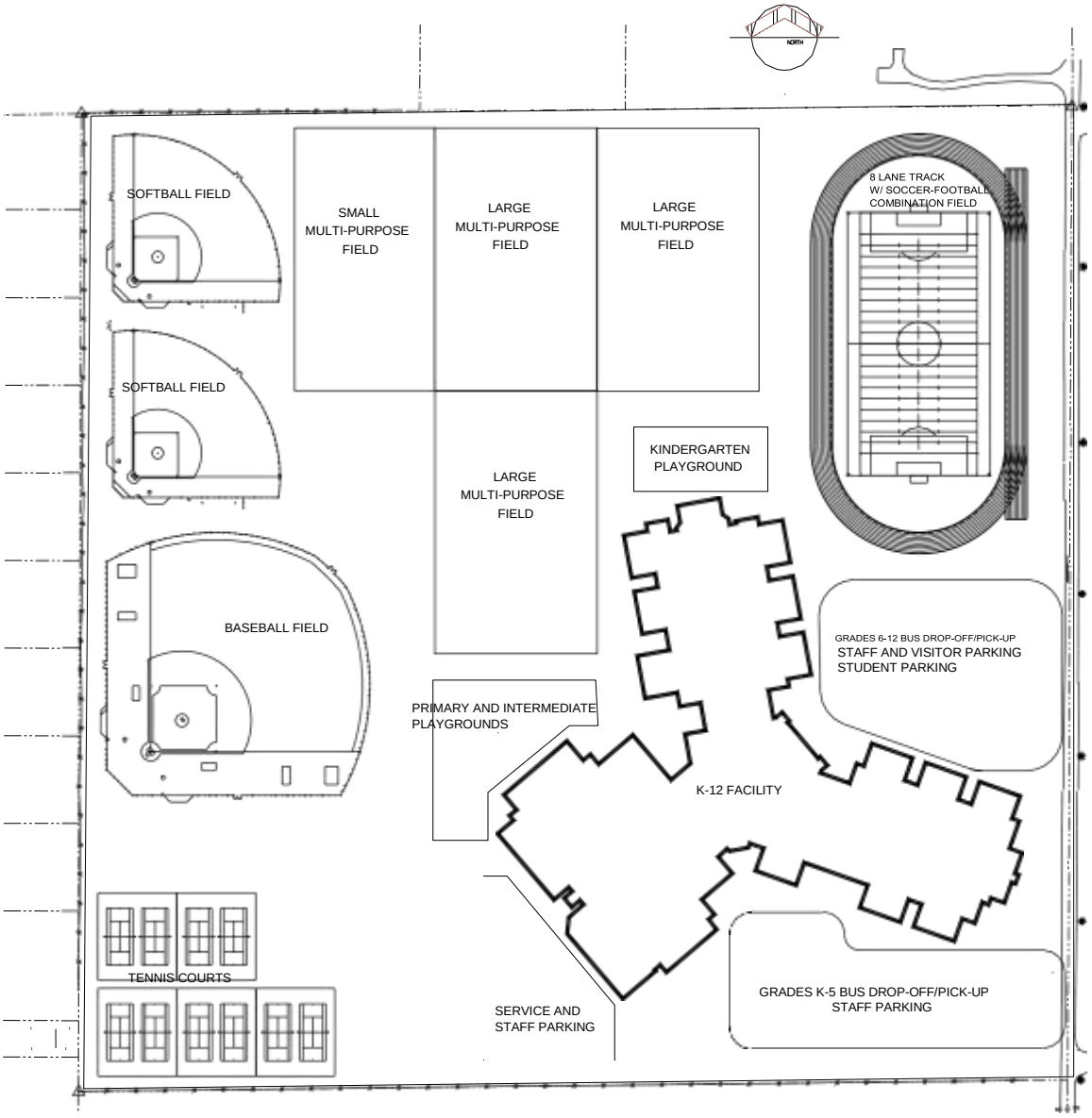
Typical Bus Parking Lot Design
Figure C-1

B. VISITOR PARKING

1. Provide a minimum of 15 parking spaces.

C. STUDENT PARKING

1. Student parking area is to be separate from bus, visitor, and staff parking. ***Provide spaces for 20% of all high school students.***



Typical Site Design
Figure C-2

A. PHYSICAL EDUCATION FIELDS

1. Provide grading only for 2 softball fields and 2 multipurpose fields where import of fill material is not required.

2. Plan for 1 baseball field, 10 tennis courts, 8-lane, 400-meter running track/football field, and field events, and 2 additional multipurpose fields.

3. Provide grading of fields with 1 percent to 1 1-2 percent slope.

4. The multipurpose field: 3 fields are to be 225-foot wide and 360-foot long and 1 field is to be 195-foot wide and 360-foot long.

B. SOFTBALL FIELD

1. The softball field radius: one field is to be 225 feet to 275 feet and one field is to be 180 feet to 200 feet. See Figure B-1.

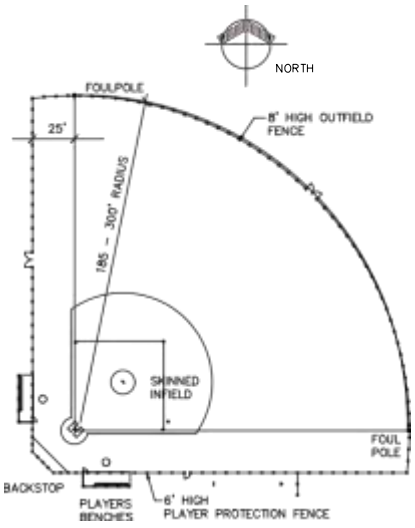
2. Provide infield area in compliance with the Ohio High School Athletic Association guidelines. See Figure B-1.

3. Plan for a backstop having a 17-foot 6-inch overhang height; and a 10-foot high by 20-foot wide back panel with 10-foot wide side panels. Locate backstop a minimum of 25 feet and a maximum of 30 feet behind home plate.

4. Plan for 6-foot high chain link, player protection fence.

5. Plan for future 8-foot high chain outfield fencing, foul poles, and top rail protective pad.

6. Plan for player benches, set back from side fence line.

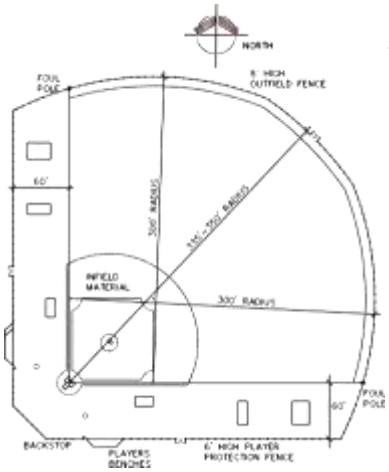


Typical Softball Field
Figure B-1

C. MULTIPURPOSE FIELD

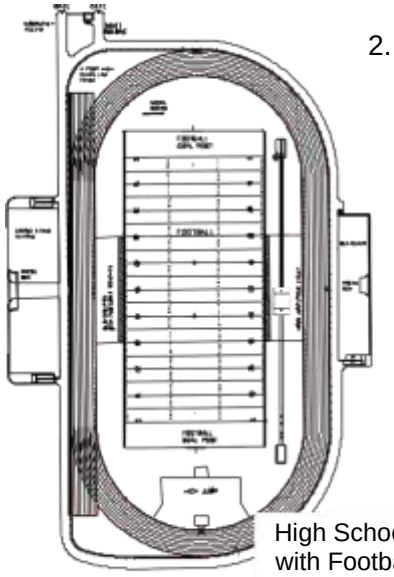
1. Grading is to crown at center of the field and slope to sidelines.
2. Plan for future under drains and irrigation.
3. Plan for portable or combination football/soccer goals.

D. FUTURE IMPROVEMENTS



High School Baseball Field
Figure D-1

1. Baseball Field
   a. Radius is to be 300 feet/335 feet to 350 feet. See Figure D-1.
   b. Plan for infield area in compliance with Ohio High School Athletic Association guidelines. See Figure D-1.
   c. Plan for a 24-foot high backstop a minimum of 60 feet from home plate.
   d. Plan for a protection fence that is 6-foot high chain link fence offset 60 feet from first and third base lines.
   e. Plan for outfield fencing and foul poles that are 8-foot high chain link fence with top rail protective pad between foul lines.
   f. Plan for player benches, set back from side fence line.



High School Track with Football Field
Figure D-2

2. Running Track/Football Field
   a. Plan for 8-lane, 400-meter running track/football field. See Figure D-2.
   b. Design track radius to allow for a soccer or football field inside the track.
   c. Plan for field events that include high jump, long/triple jump, discus, and shot-put.
   d. Plan for a 4-foot high chain link perimeter fence surrounding track with gates at center field and as needed for maintenance.

D. FUTURE IMPROVEMENTS (cont.)

3. Tennis Courts (See Figure D-3)

a. Plan each court to be 36-foot wide by 78-foot long with a minimum of 21 feet behind each base line to the fence and a minimum of 12 feet from sideline to adjacent court or fence.

b. It is recommended to have no more than 3 courts side-by-side within 1 fenced area.

c. Plan for perimeter fence to be 10-foot to12-foot high. Fence between adjacent banks of courts should be a minimum of 4-foot high.

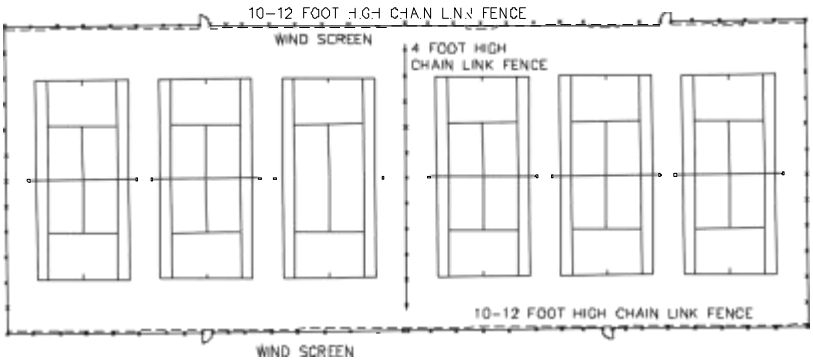
d. Plan to install windscreen on chain link fence for wind reduction and at ends of courts for increased ball visibility.

e. Backboards located on chain link fence at ends of courts for teaching is optional.

f. Plan to modify spacing, depth of footings, and post size of fencing as required for additional wind load of future windscreen or backboard.

h. Recommended slope is 1" in 10' (0.833 percent); maximum 1 percent.

i. The direction of slope in order of preference: 1) side-to-side, 2) end-to-end, and 3) corner-to-corner.



High School Tennis Courts
Figure D-3

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A. AREA REQUIRED

1. Provide 50-75 square feet of play area per student in grades Kindergarten- 5th grade (estimate 45% of the overall students as being in K-5). Example: for a 1000 student school, provide for 450 students or 33,750 square feet. This area includes both hard surfaces and soft surfaces.

B. SEPARATION OF PLAY AREAS

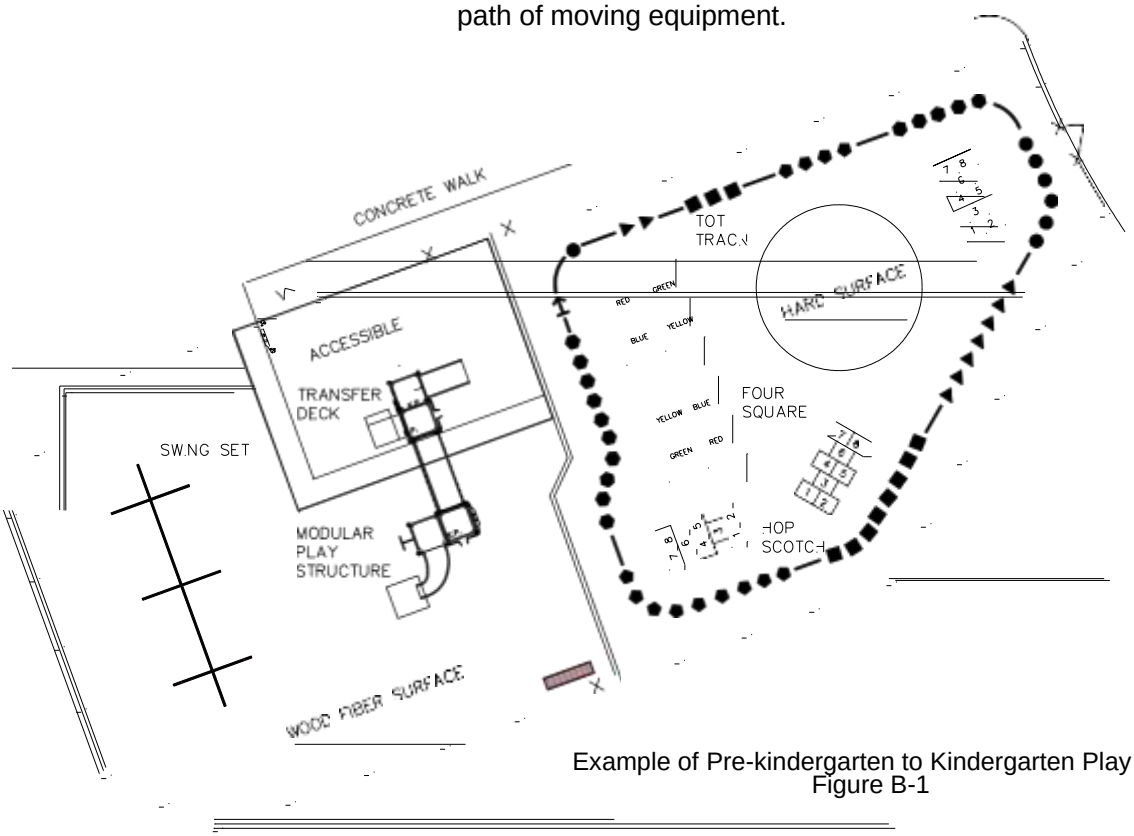
1. Provide playground areas to allow for difference in age, ability, and varying interests. If space is a consideration, one play area can accommodate all grades as long as pre-school is not a consideration.

2. Follow applicable safety guidelines for different age groups.

3. Pre-kindergarten and kindergarten play area. See Figure B-1.

   a. Provide play activities that include rocking, swinging, balancing, climbing, and sliding.

   b. Locate equipment with moving parts, such as swings, at the perimeter of the play area. Use fence or planting beds to prevent children from inadvertently stepping into path of moving equipment.



Example of Pre-kindergarten to Kindergarten Play Area
Figure B-1

B. SEPARATION OF PLAY AREAS (cont.)

4. Primary Play Area (See Figure B-2)

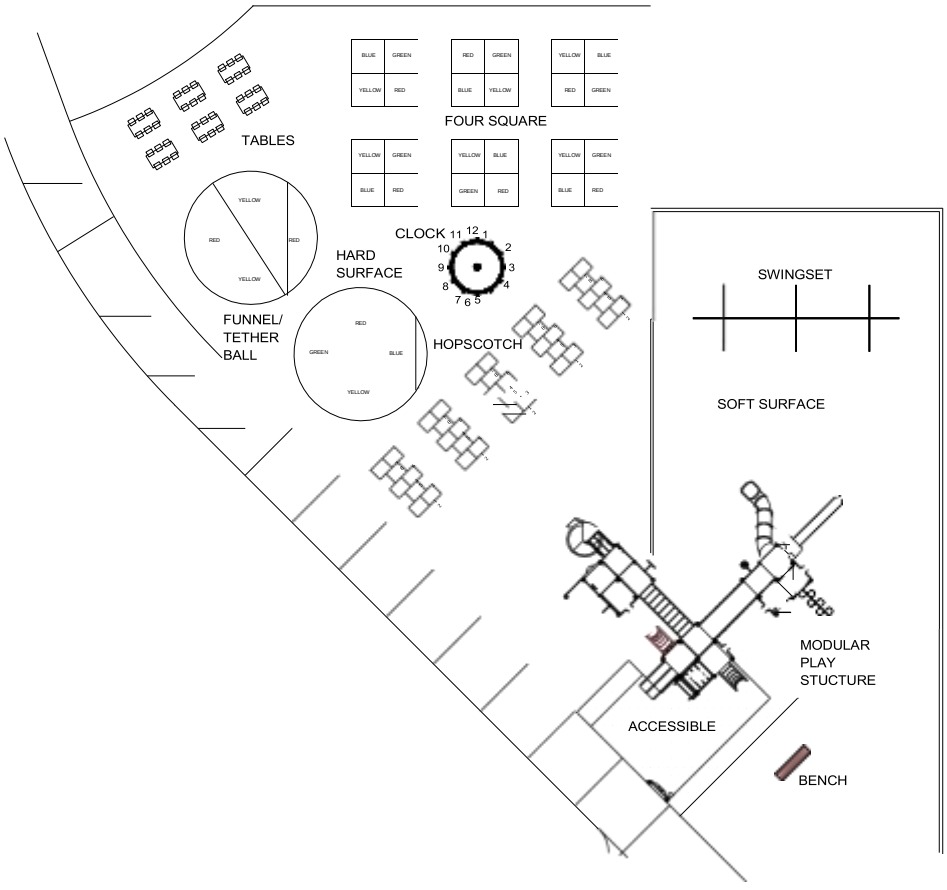
   a. Design for grades 1 through 3.

   b. Provide play activities that include rocking, swinging, balancing, climbing, and sliding.

   c. Provide upper-body strengthening devices such as a parallel bar and overhead ladder play equipment.

   d. Provide half-court basketball and dropshot/funnel ball.

   e. Provide a grouping of tables and benches for use as an outdoor classroom setting.



Example of Primary Play Area
Figure B-2

B. SEPARATION OF PLAY AREAS (cont.)

5. Intermediate Play Area (See Figure B-3)

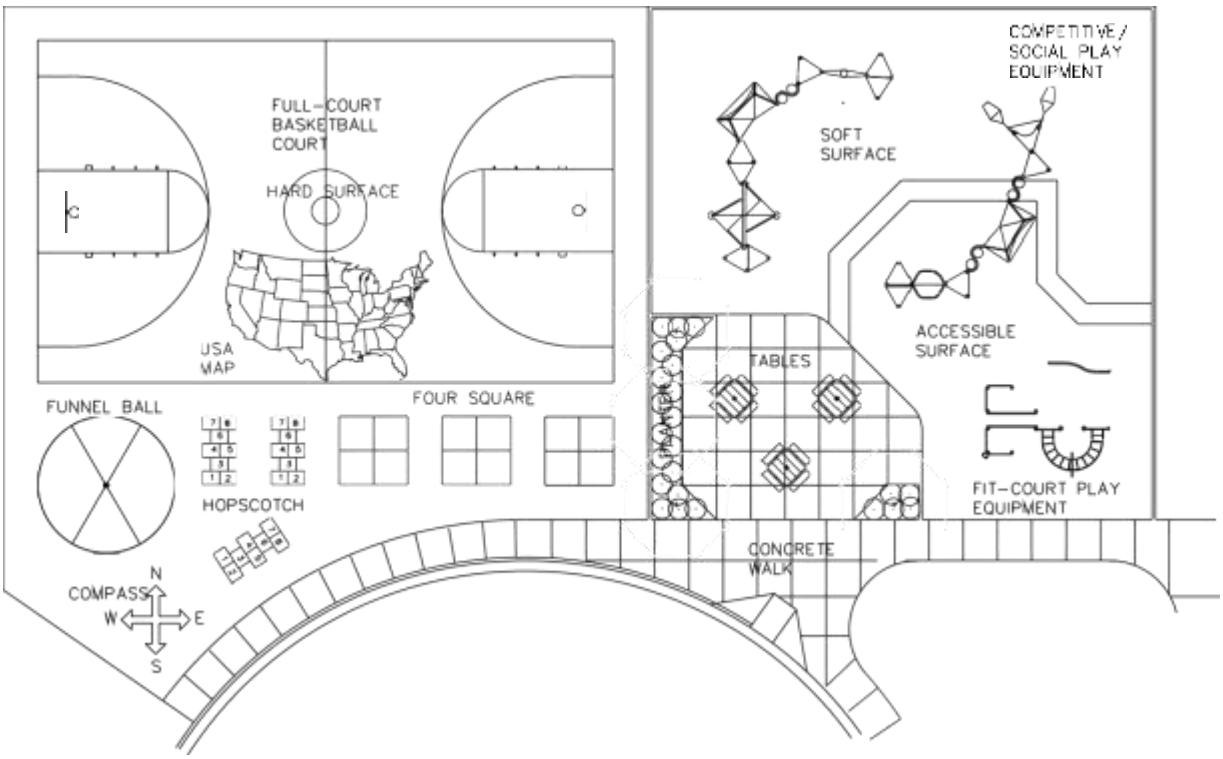
   a. Design for grades 4 and 5.

   b. Intermediate play area may be combined with primary play area.

   c. Provide fitness structures and competitive equipment.

   d. Provide 1 full basketball court (50 feet by 84 feet) or 2 half courts (50 feet by 42 feet).

   e. Provide for groupings of benches and tables for social or passive play. This area can also serve as an outdoor classroom.



Example of Intermediate Play Area
Figure B-3

C. HARD SURFACE PLAY AREA

1. Provide paved area for full- or half-court basketball. Locate on bus pavement where possible. Bus pavement should be adjacent or within view of other elementary play spaces for shared supervision.

2. Painted games could include four square, hopscotch, tetherball, kickball, dodgeball, games played in a large circle, a tot track with sequenced shapes or perimeter line for running relays or laps.

3. Educational features could include a USA or world map, counting line, compass, and clock.

D. SOFT SURFACE PLAY AREA

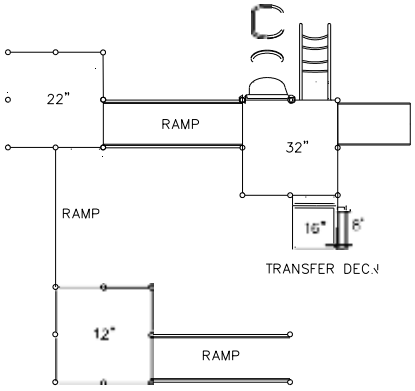
1. Surfacing is to be resilient, and installed at a sufficient depth to meet current safety guidelines. If should be a nonsplintering surface where children may be crawling. Avoid using black surfacing.

2. Provide edging to keep loose fill soft surface within bounds of the play area. Depress loose fill soft surface material below edging. Provide under drain system and geotextile below loose fill soft surface.

3. Increase the depth of soft surface material in areas of high use such as the base of swings and slides.

4. Provide play structures.

E. ACCESSIBILITY STANDARDS



Typical Ramp and Transfer Deck
Figure E-1

1. Provide ramps and/or transfer points on composite play structures for access to play components on elevated decks. Meet the Americans with Disabilities Act guidelines for percentage of components that are to be accessible by ramp and by transfer deck. See Figure E-1.

2. Provide table and benches along accessible route.

3. Provide future upper-body strengthening devices as appropriate for age group and amount of supervision.

A. VISITOR PARKING

1. Provide parking spaces for between 2%-3% times the student capacity as determined by Design Professional.

B. STUDENT PARKING

1. Student parking area is to be separate from bus and staff parking. Provide 3 spaces for every 4 students.

C. CUSTOMER PARKING

1. Provide 10 spaces for each program serving outside customers except the restaurant program. Provide 1 space for every 2 seats within the restaurant.

D. ACCESSIBLE PARKING

1. ***The number of parking spaces required to be accessible shall be calculated separately for each facility, according to Table 1106.1 of the Ohio Building Code.***

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PURPOSE

The purpose of this Chapter is to provide the school district and the Design Professional with the guidelines and relationships for the Elementary School spaces identified in Chapter 2: Bracketing.

INTRODUCTION

This Chapter begins with an overall building diagram showing how the various areas of a school could be arranged. The diagram is meant only to demonstrate the relationships between various parts of the building.

Along with the overall building diagram, there are various program area diagrams throughout this chapter which demonstrate how specific spaces may relate to each other within a particular program area.

NO SMOKING SIGNS

As required by the Ohio Revised Code, post “No Smoking” signs at every entrance door into the building. If a door is for exit only, there is no need for a sign. Post the signs on entrance glass or other appropriate surface. Signs shall contain a telephone number for reporting violations. (866/559-6446)

DIAGRAM

Diagrams of the space have been developed to show how some of the features and loose furnishings may be organized. The space is not required to be designed in the configuration shown.

PROGRAM ACTIVITIES

Program activities indicate the type of activities that may occur in the space. These activities will vary from school district to school district depending on the educational program.

SPATIAL RELATIONSHIPS

Relationships of a particular room to other spaces and activities have been identified to assist the Design Professional in the design of the facility.

ENVIRONMENTAL CONSIDERATIONS

Environmental considerations are items that may affect the educational program. They are the basis of some requirements of Finishes, Features, Plumbing, HVAC, Electrical, and Technology. ***Storage rooms shall not be required to be exhausted if there is no objectionable transfer (odors or hazardous gas) to adjacent spaces.***

FINISHES

The finishes stated for the spaces have been developed based on the function of the room. The spaces adjacent to the room or a building system may change the finishes stated.

OPERABLE WINDOWS

Operable windows are optional in exterior window fenestration.

LIGHTING

Interior lighting shall be controlled by occupancy sensors, automatic timed lighting controlled system or a combination of both to comply with ASHRAE 90.1. Exterior lighting shall be controlled by photosensor or astronomical time clock to comply with ASHRAE 90.1.to automatically turn lighting off when sufficient daylight is available.

AREA

Square foot area given for the room is the necessary area. This area is given in net square feet – defined as the area within the walls of the room.

LOOSE FURNISHINGS

Loose furnishings are to be funded by the Ohio School Facilities Commission. The loose furnishings requirements are to be coordinated with the district's educational program. As an example, some spaces may require tables with student chairs and other spaces may require student desks with chairs.

***** The intent of the loose furnishings shown on the space plates is not necessarily to be all-inclusive of furniture options or mandate items which may not be needed in a particular district, but rather to provide a general concept of how a particular space could be laid out. Some items listed as loose furnishings could be provided as fixed casework and items listed as fixed casework, if appropriate, could be provided as loose furnishings depending on the building design and types of technology used. Construction and loose furnishings budgets should be coordinated appropriately.

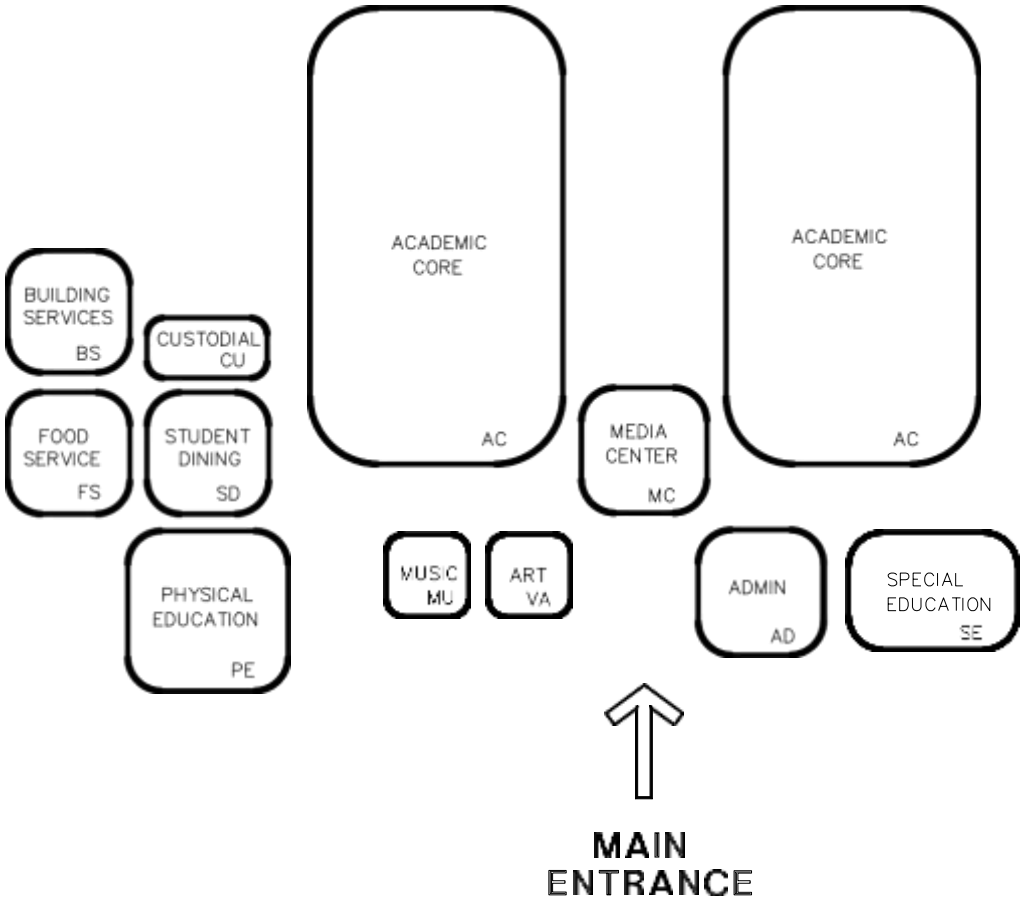
FEATURES

Features identified on the space plates are recommended for these rooms. These features include Fixed Items, Plumbing, Heating, Ventilating and Air Conditioning, Electrical, and Technology systems as well as Miscellaneous Items. Exact sizes of items may need to be modified slightly to interface with the exact size and proportions of the actual space.

Casework and Visual Display Boards should reflect the needs of the district's educational program. The intent of this list is not to mandate casework or visual display boards that may not be needed by a particular district, but rather to be used as a guideline for items that are generally used in this type of space. Some items listed as "fixed casework" could also be provided by mobile casework or loose furnishings if appropriate. Construction and loose furnishings budgets should then be adjusted appropriately.

TECHNOLOGY

The location of projectors, in spaces where required, shall be carefully coordinated between the Design Professionals in relation to the projection surface and ADA requirements. Note that classroom projectors are required to be ultra-short throw interactive projectors (refer to Section 274119). Classroom instructor AV interfaces and AV equipment are to be comprised of digital systems. Coordination is required between the Design Professionals to accommodate the digital solution that is selected by the District. Refer to Section 271543 and Figure 1, within that section, for a general overview of classroom equipment and interconnectivity requirements. The District's Digital Media Management System requires Design Professionals coordination for adequate dedicated rooftop space for current and potential future system antennas for incorporation of digital broadcast media sources as selected by the District (refer to Section 274125). Design Professionals should especially note that the classroom's dedicated 4 student data ports and associated work stations have been removed. A robust Wireless Local Area Network (WLAN), capable of supporting 1:1 and/or Bring Your Own Device (BYOD) throughout all educational areas is now required. Refer to Section 272133 for all of the new requirements for the District's WLAN.



NOTES:

This is an example of how the spaces in an elementary school could be arranged. This is meant only to demonstrate the relationships between various areas of this building.

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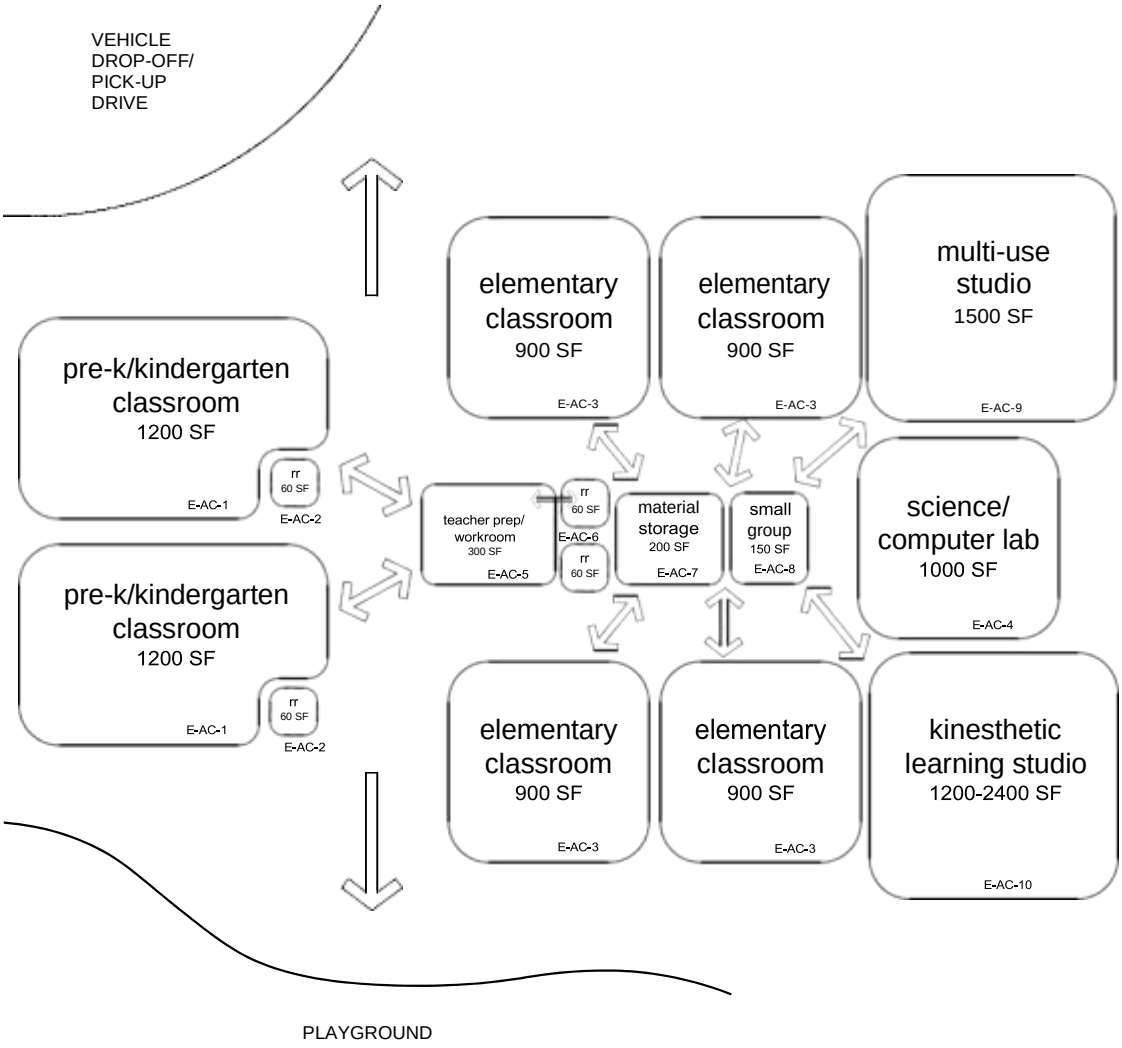

NOTES:

This is an example of how the academic core spaces in an elementary school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Academic Core space plates:

E-AC-1	Pre-K/Kindergarten Classroom
E-AC-2	Pre-K/Kindergarten Restroom
E-AC-3	Elementary Classroom
E-AC-4	***Science/Computer Lab***
E-AC-***5***	Teacher Prep Area/Workroom
E-AC-***6***	Individual Restroom
E-AC-***7***	Instructional Material Storage
E-AC-8	***Small Group Room***
E-AC-9	***Multi-Use Studio***
E-AC-10	***Kinesthetic Learning Studio***

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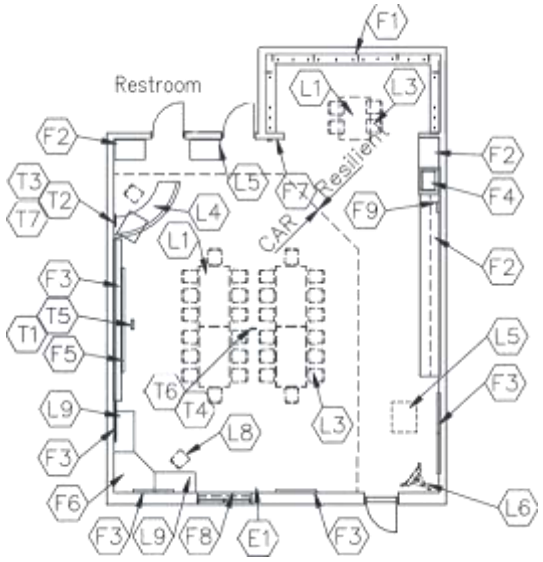
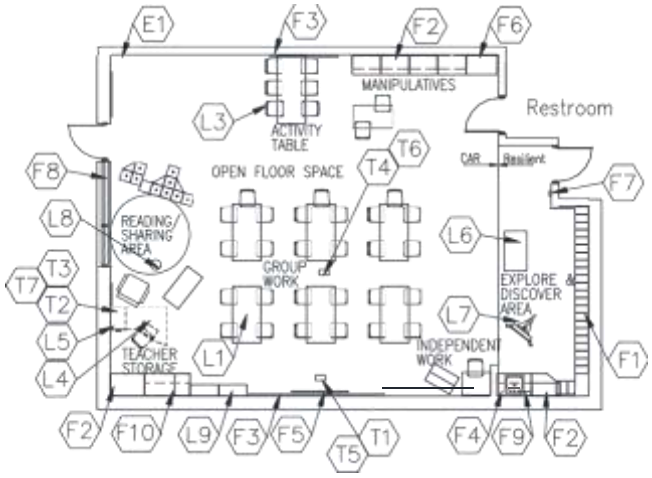




PROGRAM ACTIVITIES:

- Kindergarten instruction through active exploration
- Children practice with tangible articles and are encouraged to develop learning skills, creativity, and imagination.
- Activities include, but are not limited to: group discussions, demonstrations, music activities, listening skills, gross motor skills, art and science projects, and small group activities.

SPATIAL RELATIONSHIPS:

- Near other pre-k/kindergarten classrooms
- Near teacher prep area/workroom
- Direct access to outdoor playground or access through adjacent corridor
- Near vehicle drop-off/pick-up drive
- Adjacent to pre-k/kindergarten restroom

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control –
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Resilient and stain-resistant floor covering
- Ergonomically appropriate furniture and equipment heights

CAPACITY:	25 students
SIZE:	1,200 SF
ANCILLARY SPACES:	Pre-K/Kindergarten Restroom E-AC-2

NOTES:

1. Loose furnishings shown represent one of many possible configurations based on educational program.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this classroom or could be placed in a teacher prep area/workroom.
3. Second exit from space to meet code need not open to exterior.

PRE-K/KINDERGARTEN CLASSROOM

E-AC-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Combination carpet, carpet tile,	096816
with resilient options	096500
Optional: All linoleum, ET,	096516
sheet vinyl, or rubber	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:

L1 Student desks/tables

L2 Reserved

L3 Student chairs
L4 Teacher workstation/computer support and chair (fixed or mobile)
L5 File cabinet
L6 Sand/water table
L7 Children's painting easel
L8 Teacher reading chair or stool
L9 8'-10' of low bookcases (fixed or mobile)
Loose carpet/rug (optional)
Wastebasket

Electronic Safety and Security:

Life safety devices per code	283111

Miscellaneous:

Pencil sharpener (optional)

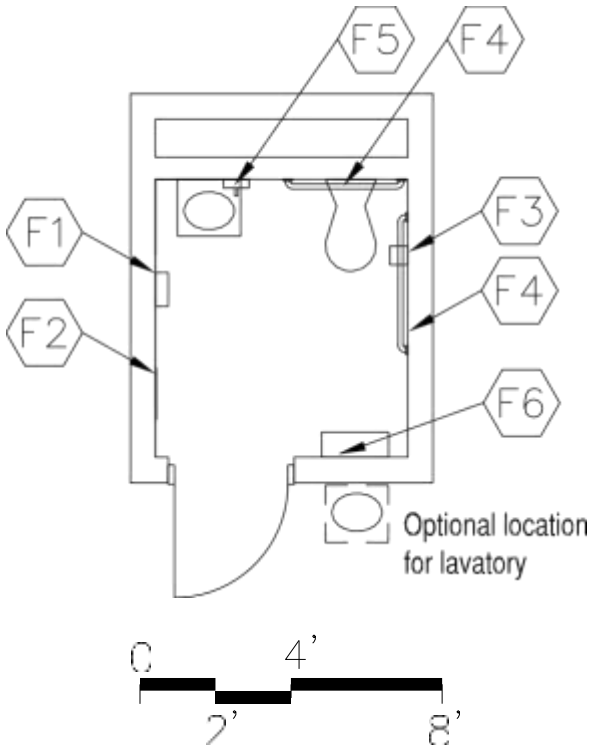
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Open casework - student coats and personal items, (cubbies) (optional wall cabinets above)	123550
F2 18'–24' combination tall wardrobe, base and wall cabinets	123550
F3 28'-36' combination marker board, tack board, & tackable surface	123550
F4 3' sink base cabinet	123550
F5 Projection screen (optional)	115213
F6 Technology support casework (could be mobile)	123550
F7 Pencil sharpener support (optional)	062000
F8 Window with integral blinds	085113
F9 Towel dispenser (optional)	102813
F10 36"- 42" high storage cabinet	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink with drinking fountain	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting	265100
Means of egress lighting per code	265100
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Wireless access point cable above ceiling	271513
Central sound system	275123
Clock	275313
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as	

E1 Duplex receptacle with dedicated circuit for wireless devices

NOTES:

	2014 - 567		
determined		by design – refer to Note 4	272133
	T7	Classroom technology center video port	271543, 274116, 274119, 275127

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Where appropriate, some casework may be mobile to add flexibility and become part of loose furnishings.
4. Baseline includes WAP cable per classroom. WAP device quantity/placement per 272133 requirements.



PROGRAM ACTIVITIES:

- Personal and health needs for kindergarten students

SPATIAL RELATIONSHIPS:

- Adjacent to and only accessible from Pre-K/ Kindergarten Classroom

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

CAPACITY:	1 person
SIZE:	***60*** SF
ANCILLARY SPACES:	Pre-K/Kindergarten Classroom E-AC-1

NOTES:

PRE-K/KINDERGARTEN RESTROOM
E-A C-2

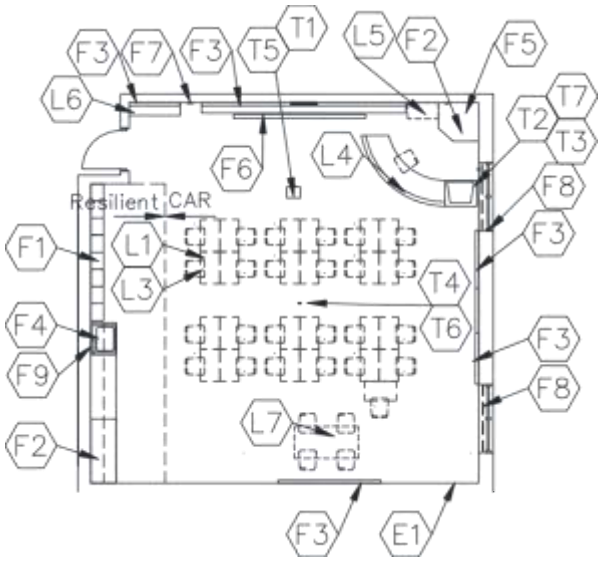
FINISHES[1]:	Spec. Ref.#
Flooring:	
ET or	096516
sheet vinyl	096500
Optional: ceramic mosaic tile,	093000
porcelain tile, or	096723
resinous flooring	
Base:	
Resilient base	096500
Optional: ceramic mosaic tile,	093000
porcelain tile, resinous flooring, or integral vinyl cove base	096723
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
- Wastebasket

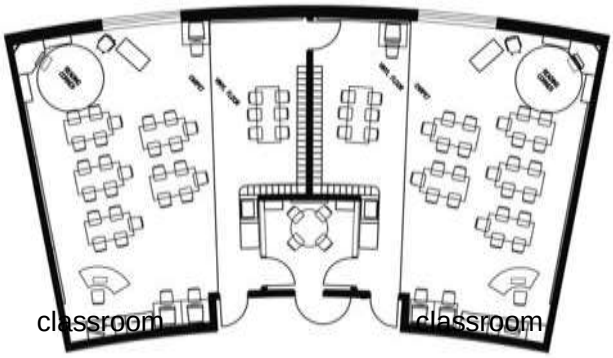
FEATURES[1]:		Spec. Ref.#
Fixed Items:		
F1	Towel dispenser	102813
F2	24" x 60" mirror	102813
F3	Toilet tissue holder	102813
F4	36" and 42" grab bar	102813
F5	Soap dispenser	102813
F6	Changing station (optional)	102813
Fire Suppression:		
	Fire suppression system	211000
Plumbing:		
	Wall-mounted water closet	224000
	Wall-mounted lavatory	224000
	Plumbing connections	224000/221116/221119
HVAC:		
	Exhaust air system	Div. 23
	Supplemental heat as required	Div. 23
Electrical:		
	Single level switching	262726
	Fluorescent lighting	265100
	Illumination level: See Table 8600-***5***	
Communications:		
	Central sound system	275123
Electronic Safety and Security:		
	Life safety devices per code	283111
Miscellaneous:		
	N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

ELEMENTARY CLASSROOM



small group room
or tutor room -
part of classroom tolerance



CAPACITY: 25 students
SIZE: 900 SF

PROGRAM ACTIVITIES:

- Developmental experiences, technical skill building, and hands-on activities
- Activities include, but are not limited to: group discussions, demonstrations, music activities, listening skills, presentations, art and science projects, and small group activities.

SPATIAL RELATIONSHIPS:

- Near other elementary classrooms
- Near large group restrooms
- Near teacher prep area/workroom
- Access to outdoor playground

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control –
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Resilient and stain-resistant floor covering

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this classroom or could be placed in a teacher prep area/workroom.

ELEMENTARY CLASSROOM
E-A C-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Combination carpet, carpet tile, with resilient options	096816 096500
Optional: All linoleum, ET, sheet vinyl, or rubber	096516 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:
L1 Student desks/tables
L2 Reserved
L3 Student chairs
L4 Teacher desk or workstation/computer support and chair
L5 File cabinet
L6 8'-10' of low bookcases (fixed or mobile)
Loose carpet/rug
L7 Reading table
Wastebasket

SCIENCE
Optional items for science teaching center (in one of elementary classrooms):

- Mobile demonstration unit with portable water supply and sink
- (2)-(3) mobile storage cabinets for science equipment and materials

Electronic Safety and Security:
Life safety devices per code 283111

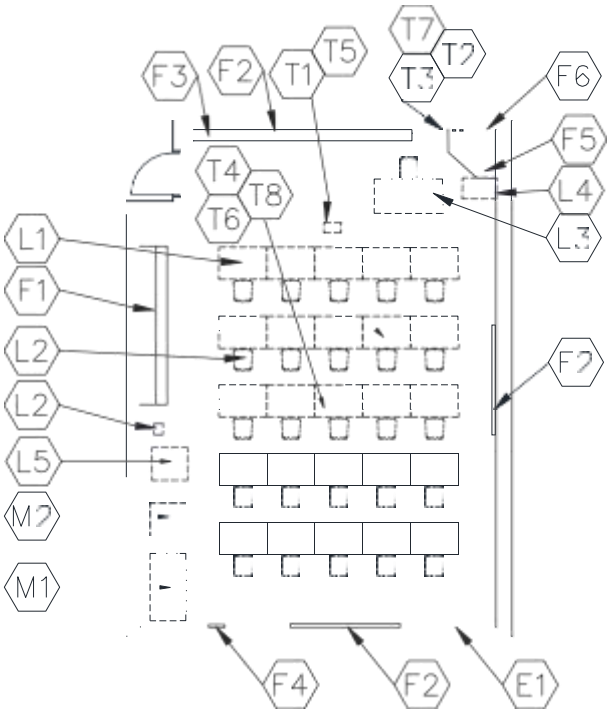
Miscellaneous:
Pencil sharpener (optional)
M1 Operable partitions are optional between classrooms with tackboard/ markerboard surface 102226

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Open casework – student coats and personal items, "cubbies" for grades 1,2,3 (optional wall cabinets above)	123550
F2 9'-12' combination tall wardrobe, base and wall cabinets	123550
F3 22'-36' combination marker board, tack board and tackable wall surface	123550
F4 3' sink base cabinet	123550
F5 Technology support casework	123550
F6 Reserved	
F7 Pencil sharpener support (optional)	062000
F8 Windows with integral blinds	085113
F9 Towel dispenser (optional)	102813
F10 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink with drinking fountain	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting Illumination level: See Table 8600-5	265100
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone T3 1 data port near teacher workstation	271513/273123 271513
T4 Wireless access point cable above ceiling	
Central sound system	275123
Clock	275313
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 5	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Option for Features (F1): lockers in classroom or corridor for grades 4 and 5 only.
3. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
4. Where appropriate, some casework may be mobile to add flexibility and could become part of loose furnishings.
5. Baseline includes WAP cable per classroom. WAP device quantity / placement is per 272133 requirements.



PROGRAM ACTIVITIES:

- Contains computer workstations for group instruction and individual work
- Activities include computer instruction, media production, and individual project work

SPATIAL RELATIONSHIPS:

- Near reading room/circulation
- Near media specialist office
- Near academic core classrooms

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

MISCELLANEOUS:

- Due to the changing nature of technology, a computer lab is to be designed for flexibility of use.

CAPACITY:	25 students
SIZE:	1,000 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

SCIENCE/COMPUTER LAB
E-AC-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, ET, sheet vinyl,	096816
or carpet tile	096500
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:
L1 Computer workstation furniture (could be fixed)
L2 Student chairs
L3 Teacher desk/computer support and chair
L4 File cabinet
L5 Printer / scanner stand
Wastebasket

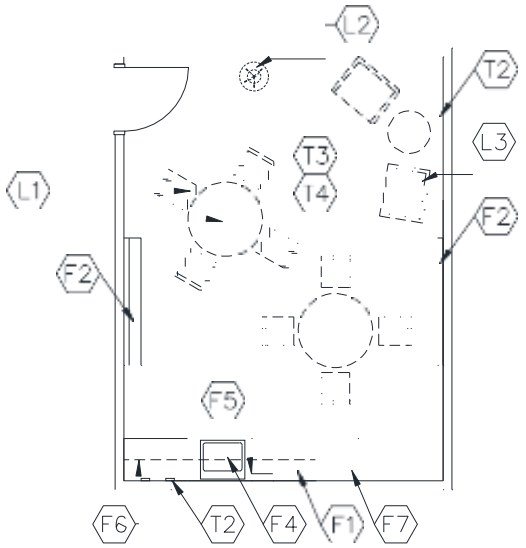
Miscellaneous:
Pencil sharpener (optional)
The following items are to be funded by the school district:
M1 Classroom area network file server
M2 Printer

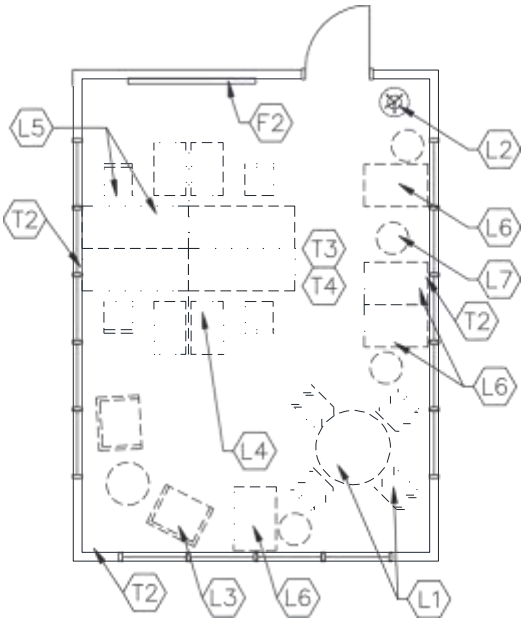
Electronic Safety and Security:
Life safety devices per code 283111

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 4'-16' of base & wall cabinets	123550
F2 18'-28' combination marker board, tack board and tackable wall surface	101100
F3 Projection screen (optional)	115213
F4 Pencil sharpener support (optional)	062000
F5 3' of tall wardrobe with file drawers	123550
F6 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting with ***computer aided*** lenses	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Classroom area network	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127
T8 Wireless access point cable above ceiling	271513

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.





CAPACITY: ***4 - 8 teachers***
SIZE: ***150-300 SF***

PROGRAM ACTIVITIES:

- Teachers and other staff members hold team meetings and prepare for class
- Professional interaction should be encouraged to improve communication, professional development, and team building.
- ***Collaboration of grade level grouped or subject grouped instructors.***
- ***Collaboration spaces should support the exchange of ideas, remain instantly flexible, and provide an area for both individual study and group collaboration.***

SPATIAL RELATIONSHIPS:

- Near academic core classrooms
- Near individual restroom
- Near instructional material storage

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- ***Transparent walls or windows to adjacent rooms***

<u>Collaboration Note:</u>

- ***Collaboration is the vehicle by which individuals communicate their vision, desires, opinions, thoughts, and insight to their fellow colleagues. It is the means to address all aspects of the educational process, themes of focus, professional and personal relationships, and to build the camaraderie and teamwork to meet the ever changing educational needs of students of all ages.***

<u>NOTES</u>:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this teacher prep area/workroom or could be placed in a classroom.

TEACHER PREP AREA/WORKROOM

E-AC-5

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, ET, linoleum,	096816
sheet vinyl, or rubber	096500
	096516
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:

L1 Tables and chairs

L2 Coat Rack

L3 Soft Seating

L4 Teacher computer trucks

L5 Teacher workstation furniture and chair

L6 42" high teacher cabinet with work surface top

L7 Stools

Wastebasket

Miscellaneous:

Copier by school district

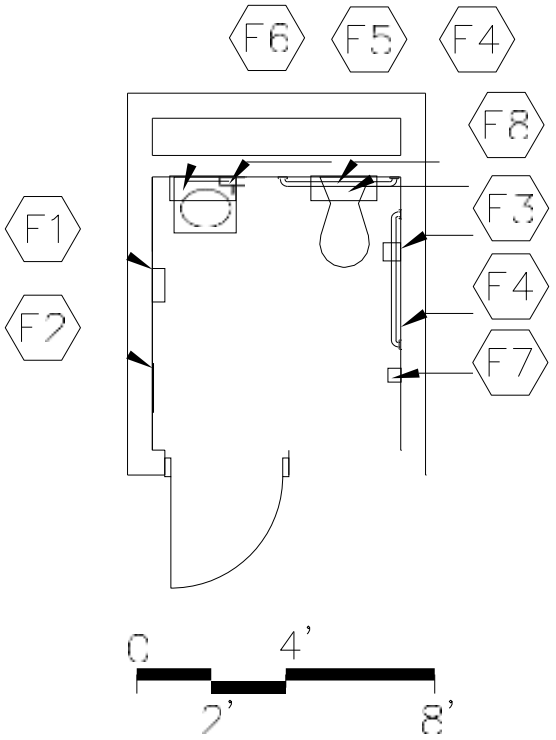
E1 Reserved

FEATURES[1]:		Spec. Ref.#
Fixed Items:		
F1	About 6' of base cabinets	123550
F2	***50-75 s.f.*** combination marker board, tack board and tackable wall surface	101100
F3	Reserved	
F4	3' sink base cabinet	123550
F5	Towel dispenser (optional)	102813
F6	About 9' of wall cabinets	123550
F7	Tall Wardrobe	123550
Fire Suppression:		
	Fire suppression system	211000
Plumbing:		
	Sink	224000
	Plumbing connections	224000/221116/221119
HVAC:		
	Supply/return air system	Div. 23
	Independent temperature control	230923
Electrical:		
	Single-level switching	262726
	Fluorescent lighting	265100
	Illumination level: See Table 8600-5	
	3 duplex receptacles	262726
	Double duplex receptacle adjacent to each data and video port	262726
	Duplex receptacles for office equipment	262726
	Receptacle for copier (if applicable)	262726
Communications:		
T1	***Reserved***	
T2	***voice ports with phones***	271513/273123
T3	***Wireless access point cable above ceiling***	***271513***
T4	***Wireless access point (WAP) as determined by design – refer to note 3***	***271533***
	Central sound system	275123
	Clock	275313
Electronic Safety and Security:		
	Life safety devices per code	283111

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***When collaboration area is selected, teacher computer trucks are provided in lieu of teacher desks in classrooms.***

3. Baseline includes WAP cable. WAP device quantity/placement per 272133 requirements.



PROGRAM ACTIVITIES:

- Personal and health needs for teachers, staff, and other individuals

SPATIAL RELATIONSHIPS:

- Near academic core classrooms
- Near teacher prep area/workroom

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

CAPACITY: 1 person
SIZE: ***60*** SF

NOTES:

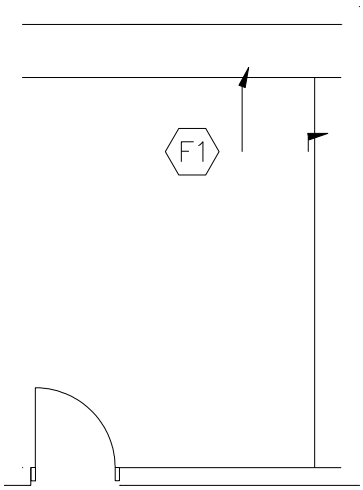
INDIVIDUAL RESTROOM
E-AC-6

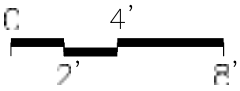
FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, or sheet vinyl	096500
Optional: Ceramic mosaic tile, porcelain tile, or resinous flooring	093000 096723
Base:	
Resilient base	096500
Optional: Ceramic mosaic tile, porcelain tile, resinous flooring, or integral vinyl cove base	093000 096723
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Wastebasket	

FEATURES[1]:		Spec. Ref.#
Fixed Items:		
F1	Towel dispenser	102813
F2	24" x 60" mirror	102813
F3	Toilet tissue holder	102813
F4	36" and 42" grab bar	102813
F5	Soap dispenser	102813
F6	Shelf above sink (optional)	102813
F7	Coat hook	102813
F8	Wall cabinet above toilet (optional)	102813
Fire Suppression:		
	Fire suppression system	211000
Plumbing:		
	Wall-mounted water closet	224000
	Wall-mounted lavatory	224000
	Plumbing connections	224000/221116/221119
HVAC:		
	Exhaust air system	Div. 23
	Supplemental heat as required	Div. 23
Electrical:		
	Single level switching	262726
	Fluorescent lighting	265100
	Illumination level: See Table 8600-***5***	
	1 duplex receptacle	262726
Communications:		
	Central sound system	275123
Electronic Safety and Security:		
	Life safety devices per code	283111
Miscellaneous:		
	N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.





PROGRAM ACTIVITIES:

- Storage of supplies, textbooks, and equipment

SPATIAL RELATIONSHIPS:

- Near teacher prep area/workroom

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	200 SF

NOTES:

INSTRUCTIONAL MATERIAL STORAGE

E-AC-7

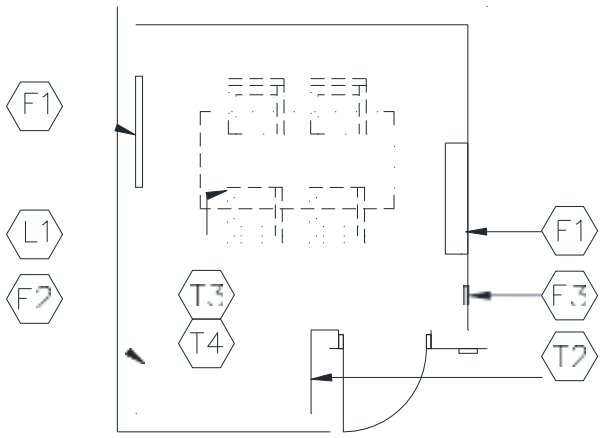
FINISHES[1]:	Spec. Ref.#
Flooring:	
Rubber, ***linoleum, ET, or sheet vinyl***	096500 ***096516***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry	042000/099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 10'-20' of open shelving, depths may vary (fixed or loose)	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Student small group work
- Independent student work
- Small group meetings

SPATIAL RELATIONSHIPS:
- Near academic core classrooms

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  Wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	4 - 5 students
SIZE:	150 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

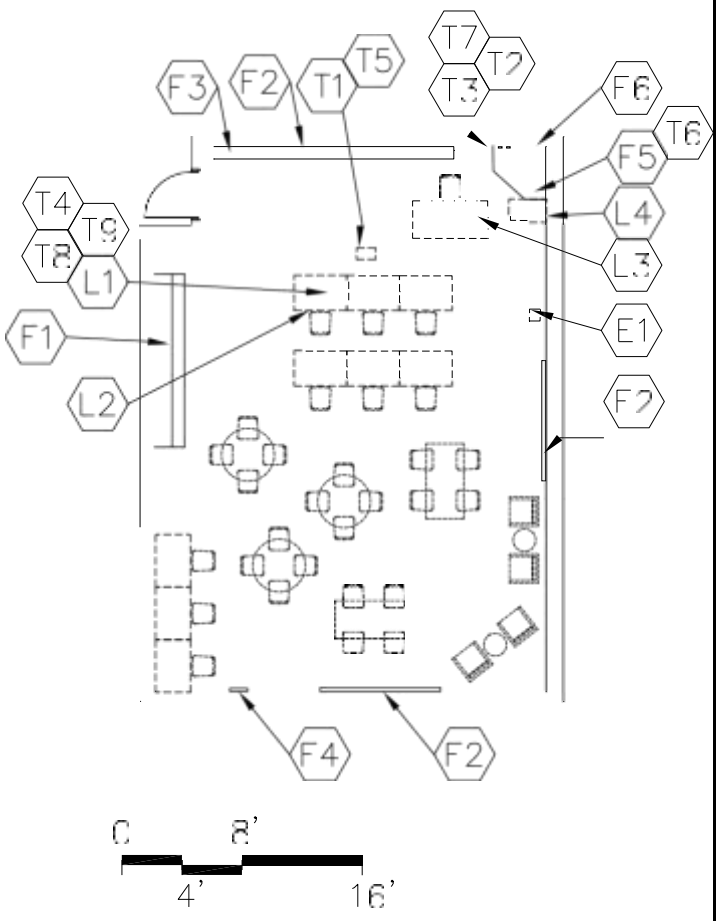
SMALL GROUP ROOM
E-AC-8

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, sheet vinyl, linoleum, or rubber	096500 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Work tables and chairs
L2 Reserved
Wastebasket
Pencil sharpener (optional)

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 8'-10' combination of chalk/marker board, tack board, or tackable wall surface	101100
F2 Pencil sharpener support (optional)	062000
F3 4'-6' of work surface, loose or fixed (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Fluorescent lighting: Illumination level: See Table 8600-5	265100
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 Reserved	
T2 voice port with phone	271513/273123
T3 Wireless access point cable above ceiling	***271513***
T4 Wireless access point (WAP) as determined by design – refer to note 2	***271533***
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior windows (optional)	081113/088000

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:

- Group instruction and individual work
- Activities include instruction, production, and individual project work
- "Wet / Dry" activities

SPATIAL RELATIONSHIPS:

- Near kinesthetic studio
- Near academic core classrooms

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

MISCELLANEOUS:

- Due to the changing nature of the activities anticipated, a multi-use studio is to be designed for flexibility of use.

CAPACITY:	25 students
SIZE:	1,500 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

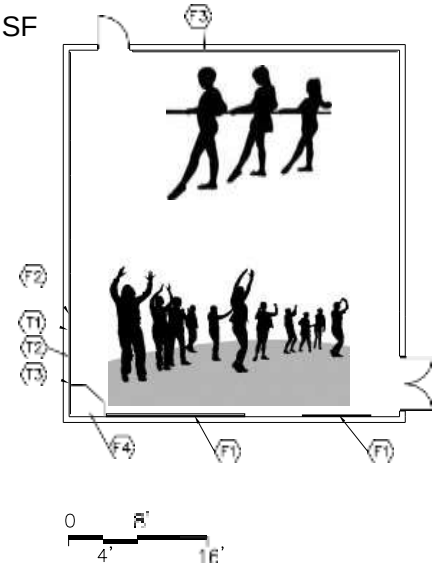
MULTI-USE STUDIO
E-AC-9

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, sheet vinyl, linoleum, rubber	096500 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
L1 Flexible furniture	
L2 Student chairs	
L3 Teacher desk and chair	
L4 File cabinet	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
E1 Duplex receptacle with dedicated circuit for wireless devices	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 4'-16' of base & wall cabinets	123550
F2 18'-28' combination marker board, tack board, or tackable wall surface	101100
F3 Projection screen (optional)	115213
F4 Pencil sharpener support (optional)	062000
F5 Tall wardrobe with file drawers	123550
F6 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Classroom area network (10 ports minimum)	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Combination i-Pod / CD Player unit and Mixer/Amp unit, located in the wardrobe, serving room overhead distributed speakers	
T7 Classroom technology center video port	271543, 274116, 274119, 275127
T8 Wireless access point cable above ceiling	271513
T9 Wireless access point (WAP) as determined by Design – refer to Note 3	272133

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

1,600 SF



2,400 SF



CAPACITY: 22-25 students
SIZE: 1,200 – 2,400 SF

PROGRAM ACTIVITIES:
- Gross motor activities
- Dance
- Aerobics
- Gymnastics
- "Movement" activities

SPATIAL RELATIONSHIPS:
- Near multi-use studio
- Near academic core spaces

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Flexibility of space

NOTES:

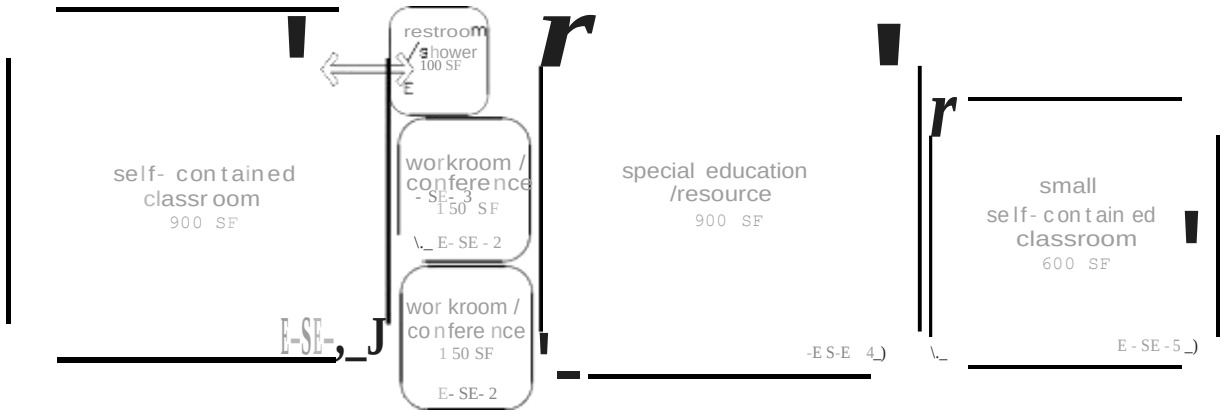
KINESTHETIC LEARNING STUDIO
E-AC-10

FINISHES[1]:	Spec. Ref.#
Flooring:	
Fluid applied athletic flooring	096766
Base:	
Resilient base	096500
Ceiling:	
Painted exposed structure	099100
Walls:	
Paint	099100

FEATURES:	Spec. Ref.#
Fixed Items:	
F1 8'-24' combination marker board, tack board, or tackable wall surface	101100
F2 Mirrors	102813
F3 Dance bars	116615
F4 Tall wardrobe with file drawers	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
Dimmable lighting	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Means of egress lighting	265100
Emergency lighting per code	265100
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123 T3
1 data port	271513
Clock	275313
Central sound system horns	275123
T4 Combination i-Pod / CD Player unit and Mixer/Amp unit, located in the wardrobe, serving room overhead distributed speakers	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



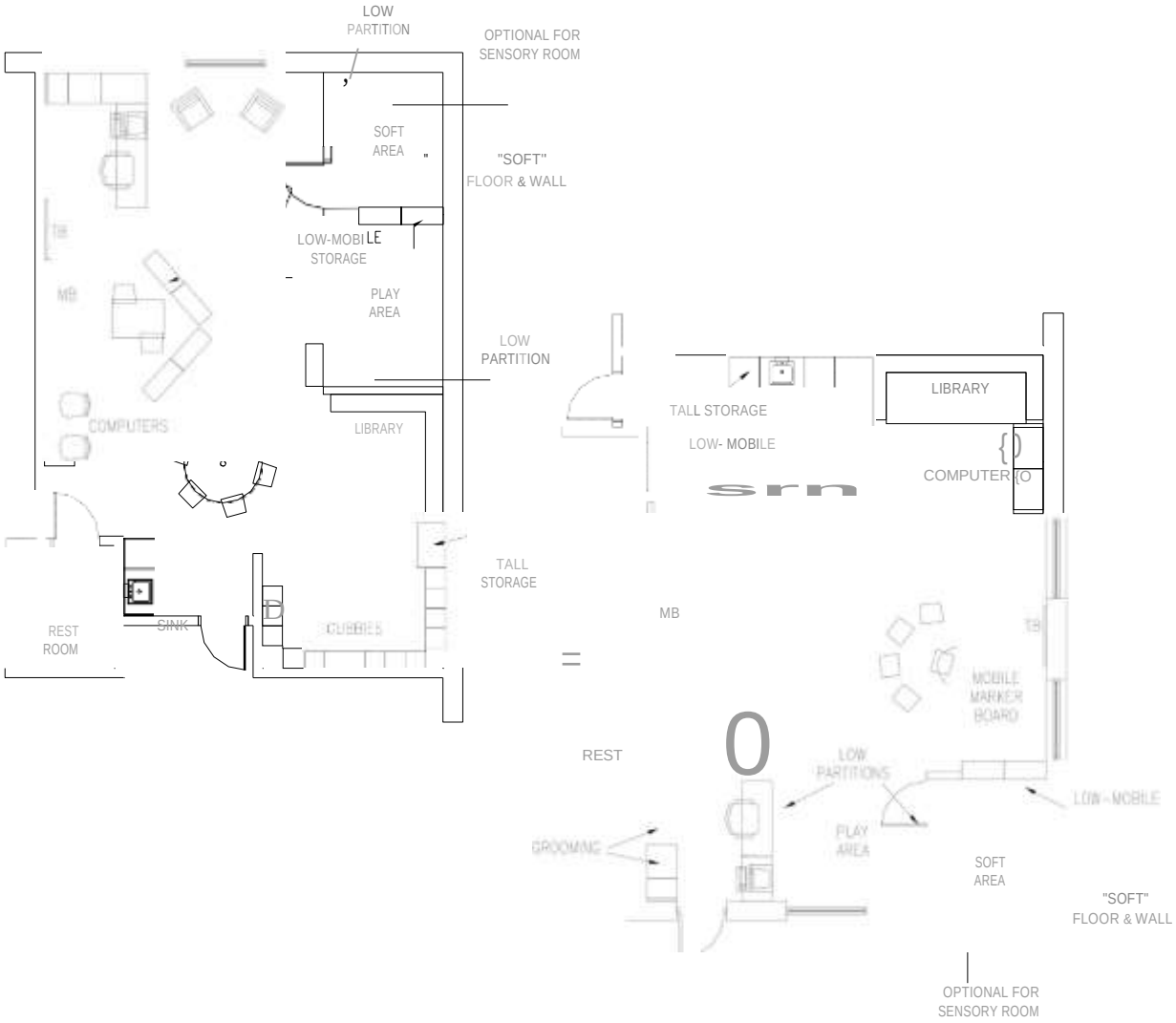
NOTES:

This is an example of how the special education spaces in an elementary school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

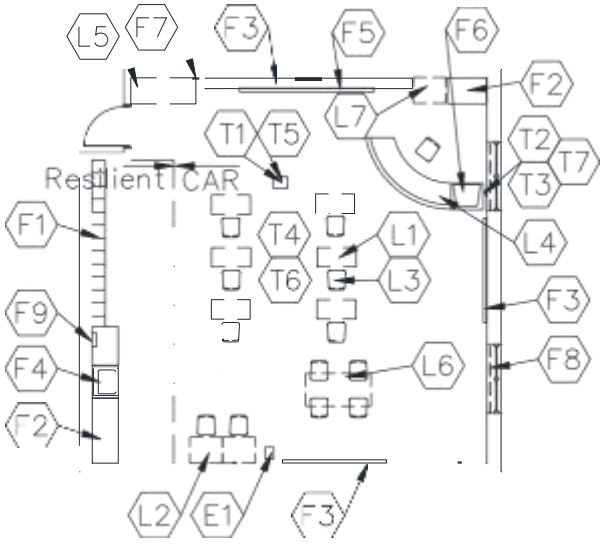
Following are the Special Education space plates:

E-SE-1	Self-contained Classroom
E-SE-2	Workroom/Conference
E-SE-3	Restroom/Shower
E-SE-4	Special Education/Resource
E-SE-5	Small Self-contained Classroom

SPECIAL EDUCATION SPACES
E-S E



- Student capacity: 8-12 students
- Least restrictive environment
- ADA accessible
- Flexible or multiple displays
- Full-spectrum LED lighting
- Sound enhancement
- Age appropriate, moveable furniture with lock down features
- Adaptive equipment storage
- Adaptive computer equipment
- “Visual” barriers on windows as needed for disability
- Sound/acoustic treatment to reduce sensory/hearing difficulties
- “Messy” area for art projects
- Appropriate signage
- Adjacent to restroom
- Moveable/lock down partitions



PROGRAM ACTIVITIES:

- Accommodates students who have special needs and are unable to be included in regular instructional program areas a majority of the school day.
- Activities include, but are not limited to: group and individual work to improve auditory, tactile, visual, kinesthetic and academic skills.

SPATIAL RELATIONSHIPS:

- Near academic core classrooms
- Adjacent to special education restroom/ shower

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Resilient and stain-resistant floor covering
- Special consideration for wheelchair access and physical accessibility needs (ADA)

CAPACITY: Based on disability.
See Chapter 1, Section 1110.

SIZE: 900 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this classroom or could be placed in a workroom/conference area.
3. See Chapter 1, page 1110-16, for specific areas needed for each disability.

SELF-CONTAINED CLASSROOM

E-SE-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Combination carpet, carpet tile, with resilient options	096816 096500
Optional: All ET, sheet vinyl, linoleum, or rubber	096516 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:

L1 Student desks/tables
L2 Reserved
L3 Student chairs
L4 Teacher workstations/computer support and chair
L5 8'-10' of low bookcases (fixed or mobile)
L6 Reading table
L7 File cabinet
Wastebasket

Electronic Safety and Security:	
Life safety devices per code	283111

E1 Duplex receptacle with dedicated circuit for wireless devices

Miscellaneous:
Pencil sharpener (optional)

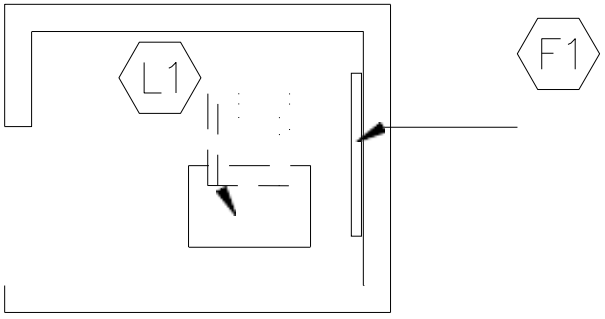
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Open casework – student coats and personal items (optional wall cabinets above) (cubbies)	123550
F2 9'-12' combination tall wardrobe, base & wall cabinets	123550
F3 24'-32' combination marker board, tackboard & tackable wall surface	123550
F4 3' sink base cabinet	123550
F5 Projection screen (optional)	115213
F6 Technology support casework	123550
F7 Pencil sharpener support (optional)	062000
F8 Windows with integral blinds	085113
F9 Towel dispenser (optional)	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink with drinking fountain	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting Illumination level: See Table 8600-5	265100
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Wireless access point cable above ceiling	271513
Clock	275313
Sound reinforcement system	275127
Central sound system	275123
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127

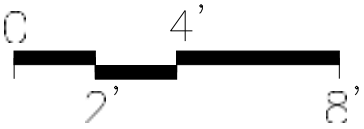
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.

WORKROOM/CONFERENCE
(Quiet Area) **E-SE-2**





PROGRAM ACTIVITIES:
- Could be used for emotionally disturbed or other students requiring a quiet individual area.
- Preparation and storage of instructional materials and equipment.

SPATIAL RELATIONSHIPS:
- Close proximity to academic classrooms
- Integral part of self-contained classroom or special education/resource room

ENVIRONMENTAL CONSIDERATIONS:
- Dimmed lighting
- Environmental sound control
  wall minimum STC ***45***
  ceiling minimum CAC 35, NRC ***0.70***

CAPACITY: 1 - 2 persons
SIZE: 150 SF

NOTES:
1. Loose furnishings shown represent one of many possible arrangements.
2. Walls floor to ceiling and an open area for ½ of the fourth wall.
3. See Chapter 1, page 1110-16 for specific areas needed for each disability.

WORKROOM/CONFERENCE

E-SE-2 (Quiet Area)

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, ET, linoleum, or sheet vinyl	096816 096500 096516 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:

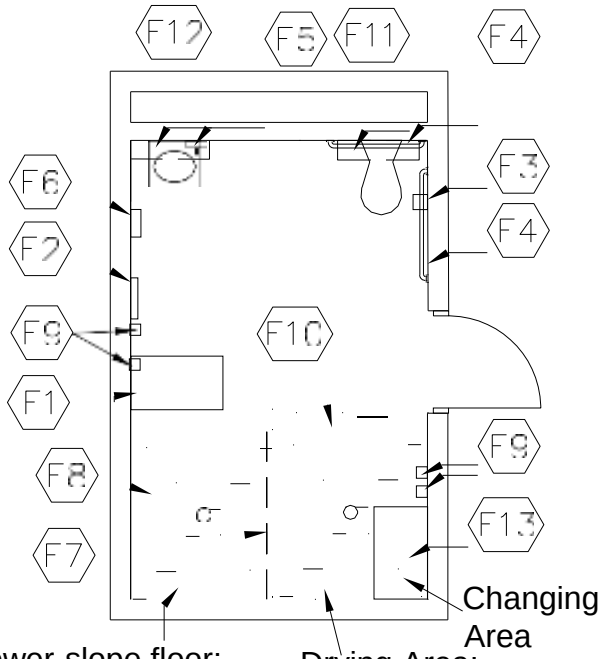
L1 Student desk and chair

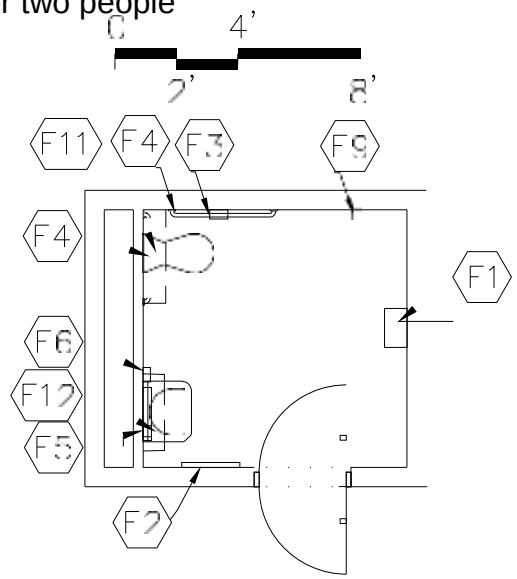
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 4' of tack board ***or chalk board or marker board*** (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Dimmable lighting	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Clock (optional)	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window with blinds (optional)	081113/088000

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.





CAPACITY: 1 - 2 persons
SIZE: 100 SF

PROGRAM ACTIVITIES:
- Changing area
- Toilet / shower needs

SPATIAL RELATIONSHIPS:
- Next to self-contained classroom

ENVIRONMENTAL CONSIDERATIONS:
- Uniform lighting
- ☐ Environmental sound control - wall minimum STC 48 ceiling minimum CAC 35**,** NRC 0.70
- ☐ Moisture- and stain-resistant finishes
- ☐ Special consideration for wheelchair access and physical accessibility needs (ADA)

NOTES:

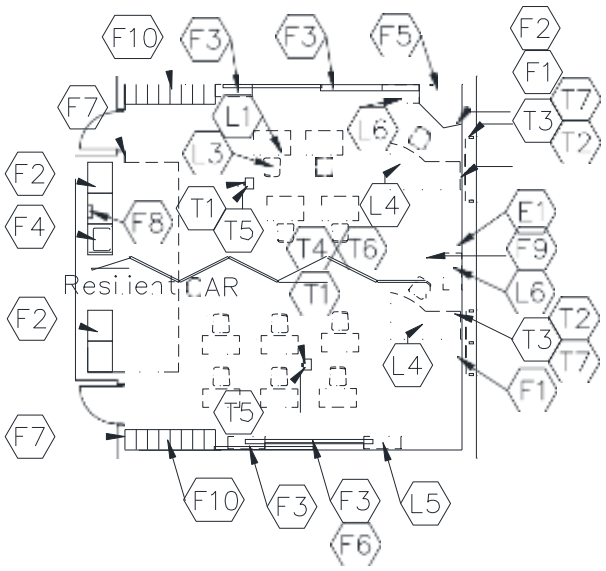
1. See Chapter 1, page 1110-16 for specific areas needed for each disability.

RESTROOM/SHOWER
E-SE-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Restroom: ET, vinyl sheet, ***ceramic mosaic, porcelain tile***	093000 096500
Shower: Ceramic mosaic tile, or porcelain tile	093000
Base:	
Restroom: Resilient base, ***ceramic mosaic, porcelain tile, or*** integral vinyl cove base	096500 093000
Shower: Ceramic mosaic tile base, porcelain tile, or integral vinyl cove base	
Ceiling:	
Restroom: Suspended, acoustical	095113
Shower: Painted portland cement plaster or interior finish system	092400/099100 092513
Walls:	
Epoxy painted concrete masonry units or ceramic wall tile in shower and latex paint in restroom	042000/099100 093000 099100
LOOSE FURNISHINGS:	
Wastebasket	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Base cabinets	123550
F2 24" x 60" mirror	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Towel dispenser	102813
F7 Shower curtain and rod	102813
F8 ADA shower accessories	102813
F9 (2) hooks	102813
F10 Cubicle curtain	102813
F11 8" deep wall cabinet above toilet	102813
F12 Shelf (optional)	102813
F13 Changing station ***(fixed or loose)***	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
ADA shower controls and head	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Refer to ADAAG 4.21 for grab bar and control locations.



PROGRAM ACTIVITIES:

- Accommodates students who have special needs with cognitive disability, hearing impairment, visual impairment, emotional disturbance, orthopedic impairment, autism, brain injury, learning-deaf-blindness disabilities.
- Variety of special services such as one-on-one instruction and small group instruction.
- Activities include, but are not limited to: group discussions, demonstrations, music activities, life skills, coping skills, speech, and visual and hearing support services.

SPATIAL RELATIONSHIPS:

- Near academic core classrooms
- The space will be used to accommodate the specific IEP requirements of each student

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control –
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: Based on disability.
See Chapter 1, Section 1110.

SIZE: 900 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this room or could be placed in a workroom/conference area.
3. See Chapter 1, page 1110-16 for specific areas needed for each disability.

SPECIAL EDUCATION/RESOURCE
E-SE-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Combination carpet, carpet tile, with resilient options	096816 096500
Option: All ET, sheet vinyl, linoleum, or rubber	096516 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:

L1 Student desks/tables
L2 Reserved
L3 Student chairs
L4 Teacher desk / computer support and chair
L5 Mobile bookcases or storage unit
L6 File cabinet
Wastebasket

Electronic Safety and Security:

Life safety devices per code 283111

E1 Duplex receptacle with dedicated circuit for wireless devices

Miscellaneous:

Pencil sharpener (optional)

Communications (cont'd):

T7 Classroom technology center video port 271543, 274116, 274119, 275127

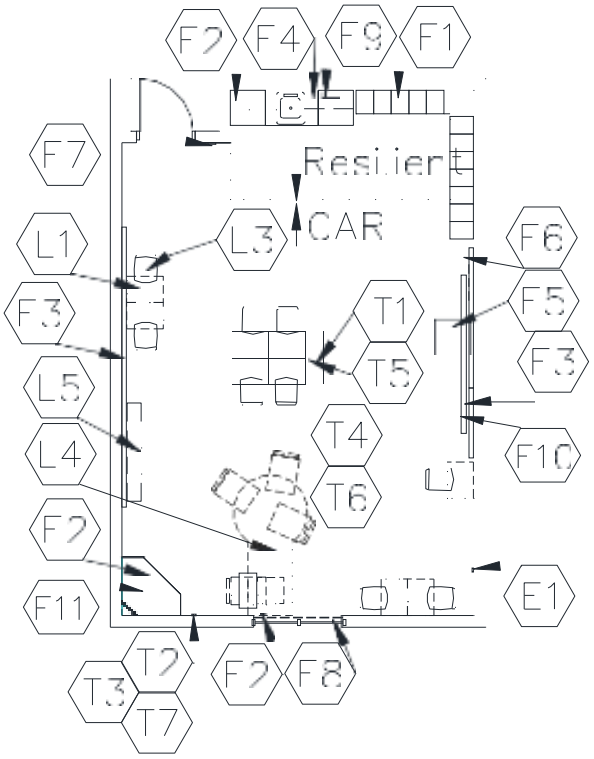
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Windows with integral blinds	085113
F2 9'-12' combination tall wardrobe, base and wall cabinets	123550
F3 24'-32' combination chalk/marker board tackboard & tackable wall surface	123550
F4 3' sink base cabinet	123550
F5 Technology support casework	123550
F6 Projection screen (optional)	115213
F7 Pencil sharpener support (optional)	062000
F8 Towel dispenser (optional)	102813
F9 Operable partition (optional)	102226
F10 Open casework coats and personal storage w/wall cabinets above	123550
Mirror (optional)	102813
Mobile storage cabinet (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near each teacher workstation	271513
T4 Wireless access point cable above ceiling	271513
Clock	275313
Sound reinforcement system	275127
Central sound system	275123
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other

casework in the room.

3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



CAPACITY: Based on disability.
See Chapter 1, Section 1110.

SIZE: 600 SF

PROGRAM ACTIVITIES:

- Can accommodate students with cognitive, hearing, speech, language, emotional, orthopedic, autistic, brain injury, learning, deaf, and blindness. Services to include occupational, physical, and speech therapy.
- Accommodates students who have special needs and are unable to be included in regular instructional program areas.
- Activities include, but are not limited to: group discussions, demonstrations, music activities, listening skills, presentations, art and science projects, and small group activities.

SPATIAL RELATIONSHIPS:

- Distributed throughout academic core areas.

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Resilient and stain-resistant floor covering
- Special consideration for wheelchair access and physical accessibility needs (ADA)

`

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this classroom or could be placed in a workroom/conference area.
3. See Chapter 1, page 1110-16, for specific areas needed for each disability.

SMALL SELF-CONTAINED CLASSROOM

E-SE-5 (Special Education) CHAPTER 4: ELEMENTARY SCHOOL

FINISHES[1]:	Spec. Ref.#
Flooring:	
Combination carpet, carpet tile,	096816
with resilient options	096516
Option: All ET, sheet vinyl	096500
linoleum, or rubber	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:

L1 Student desks/tables
L2 Reserved
L3 Student chairs
L4 Teacher workstations/computer support and chair
L5 6' of low bookcases (fixed or mobile)
Wastebasket

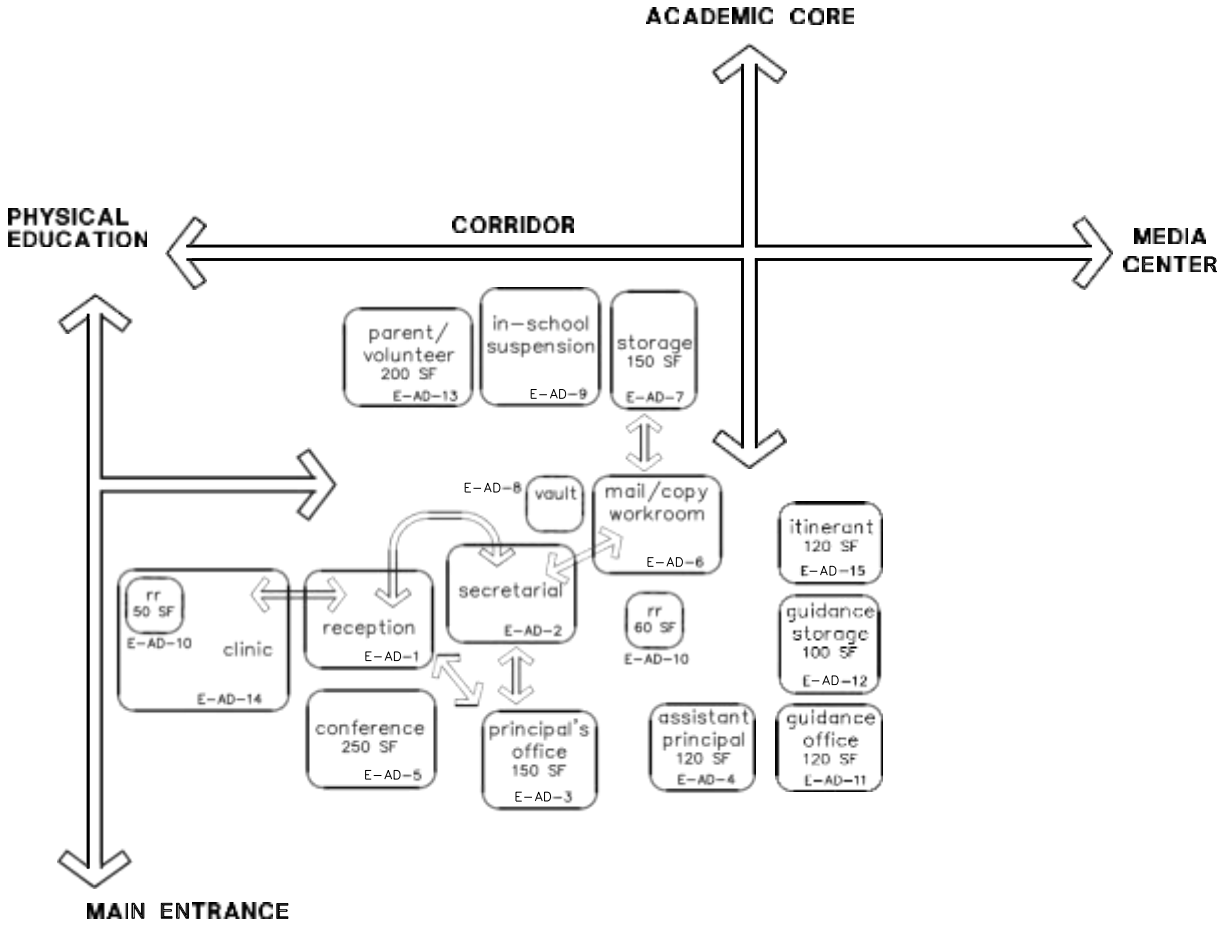
Electronic Safety and Security:	
Life safety devices per code	283111

E1 Duplex receptacle with dedicated circuit for wireless devices

Miscellaneous:
Pencil sharpener (optional)

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Open casework – coats and personal items with wall cabinets above	123550
F2 Combination tall wardrobe, base and wall cabinets	123550
F3 20'-28' combination marker board, tackboard, tackable wall surface	123550
F4 3' sink base cabinet	123550
F5 Mobile storage cabinet (optional)	123550
F6 Mirror (optional)	102813
F7 Pencil sharpener support (optional)	062000
F8 Windows with integral blinds	085113
F9 Towel dispenser (optional)	102813
F10 Projection screen (optional)	115213
F11 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink with drinking fountain	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



NOTES:

This is an example of how the administrative spaces in an elementary school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Administrative space plates:

E-AD-1 Reception Area
E-AD-2 Secretarial Area
E-AD-3 Principal's Office
E-AD-4 Assistant Principal's Office
E-AD-5 Conference Room
E-AD-6 Mail/Work/Copy Room
E-AD-7 Administrative Storage
E-AD-8 Vault/Records Storage
E-AD-9 In-school Suspension
E-AD-10 Restroom
E-AD-11 Guidance Counselor's Office
E-AD-12 Guidance Records/Storage
E-AD-13 Parent/Volunteer Room
E-AD-14 Health Clinic (includes restroom)

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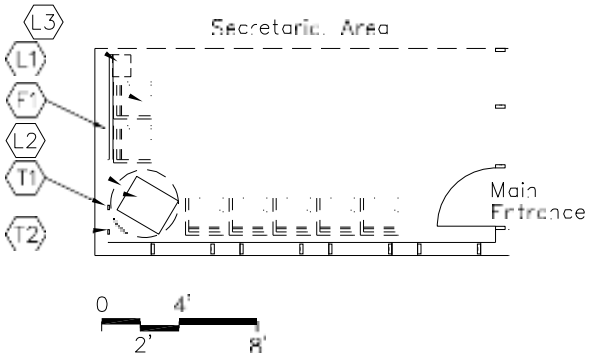
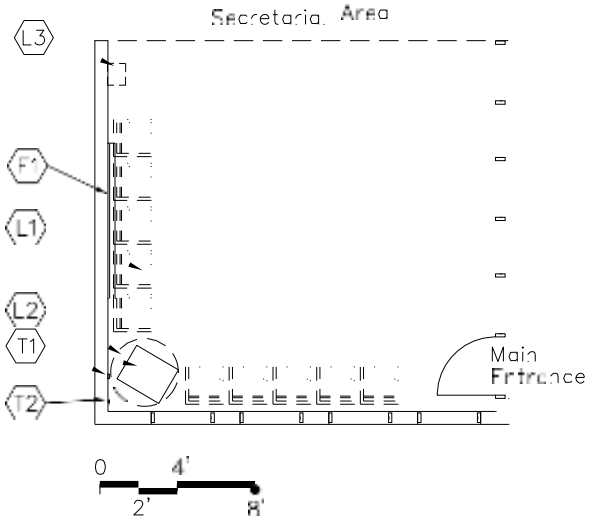
200 SF



350 SF



PROGRAM ACTIVITIES:
- Serves as the main entry to the building
- Visitors may wait or are directed to other areas of the building.

SPATIAL RELATIONSHIPS:
- Access to all areas of the building
- Open to secretarial area
- Near principal's office
- Near main entrance to the building
- Visual access to main entrance of the building

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 40
  ceiling minimum CAC 35, NRC 0.70
- Audio and visual control from secretarial area

CAPACITY:	6 - 8 or 8 - 10 visitors
SIZE:	200 - ***350*** SF
ANCILLARY SPACES:	Secretarial Area E-AD-2

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

RECEPTION AREA
E-AD-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

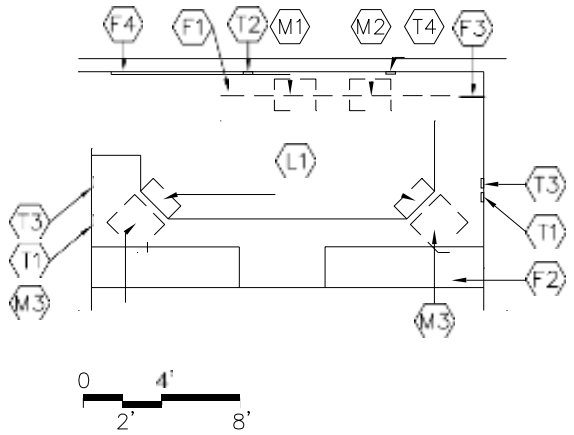
LOOSE FURNISHINGS:
L1 Visitor chairs
L2 End table
L3 Racks for forms (optional)
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tack board or tackable wall surface (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230993
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
2 duplex receptacles	262726
Double duplex receptacle adjacent to video port	262726
Means of egress lighting per code	265100
Communications:	
T1 1 ***projector*** video port, monitor, and brackets	271543/274119
T2 1 voice port and phone	271513/273123
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior windows	081113/088000

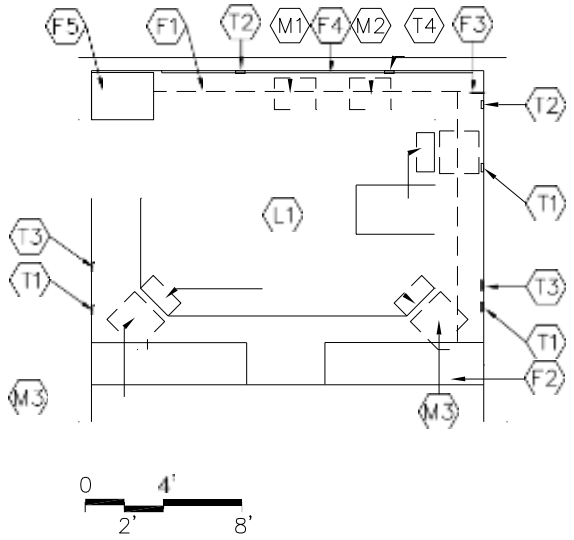
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

200 SF ADA Compliant Approach



350 SF ADA Compliant Approach



CAPACITY: 1 - 2 or 2 - 3 staff
SIZE: 200 - ***350*** SF
ANCILLARY SPACES: Reception Area
E-AD-1

PROGRAM ACTIVITIES:

- Conduct administrative support duties, and receive and direct visitors

SPATIAL RELATIONSHIPS:

- Easy access to all areas of the building
- Open to reception area
- Near principal's office
- Near main entrance to the building
- Visual access to main entrance of the building

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 40
  ceiling minimum CAC 35, NRC 0.70
- Audio and visual control of reception area

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

SECRETARIAL AREA

E-AD-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet ***or Carpet Tile***	096816 ***096813***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	***092116***/ 099100

LOOSE FURNISHINGS:

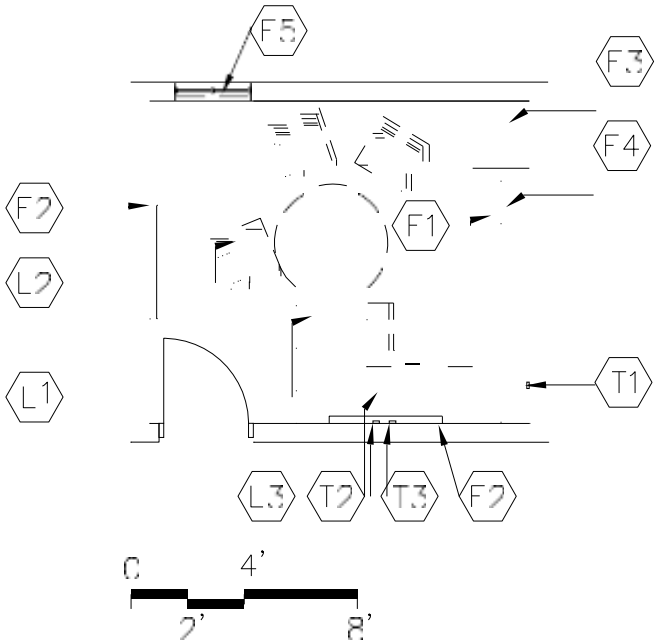
L1 Secretarial chairs

Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 24' - 60' of work surface with file drawers	123550
F2 42" high counter top with portion of counter 34" high or lower	123550
F3 16'-24' of wall cabinets for forms, supplies, books, and manuals	123550
F4 Tackable wall surface (optional)	101100
F5 Tall cabinet for coats (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Temperature control with reception area (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
3 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Emergency lighting	265100
Communications:	
T1 1 voice port and phone at each secretarial workstation	271513/***273123***
T2 1 fax port	271513/273113
T3 1 data port at each secretarial workstation	271513
T4 1 data port for printer	271513
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
The following items are to be funded by the school district:	
M1 Fax machine	
M2 Printer	
M3 Computer/typewriter	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown illustrate quantities for the smallest and largest possible room size.



PROGRAM ACTIVITIES:

- Instructional and administrative leader of the building
- One-on-one conferences with parents, small group meetings, and coordination of administrative tasks

SPATIAL RELATIONSHIPS:

- Near reception area
- Near secretarial area
- Easy access to school circulation areas
- Near main entrance to the building
- Near conference room

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	1 - 4 persons
SIZE:	150 SF

NOTES:
1. Loose furnishings shown represent one of many possible arrangements.

PRINCIPAL'S OFFICE
E-AD-3

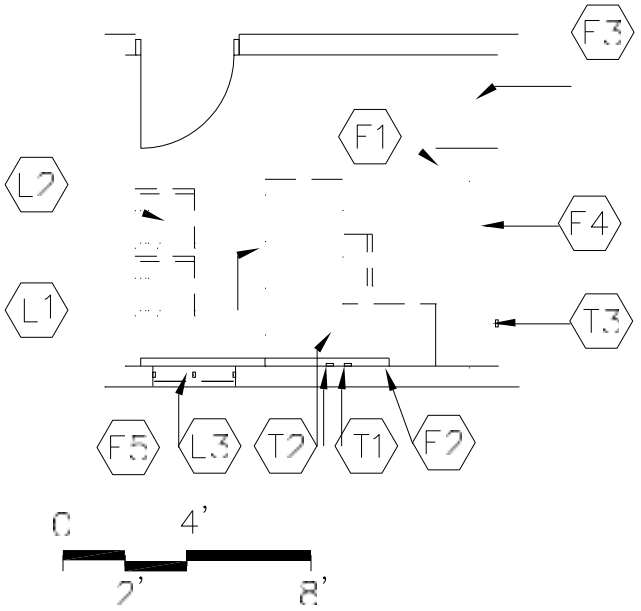
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board, marker board, or tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets above work surface	123550 F5
Window with integral blinds	085113
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near workstation	271513
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can be either all fixed casework or all loose furnishings.



PROGRAM ACTIVITIES:

- To assist principal in administrative tasks
- One-on-one conferences with parents and coordination of administrative tasks

SPATIAL RELATIONSHIPS:

- Near reception area
- Near secretarial area
- Direct access to school circulation areas
- Near main entrance to the building
- Near or accessible to principal's office
- Near conference room

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	1 - 3 persons
SIZE:	120 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

ASSISTANT PRINCIPAL'S OFFICE
E-AD-4

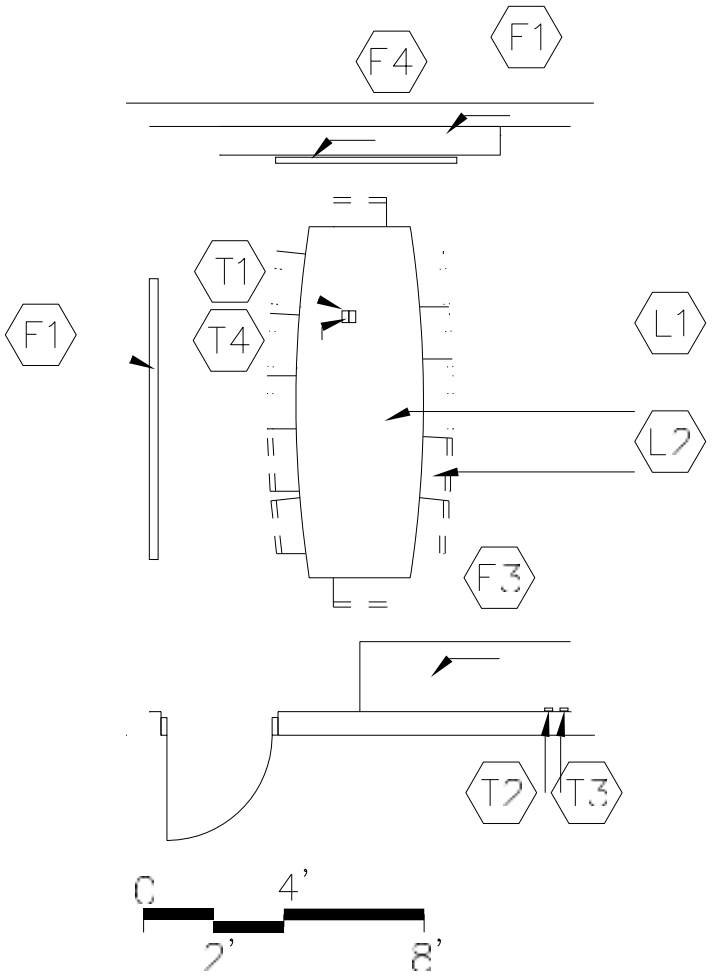
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board, marker board, or tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets above work surface	123550 F5
Window with integral blind	085113
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.



PROGRAM ACTIVITIES:

- Conferences with staff, students, parents, and other community groups

SPATIAL RELATIONSHIPS:

- Near principal's office
- Near assistant principal's office
- Near reception area
- Near secretarial area

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control - wall minimum STC ***45*** ceiling minimum CAC 35***,*** NRC ***0.70***
- ***Optional – window with integral blind***

CAPACITY: 12 – 15 persons
SIZE: 250 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

CONFERENCE ROOM
E-AD-5

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

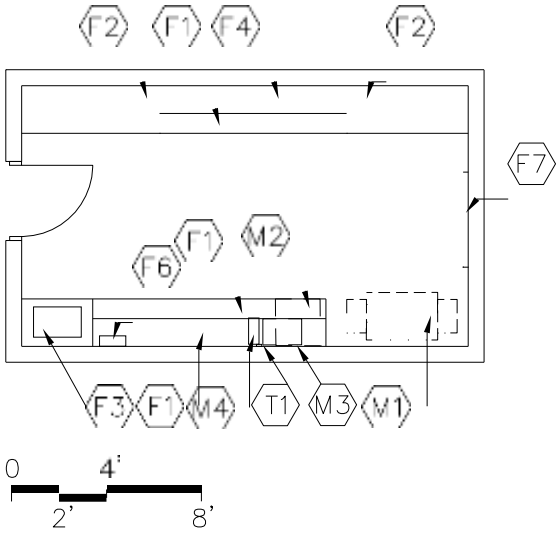
LOOSE FURNISHINGS:
L1 Conference table
L2 Chairs
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 16' combination of marker board, tackboard, tackable wall surface or media display cabinet	101100
F2 Reserved	
F3 4'-6' of base cabinets (optional)	123550
F4 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Multilevel switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
3 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123 T3
1 data port	271513
Clock	275313
Central sound system	275123
T4 ***Ultra-short throw interactive*** projector	274119
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

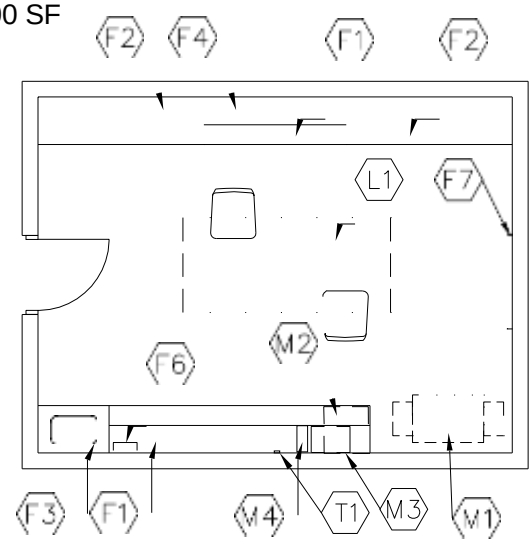
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed casework and loose furnishings can be either all fixed casework all loose furnishings.

200 SF



300 SF



PROGRAM ACTIVITIES:

- Distribution area for preparation/copying of mail and materials.
- Staff receives messages and obtains supplies.

SPATIAL RELATIONSHIPS:

- Near secretarial area

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 40
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: N/A
SIZE: 200 - ***400*** SF

NOTES:

1. The mail cubicles can be either on the wall or through the wall.

MAIL/WORK/COPY ROOM
E-AD-6

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, linoleum, rubber, ET, or sheet vinyl	096500 ***096516 096816 096813***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

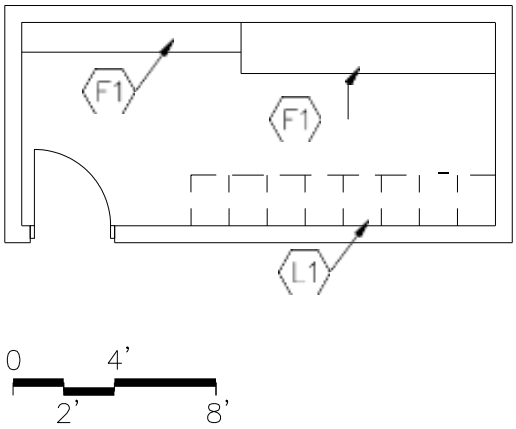
LOOSE FURNISHINGS:
L1 Work table and chairs
(applicable in 300 SF space only)
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 ***20'-24' combination base and wall cabinets***	123550
F2 8'-12' of tall storage cabinets or about 32' maximum of a combination storage cabinets	123550
F3 3' sink base cabinet	123550
F4 Mail cubicles for all staff	123200
F5 ***Reserved***	
F6 Towel dispenser (optional)	102813
F7 4' tack board ***or marker board*** (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
3 - 5 duplex receptacles	262726
Receptacle for copier	262726
Communications:	
T1 1 voice port and phone	271513/***273123***
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
The following item is to be funded by the school district:
M1 Copier
M2 Undercounter refrigerator
M3 Microwave
M4 Coffee maker

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:

- Supplies, books, records, forms, and equipment storage

SPATIAL RELATIONSHIPS:

- Near mail/work/copy room
- Near vault/records storage

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY: N/A
SIZE: ***100 -*** 150 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

ADMINISTRATIVE STORAGE

E-AD-7

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, linoleum, rubber, ET, or sheet vinyl	096500 ***096816*** ***096813*** ***096516***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

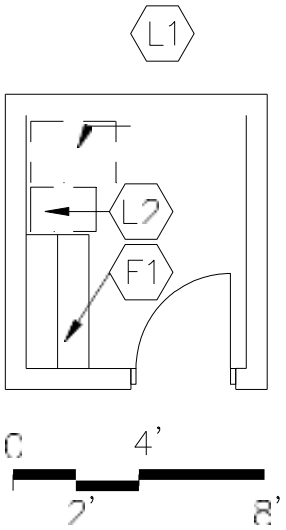
LOOSE FURNISHINGS:
L1 File cabinets

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 10'-20' of open shelving, depth may vary (fixed or loose)	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

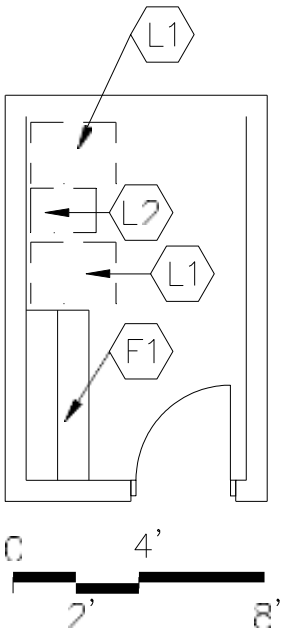
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

50 SF



80 SF



CAPACITY: N/A
SIZE: ***80*** – ***115*** SF

PROGRAM ACTIVITIES:
- Storage of records and security files in a secure area

SPATIAL RELATIONSHIPS:
- Access to guidance area
- Access to secretarial personnel

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

VAULT/RECORDS STORAGE

E-AD-8

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, linoleum, rubber, ET, or sheet vinyl	096500 ***096816*** ***096813*** ***096516***
Base:	
Resilient base	096500
Ceiling:	
Rated 2-hour construction	---
Walls:	
Rated 2-hour construction	
Painted concrete masonry units or	042000/099100
Painted gypsum wallboard on metal studs	092116/099100

LOOSE FURNISHINGS:

L1 File cabinet (2 in 80 SF room)

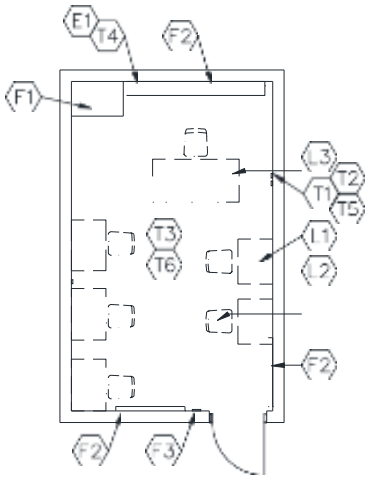
L2 Safe (loose or fixed)

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Open sheving ***(width may vary)***,	
(depth may vary)(fixed or loose)	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
Wall, ceiling, and door construction to have a 2-hour fire rating	

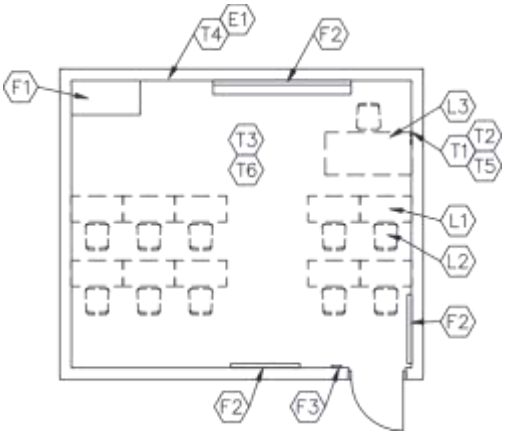
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

225 SF



325 SF



CAPACITY: 5 - 8 students
SIZE: 225 - 600 SF

PROGRAM ACTIVITIES:

- Instructional area for students who require time away from the normal classroom due to behavioral problems

SPATIAL RELATIONSHIPS:

- Near principal's office
- Near secretarial area

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blind

NOTES:

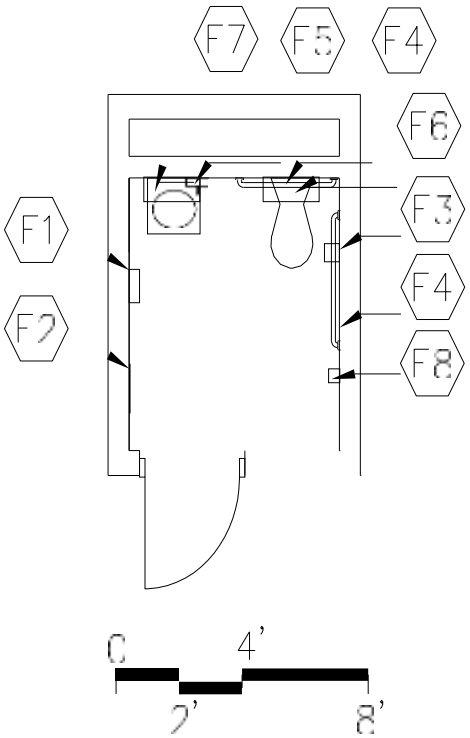
1. Loose furnishings shown represent one of many possible arrangements.

IN-SCHOOL SUSPENSION
E-AD-9

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile,	096816
ET, linoleum,	096500
rubber, or sheet vinyl	096813
	096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100
LOOSE FURNISHINGS:	
L1 Student carrels and/or desks	
L2 Student chairs	
L3 Teacher workstation and chair	
L4 ***Reserved***	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111
E1 Duplex receptacle with dedicated circuit for wireless devices	
Miscellaneous:	
Pencil sharpener (optional)	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 3'-4' of base cabinets (optional)	123550
F2 10'-16' combination marker board, tackboard or tackable wall surface	101100
F3 Pencil sharpener support (optional)	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123
T2 1 data port near teacher workstation	271513
T3 Wireless access point cable above ceiling	271513
T4 1 projector video port	271543
Clock	275313
Central sound system	275123
T5 Classroom technology center video port	271543, 274116, 274119, 275127
T6 Wireless access point (WAP) as determined by Design – refer to Note 2	272133

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:
- Personal and health needs for teachers and staff
- Restroom facilities for clinic

SPATIAL RELATIONSHIPS:
- Located in the administrative area

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

CAPACITY: 1 person
SIZE: ***60*** SF

NOTES:

RESTROOM
E-AD-10

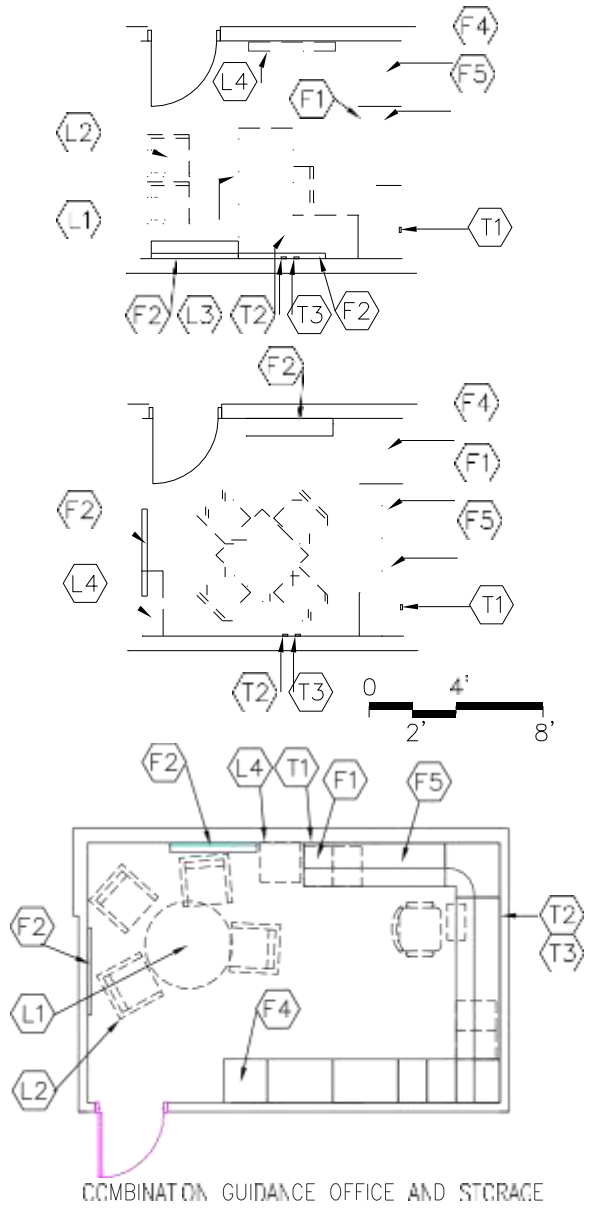
FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, or sheet vinyl	
Optional: ceramic mosaic tile,	096500
porcelain tile, or	093000
resinous flooring	096723
Base:	
Resilient base	096500
Optional: ceramic mosaic tile, porcelain tile, resinous flooring, or integral vinyl cove base	093000 ***096723***
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
Optional: moisture & abuse-resistant gypsum wall board	092116

LOOSE FURNISHINGS:
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 24" x 60" mirror	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 8” deep wall cabinet above toilet for supplies (optional)	102813 F7
Stainless steel shelf (optional)	102813 F8
Coat hook	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



COMBINATION GUIDANCE OFFICE AND STORAGE

CAPACITY: 1 - 3 persons
SIZE: ***100 -*** 120 SF

PROGRAM ACTIVITIES:

- Guidance counselor to do individual work and provide assistance to students
- One-on-one conferences with parents and coordination of administrative tasks
- Could be combined with guidance records/storage

SPATIAL RELATIONSHIPS:

- Near guidance/records storage
- Near reception area
- Near secretarial area
- Access to school circulation areas

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blind

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

GUIDANCE COUNSELOR'S OFFICE
E-AD-11

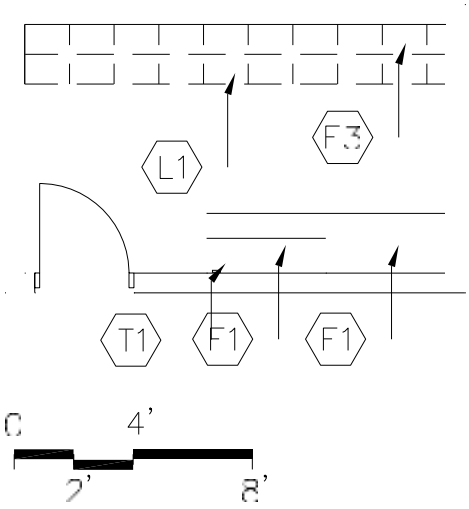
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Desk or table, with chair
L2 Visitor chairs
L3 Computer desk return
L4 Bookcase (fixed or loose)
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' - 8' combination marker board, tack board, tackable wall surface	101100
F3 Reserved	
F4 Tall wardrobe	123550
F5 Wall cabinets	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near workstation	271513
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.



PROGRAM ACTIVITIES:

- Storage of supplies, files, and equipment in a secure area

SPATIAL RELATIONSHIPS:

- Near guidance counselor's office
- Could be combined with guidance counselor's office

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY: N/A
SIZE: ***55 - 150*** SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

GUIDANCE RECORDS/STORAGE
E-AD-12

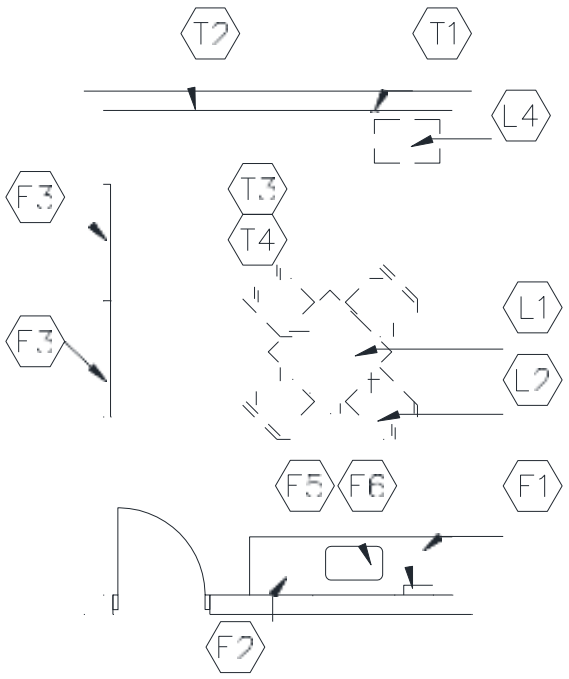
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, linoleum, rubber, ET or sheet vinyl	096500 ***096813 096816 096516***
Base:	
Resilient base	096500
Ceiling:	
Rated 2-hour construction	---
Walls:	
Rated 2-hour construction	
Painted gypsum wallboard over metal studs or	092116/099100
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 File cabinets

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 ***6'-10' combination base and wall cabinets or tall cabinets***	123550
Option: mobile storage shelving ***or file cabinets***	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
1 data port (optional)	271523
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Wall, ceiling, and door construction to have a 2-hour fire rating	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- After school meetings, community, and small group meetings

SPATIAL RELATIONSHIPS:
- Near administrative area

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blind

CAPACITY: 2 - 8 persons
SIZE: 200 - 300 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

PARENT/VOLUNTEER ROOM
E-AD-13

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

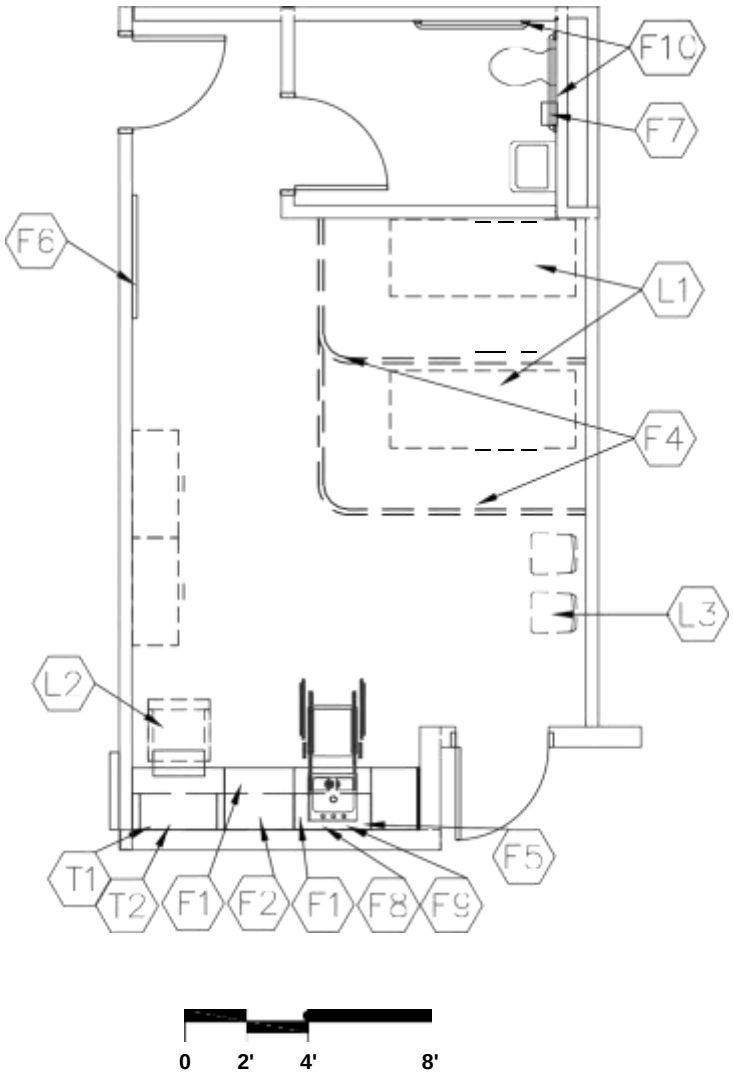
LOOSE FURNISHINGS:
L1 Table
L2 Chairs
L3 Reserved
L4 Monitor cart
Wastebasket

Miscellaneous:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 About 3' of base cabinets	123550
F2 Tall wardrobe	123550
F3 4'-8' combination marker board, tack board, tackable wall surface	101100
F4 Reserved	
F5 3' Sink base cabinet	123550
F6 Towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 Reserved	
T2 voice port with phone	271513/273123
T3 Wireless access point cable above ceiling	***271513***
T4 Wireless access point (WAP) as determined by design – refer to note 2	
271533	
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable. WAP device quantity / placement per 272133 requirements.

450 SF



CAPACITY: 2 - ***5*** patients
SIZE: Clinic…….240 - ***740*** SF
Restroom…..……60 SF
ANCILLARY SPACES: Secretarial Area
E-AD-2

PROGRAM ACTIVITIES:
- Treatment of minor injuries, administration of medication, and conduction of hearing or vision tests

SPATIAL RELATIONSHIPS:
- Near reception area
- Adjacent to individual restroom
- Near special education shower

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Stain-resistant floor covering

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

HEALTH CLINIC *(includes restroom)*
E-AD-14

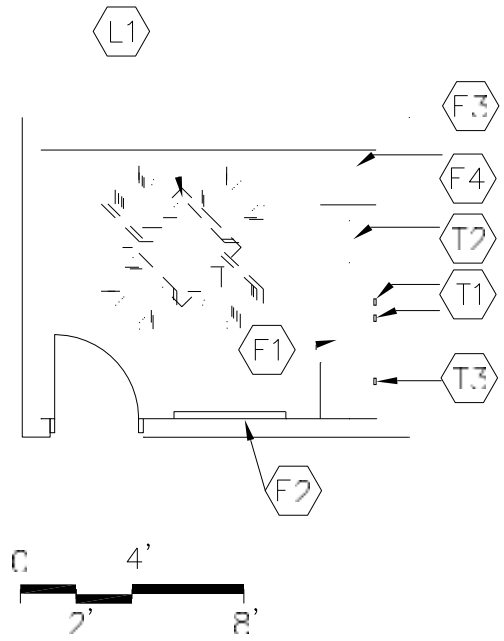
FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, ET,	096516
sheet vinyl, or	096500
resinous flooring	096723
Restroom: ET, sheet vinyl,	***096500***
resinous flooring, ceramic	***093000***
mosaic, or porcelain tile	***096723***
Base:	
Resilient base, resinous flooring, integral vinyl cover base,	096500 096723
ceramic mosaic tile, porcelain tile	***093000***
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Cots
L2 Desk and chair
L3 Chairs
Wastebasket

EQUIPMENT
E1 Refrigerator with ice making capabilities

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 ***8'-18' combination base & lockable wall cabinets***	123550
F2 3' sink base cabinet	123550
F3 ***Reserved***	
F4 Cubicle curtain and track	102123
F5 Towel dispenser	102813
F6 4' of tack board	101100
F7 Sanitary napkin dispenser/disposal	102813
F8 Soap dispenser	102813
F9 24" x 60" mirror	102813
F10 36" and 42" grab bars	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Sink - with goose neck	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Exhaust directly to exterior	
Electrical:	
Single level switching with dimmer	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
2 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Receptacle for refrigerator	262726
Emergency lighting	265100
Communications:	
T1 1 voice port and phone	271513/***273123***
T2 1 data port near workstation	271523
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:

- Office and work area for specialists such as psychologist, reading specialist, etc., who regularly spend a portion of their schedule at one of several schools

SPATIAL RELATIONSHIPS:

- Near reception area
- Near secretarial area
- Direct access to school circulation areas
- Near main entrance to the building
- Near or accessible to principal's office and guidance counselor's office

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC ***45***
  ceiling minimum CAC 35, NRC ***0.70***
- ***Optional – window with integral blind***

APACITY: 1 - 3 persons
SIZE: 120 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

ITINERANT PERSONNEL OFFICE

E-AD-15

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:

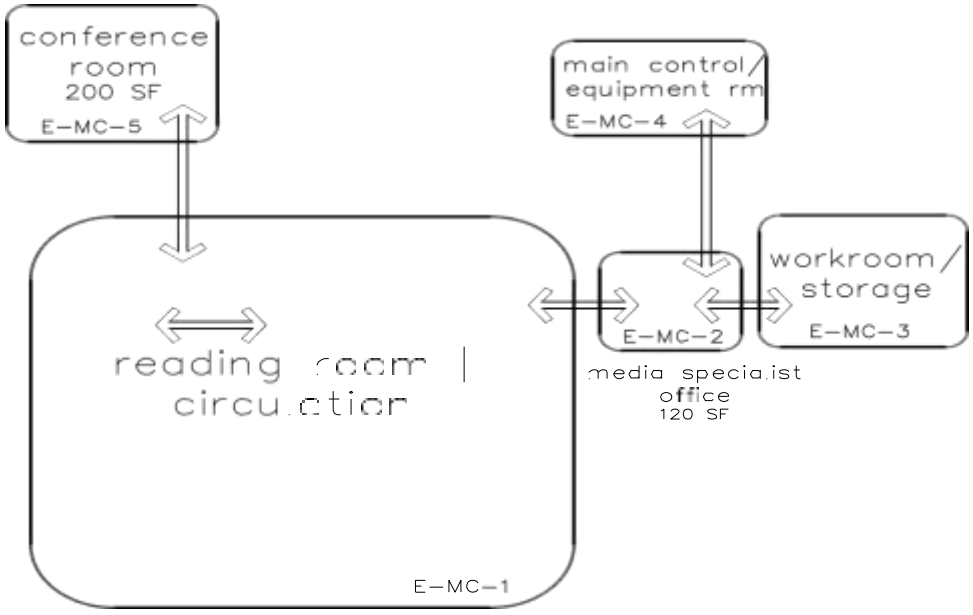
L1 Table and chairs

Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers(optional)	123550
F2 4'-8' of tack board, marker board or tackable wall surface	101100
F3 Tall wardrobe (optional)	123550
F4 Wall cabinets	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123
T2 1 data port	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.



NOTES:

This is an example of how the media center spaces in an elementary school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Media Center space plates:

E-MC-1 Reading Room/Circulation E-
MC-2 Media Specialist Office
E-MC-3 Workroom/Storage
E-MC-4 Main Control/Equipment Room
E-MC-5 Conference Room

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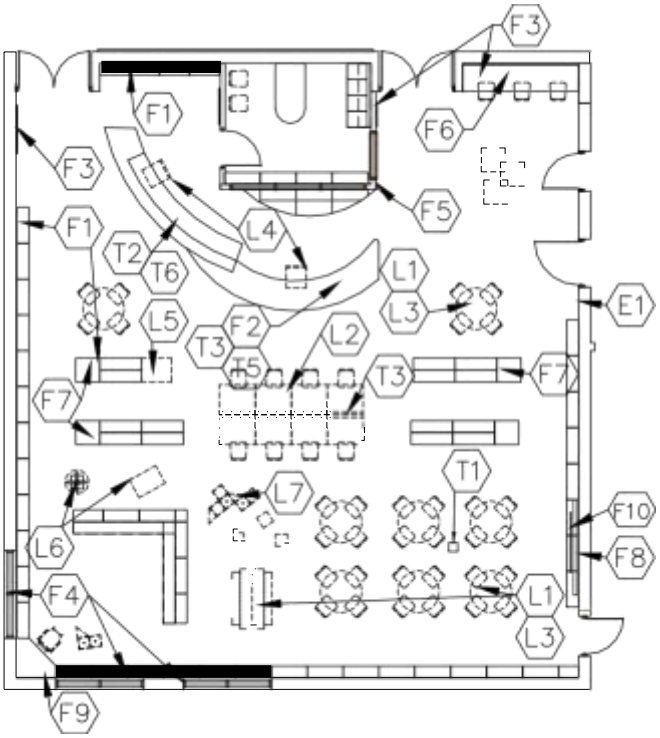
READING ROOM/CIRCULATION
E-MC-1



PROGRAM ACTIVITIES:

- Media center is an information laboratory that serves the instructional needs of the entire school.
- Provides students with access to information, technology, and multimedia materials in an area that will allow for individual, small group, and classroom research. Space should encourage development of positive attitudes toward reading and learning.

SPATIAL RELATIONSHIPS:

- Near academic center of the school
- Access to classrooms
- Easy access to public parking

ENVIRONMENTAL CONSIDERATIONS:

- Natural light opening with an operable vent
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: 10% of student capacity

SIZE: Based on the student capacity
10% of student capacity multiplied by 30 SF per student

NOTES:

1. Loose furnishings shown represents one of many possible arrangements.

READING ROOM/CIRCULATION
E-MC-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
Acoustical wall treatment	098000

LOOSE FURNISHINGS[3]:
L1 Student tables
L2 Computer workstation furniture
L3 Student chairs
L4 Circulation desk task chair
L5 Atlas stand
L6 Paperback book rack
L7 Modular picture book display
Wastebaskets

Miscellaneous: Various sizes of casework for dictionaries, magazines, displays, card catalog, etc., may be required.

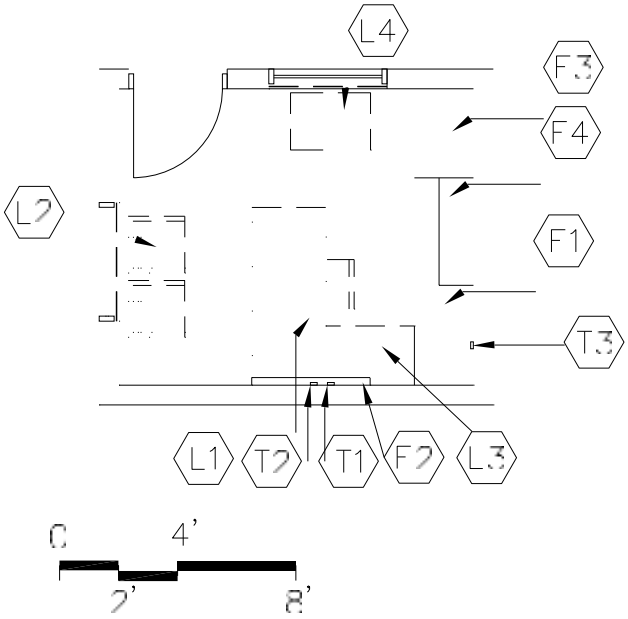
Pencil sharpener (optional)

E1 Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):
T6 Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Library book shelving (see notes)	115123
F2 Circulation desk casework	123550
F3 12'-16' of tack board or tackable wall surface (optional)	101100
F4 Windows with integral blinds (optional)	085113
F5 Pencil sharpener support (optional)	062000 F6
Computer workstations (could be loose)	123550
F7 Search terminal stations	123550
F8 Marker board (optional)	101100
F9 Technology support casework	123550
F10 Projection screen (optional)	115213
Roller window shades (optional)	122413
Fire Suppression:	
Fire suppression system	211000
Plumbing: N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature ctrl	230923
Electrical:	
Multi-level switching	262726
Fluorescent lighting	265100
Illumination level: See Table	8600-5
6 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Means of egress lighting per code	265100
Emergency lighting	265100
Electronic Safety and Security:	
~~Life safety devices per code~~	283111
Communications:	
T1 1 ***projector*** video ports and video display devices	271543/274119
T2 1 voice port and phone	271513/273123
T3 ***Wireless access point cable above ceiling***	271513
T4 1 data port for library automation system	271513
Clock	275313
Central sound system	275123
T5 Wireless access point (WAP) as determined by Design – refer to Note 6	***272133***

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed casework and loose furnishings can be interchangeable.
3. Circulation desk(s) and library shelving can be loose furnishings.
4. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
5. Up to 20% of book shelving can be movable.
6. Baseline includes WAP cable. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:
- Media specialist to conduct duties

SPATIAL RELATIONSHIPS:
- Near reading room/circulation area
- Near workroom/storage
- Could be part of the media center reading room

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: 1 - 3 persons
SIZE: 120 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

MEDIA SPECIALIST OFFICE

E-MC-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

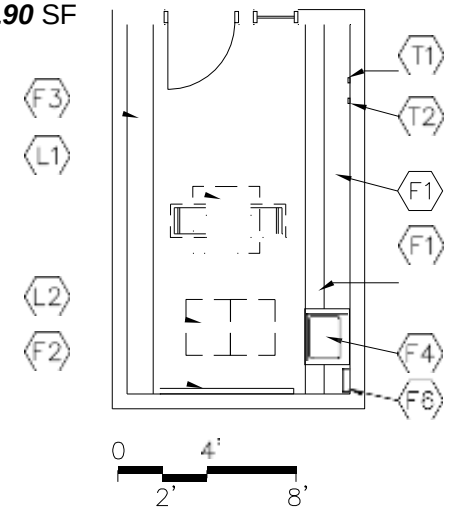
LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
L4 File cabinet
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board, marker board, or tackable wall surface	
F3 Tall wardrobe	123550
F4 Wall cabinets	123550
F5 Bookcases (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Electronic Safety and Security:	
Life safety devices per code	283111
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Miscellaneous:	
Interior window	081113/088000

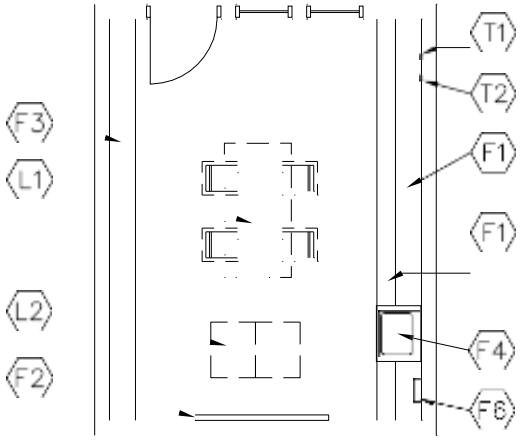
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can either be all fixed casework or all loose furnishings.

190 SF



250 SF



CAPACITY: 1 - 3 staff
SIZE: ***190 - 400*** SF

PROGRAM ACTIVITIES:
- Receiving, processing, and repairing media material

SPATIAL RELATIONSHIPS:
- Near reading room/circulation
- Near media specialist office

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Visual access to reading room/circulation

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

WORKROOM/STORAGE
E-MC-3

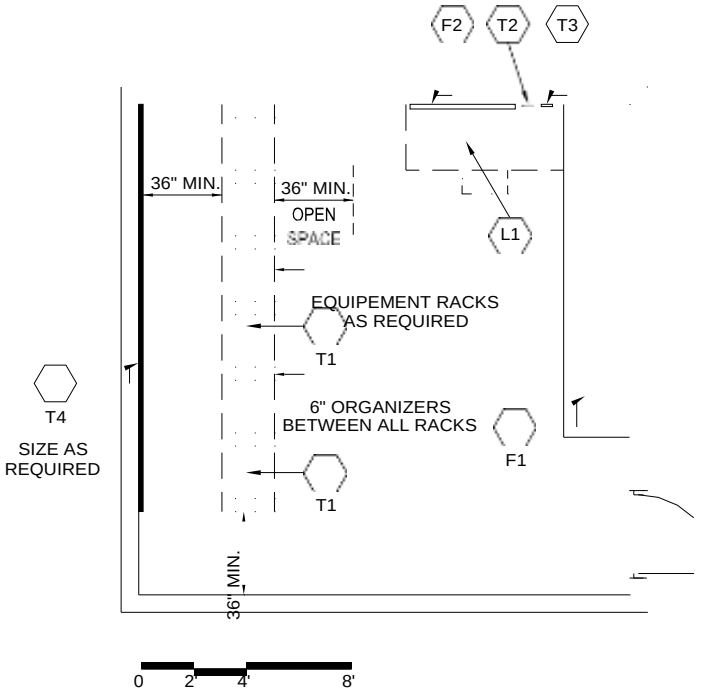
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, ET or sheet vinyl, linoleum, rubber	096500 ***096813*** ***096816*** ***096516***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Table and chairs
L2 Book trucks
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 ***20'-30' combination base & wall cabinets***	123550
F2 4'-8' of tack board ***or marker board***	101100
F3 10' - 18' of bookcases (optional)	123550
F4 3' sink base cabinet	123550
F5 ***Reserved***	
F6 Towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
3 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data port	262726
Communications:	
T1 1 voice port and phone	271513/***273123***
T2 1 data port	271523
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window	081113/088000

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



PROGRAM ACTIVITIES:

- Collection and distribution hub for the voice, video, and data networks within the facility
- Contains racks for distribution equipment

SPATIAL RELATIONSHIPS:

- Near the center of the building to minimize the number of telecommunication rooms (TR)

ENVIRONMENTAL CONSIDERATIONS:

- Ventilation and cooling of heat-generating electronic equipment

Note: Technology designer shall confer with school district technology director to determine equipment and space needed and coordinate with project designer.

CAPACITY:	N/A
SIZE: ***(Baseline) (Minimum)***	300 SF

ER Utilized as district N.O.C. – add minimum 150 SF
ER Utilized as building data center for central servers/thin client – add minimum 30 SF per 10 classrooms

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. ***Verify and coordinate ER size and location with the technology designer during programming phase.***

MAIN CONTROL / EQUIPMENT ROOM

E-MC-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET or sheet vinyl (static dissipative flooring)	096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

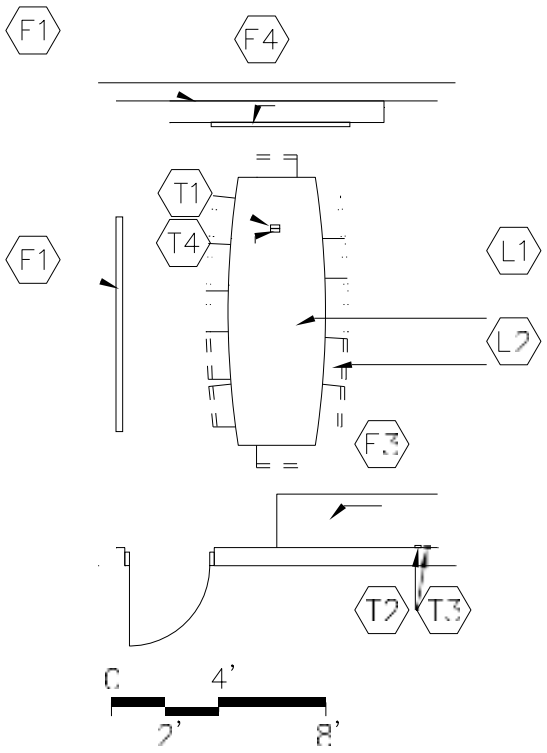
LOOSE FURNISHINGS:

L1 Desk and chair
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 8'-16' of open shelving, depth may vary, (fixed or loose)	123550
F2 4' of tack board or marker board	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Independent, packaged system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
3 duplex receptacles	262726
Duplex receptacle for electronic systems	262726
Telecommunications Grounding	270526/260526
Standby power	263213/263600
Communications:	
T1 Technology Equipment	
Central sound system	275123
Telephone wiring	271513/271313
Integrated telephone system	273123
Video wiring	271543
Digital on demand delivery system	274125
Local area network wiring	271513/271323
Local area network electronics	272100/272133
Grounding & Infrastructure Equipment	270526/271100
T2 1 voice port and phone	271513/273123
T3 1 data port near workstation	271513
T4 1/4" plywood back board	271313
Electronic Safety and Security:	
Life safety devices per code	283111
Security system	281300/281600/282300
Miscellaneous:	
Provide distribution equipment with an equipment electrical ground.	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Used primarily by students for group projects

SPATIAL RELATIONSHIPS:
- Near reading room/circulation

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: 8 - 12 persons
SIZE: 200 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

CONFERENCE ROOM
E-MC-5

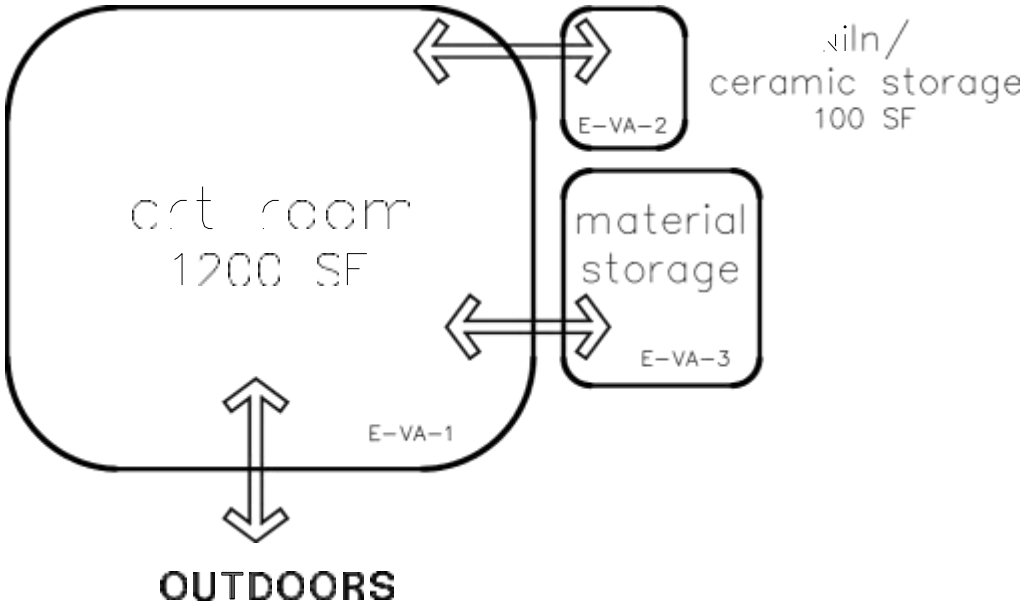
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Conference table
L2 Chairs
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 14'-18' combination marker board, tack board or tackable wall surface	101100
F2 Reserved	
F3 4'-6' of base cabinets (optional) (fixed or mobile)	123550
F4 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Multilevel switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
3 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123 T3
1 data port	271513
T4 ***Ultra-short throw interactive*** projector	274119
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed equipment or loose furnishings can also be all fixed equipment or all loose furnishings.



NOTES:

This is an example of how the visual arts spaces in an elementary school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Visual Arts space plates:

E-VA-1	Art Room
E-VA-2	Kiln/Ceramic Storage
E-VA-3	Art Material Storage

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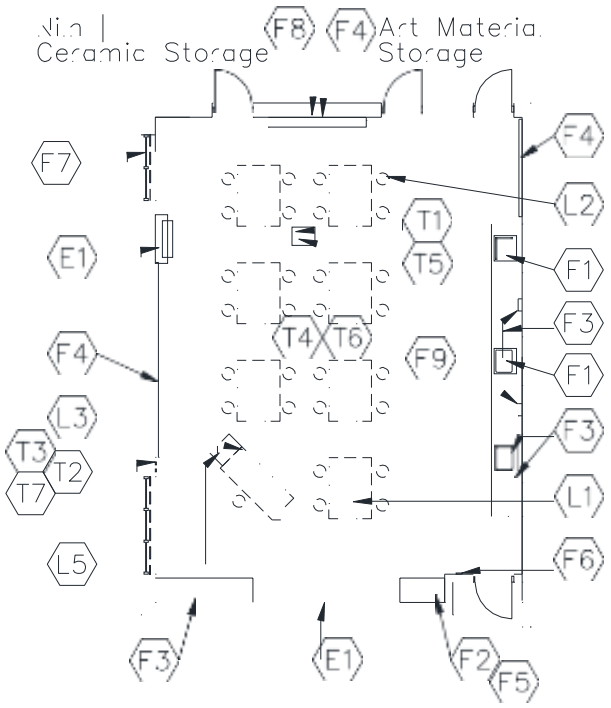
ART ROOM
E-VA-1



PROGRAM ACTIVITIES:

- Art students will work on a variety of two and three-dimensional art projects. Projects will include drawing and painting, computer graphics, sculpture and model making, collage, fiber arts, and ceramics.

SPATIAL RELATIONSHIPS:

- Near academic core classrooms
- Direct access to outdoors or access through adjacent corridor

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Stain-resistant floor covering

CAPACITY:	28 students
SIZE:	1,200 SF
ANCILLARY SPACES:	Kiln/Ceramic Storage E-VA-2
	Art Material Storage E-VA-3

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

ART ROOM
E-VA-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, sealed concrete,	096500
sheet vinyl, rubber,	033000
polished concrete finishing,	033510
or colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	
099100	

LOOSE FURNISHINGS:
L1 Student work tables
L2 Student chairs or stools
L3 Teacher desk and chair/stool and teacher computer support
L4 Reserved
L5 Desk height file cabinet
Wastebasket

EQUIPMENT:
E1 Drying rack

Electronic Safety and Security:

Life safety devices per code	283111

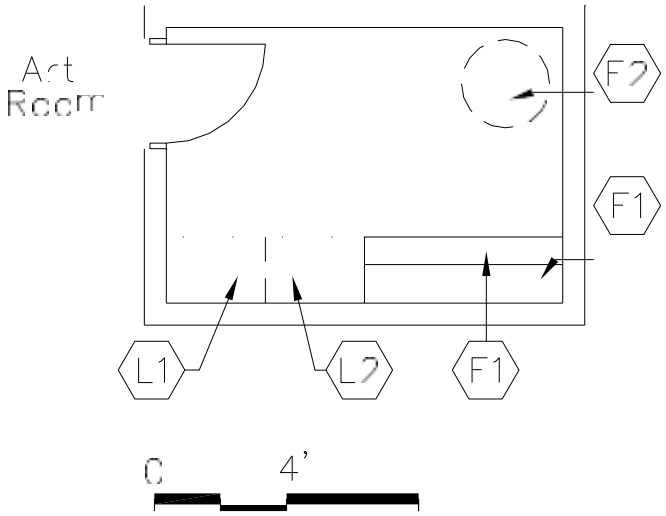
Miscellaneous:
Pencil sharpener (optional)

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 3'-4' sink base cabinet,	123550
or several wash fountains	
F2 Tall wardrobe with file drawers	123550
F3 26'-34' combination tall storage, base and wall cabinets	123550
F4 24'-32' combination marker	101100
F5 board, tackboard, tackable wall surface	
Technology support casework	123550
F6 Pencil sharpener support (optional)	062000
F7 Windows with integral blinds	085113
F8 Projection screen (optional)	115213
F9 Towel dispenser (optional)	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sinks with solids interceptor	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Manually controlled general exhaust	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Track lighting	265100
Means of egress lighting per code	265100
Emergency lighting per code	265100
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port	
near teacher workstation	271513
T4 Wireless access point cable above	
ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 2	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:

- Firing of art projects in ceramics and pottery by the teacher

SPATIAL RELATIONSHIPS:

- Adjacent to art room
- Near art material storage

ENVIRONMENTAL CONSIDERATIONS:

- Ventilation controlled by a thermostat

CAPACITY:	N/A
SIZE:	100 SF
ANCILLARY SPACES:	Art Room E-VA-1

NOTES:

KILN/CERAMIC STORAGE
E-VA-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete,	***033000***
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 3' of tall dry storage units (total)
L2 3' of tall damp storage units (total)

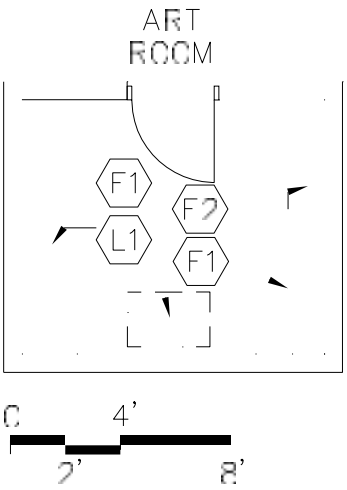
L1 and L2 could be fixed casework.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 ***6'-12' combination base and wall cabinets***	123550
F2 Kiln	119200
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Temperature controlled exhaust	Div. 23
Ventilation for kiln	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Electrical connection for kiln	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

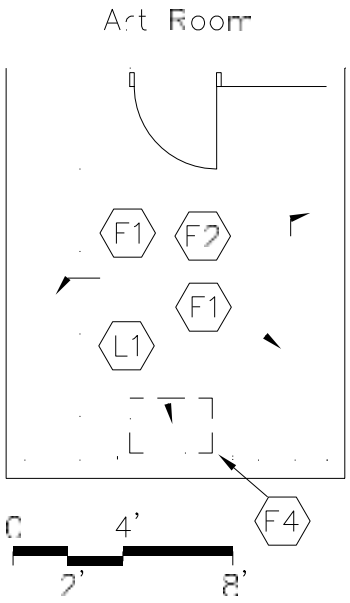
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

100 SF



150 SF



CAPACITY: N/A
SIZE: 100 - 150 SF
ANCILLARY SPACES: Art Room
E-VA-1

PROGRAM ACTIVITIES:
- Storage of art supplies and materials

SPATIAL RELATIONSHIPS:
- Adjacent to art room

ENVIRONMENTAL CONSIDERATIONS:
- Stain-resistant floor covering

NOTES:

ART MATERIAL STORAGE
E-VA-3

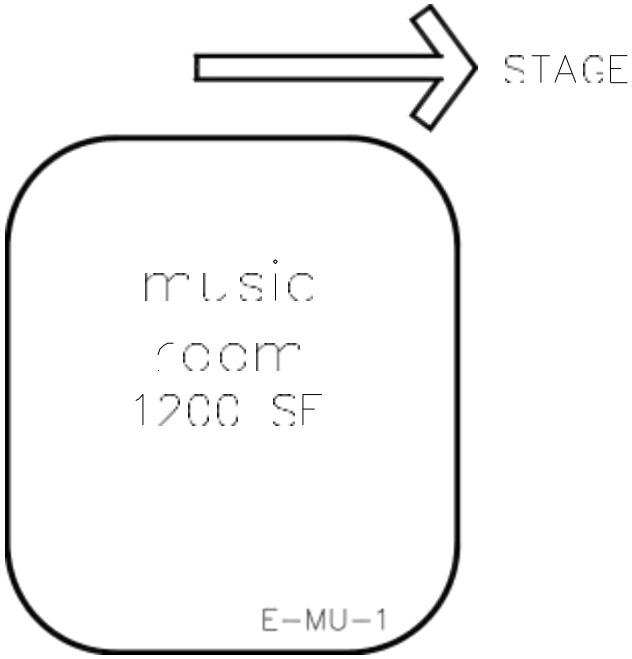
FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, ***sealed concrete, rubber,*** sheet vinyl, polished concrete finishing or colored concrete finishing	096500 ***093000*** 033510 033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Mobile materials cart

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 ***16' – 28' combination tall storage cabinets and wall cabinets***	123550
F2 8' - 14' base cabinets, (depth for school's need)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
Duplex receptacle above base cabinet	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



NOTES:

This is an example of how the music spaces in an elementary school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following is the Music space plate:
E-MU-1 Music Room

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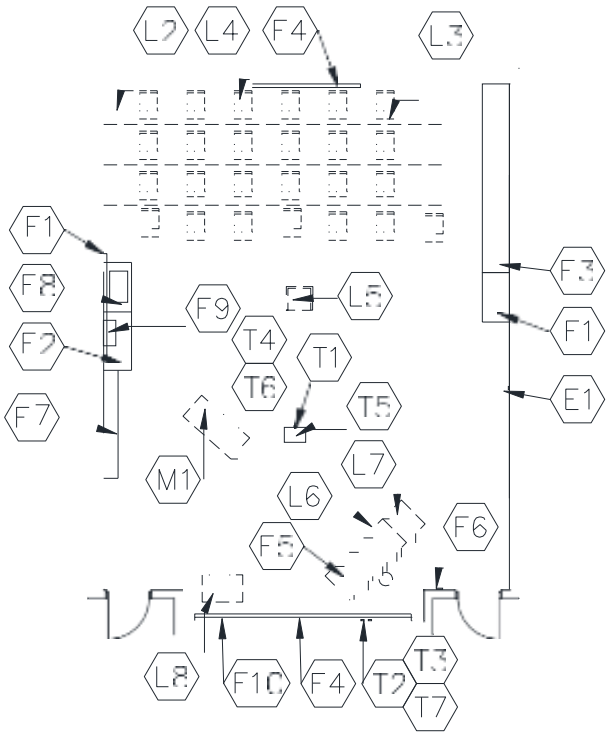


CAPACITY: 25 students
SIZE: 1,200 SF

PROGRAM ACTIVITIES:

- Music students will listen to, analyze, compose, and describe music; sing alone and with others; play instruments; participate in creative movement, dance, and mime; understand music in relation to history and culture, and in relation to the other arts and disciplines in the academic content area.

SPATIAL RELATIONSHIPS:

- Grouped with other noise producing activities
- Near stage

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 60
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

MUSIC ROOM
E-MU-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile	096816
Optional: linoleum, ET, sheet vinyl,	096500
or rubber	096516
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100
Acoustical wall treatment	098000

LOOSE FURNISHINGS:
L1 Reserved
L2 Risers
L3 Music stands
L4 Music chairs
L5 Conductor podium
L6 Teacher desk and computer workstation support and chair
L7 File cabinet
L8 Folding mobile cart for ORFF instruments
Wastebasket

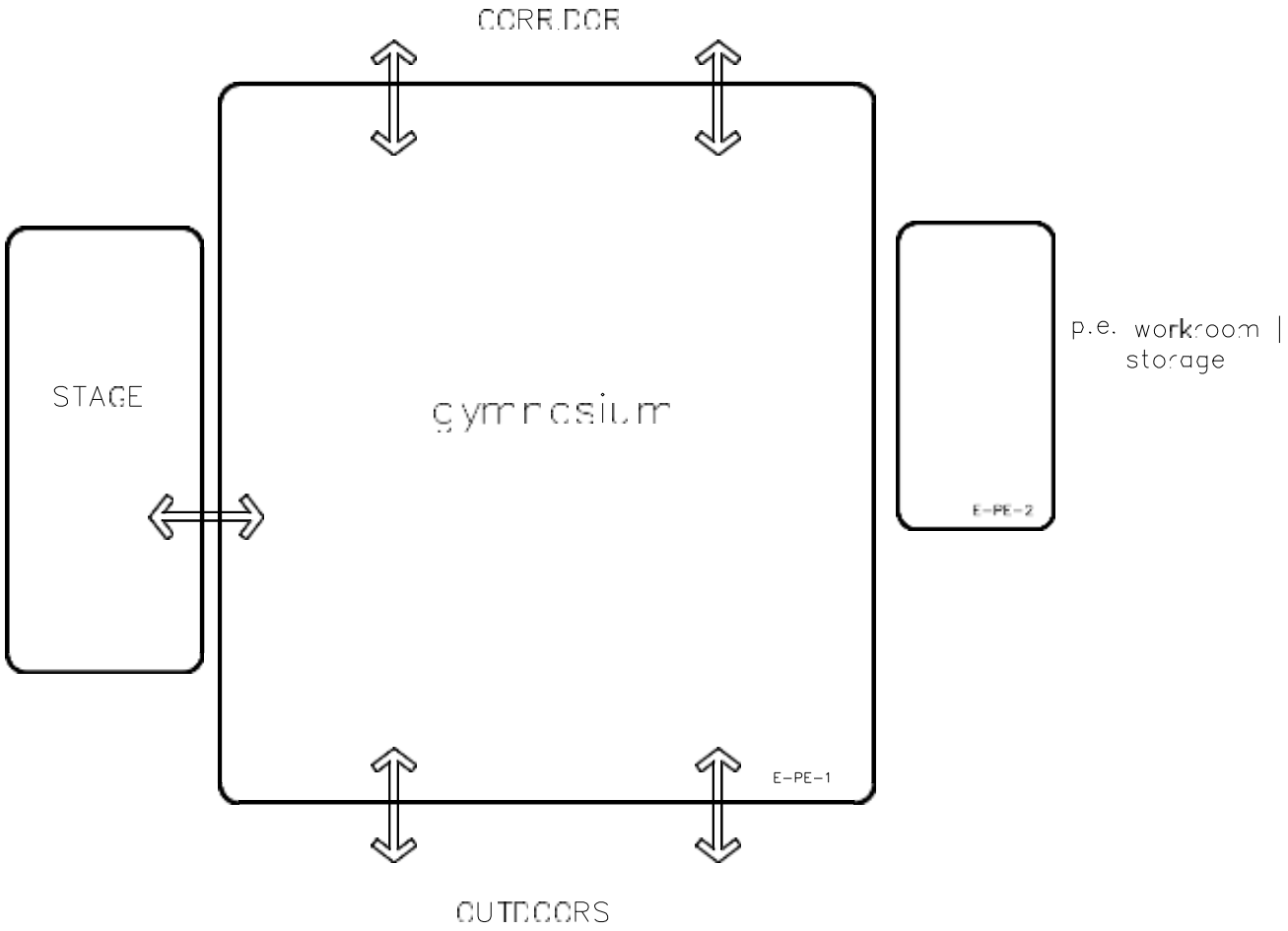
Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
Pencil sharpener (optional)
The following item is to be funded by the school district: M1 Piano

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123550
F2 Base cabinets	123550
F3 Tall storage cabinets	123550
F4 12'-32' combination marker board, tack board or tackable wall surface	101100
F5 Technology support casework	123550
F6 Pencil sharpener support (optional)	062000
F7 4'-9' of bookcases	123550
F8 3' sink base cabinet	123550
F9 Towel dispenser (optional)	102813
F10 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink with drinking fountain	240000
Plumbing connections	24000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting	265100
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Items F2 & F3: 16'-20' combination of base, wall, and tall storage cabinets to support music curriculum.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



NOTES:

This is an example of how the physical education spaces in an elementary school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Physical Education space plates:

E-PE-1 Gymnasium
E-PE-2 P.E. Workroom/Storage

GYMNASIUM SIZE

When designing spaces for physical education activities, it is important to consider the type of activities, the number of participants, equipment needed, and space allocation for each space. Consideration should also be given as to the size of the activity area and safety borders (run-outs). Adequate co-funded space for these design considerations, and others, should be provided in the square footage allowed for the gymnasium.

The table included below, illustrates the maximum gymnasium size for each of the student enrollment examples found in the Program of Requirements (POR). For example, a school with 550 students would have approximately 49 staff members indicating a total number of persons in the facility of 599. The maximum size of the gymnasium would be 4,700 sf. That value, 4,700 sf., would be inserted into the POR for the gym size.

Additional student enrollment examples (1,250 and 1,750 students) have been added to assist in planning and design of various sized gymnasiums. These examples are bolded in the table below.

SEATING

Regarding seating/bleachers, in elementary schools, space for seating in the gym is no co-funded. If desired, seating may be included at the district's expense.

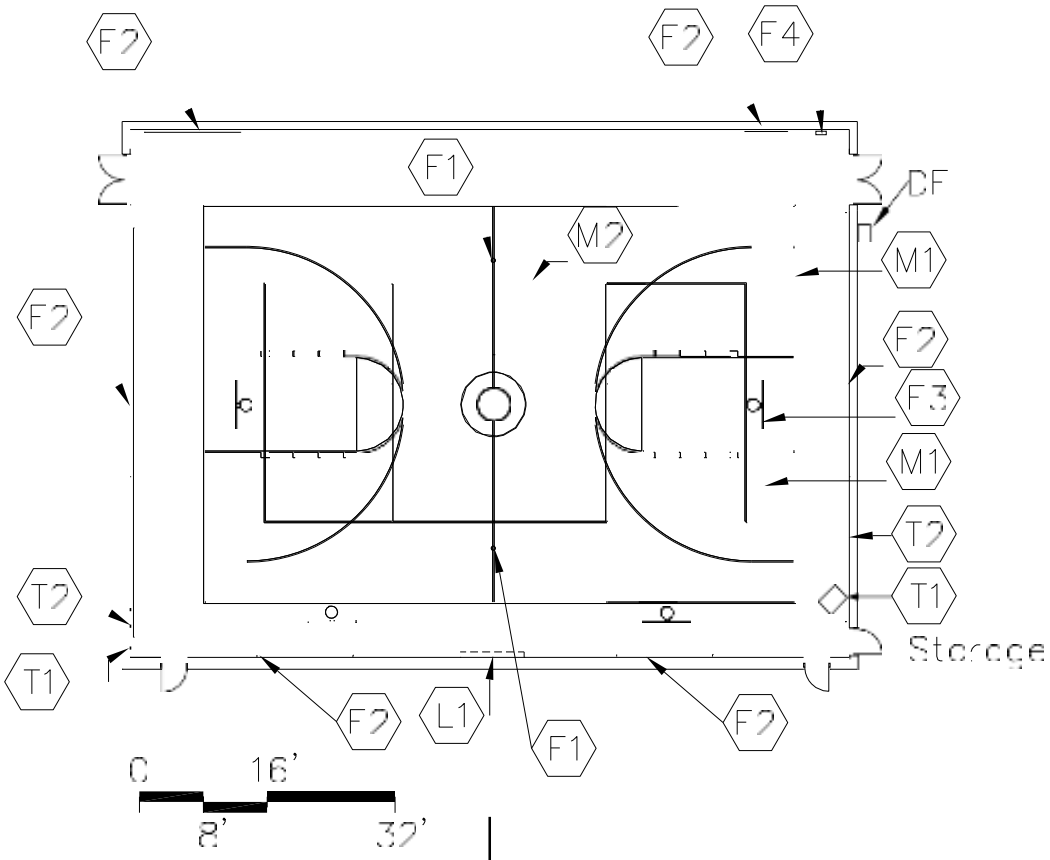
FINAL LAYOUT

The actual Gym layout will be determined during the design process.

Elementary School Gymnasium Design Guidelines

STN ENRL	Staff	Total Occup	Gym SF	Court Size	Approx. # Seats
400	36	436	3,500	As Marked	0
550	49	599	***4,000***	As Marked	0
700	62	762	***4,700***	As Marked	0
1,000	86	1,086	6,000	As Marked	0
1,250	***106***	***1,356***	***6,500***	***As Marked***	***0***
1,500	1 26	1,626	7,000	As Marked	0
1,750	***145***	***1,895***	***8,500***	***As Marked***	***0***
2,000	1 64	2,164	10,000	As Marked	0

Note: #8 Gym bleachers are a district expense. 2011



CAPACITY: varies
SIZE: 3,500 - *10,000* SF
ANCILLARY SPACES: P.E. Workroom/Storage
E-PE-2

PROGRAM ACTIVITIES:
- P. E. students will practice and participate in exercise, sports activities, intramural games, and physical fitness.
- Student assemblies
- Community use

SPATIAL RELATIONSHIPS:
- Direct access to outdoors
- Near student dining

ENVIRONMENTAL CONSIDERATIONS:
- Uniform lighting
- Environmental sound control - wall minimum STC 60
- Adequate sound control/acoustics
- Clear,***fixed*** height of ***21'*** from floor to nearest obstruction

NOTES:

GYMNASIUM

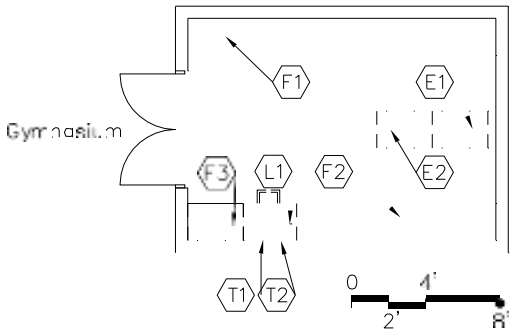
E-PE-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sheet vinyl,	096500
resilient athletic flooring,	096516
rubber, ET, fluid-applied	096566
athletic flooring, or linoleum	096766
Base:	
Resilient base	096566
Ceiling:	
Painted exposed structure	099100
Walls:	
Paint	099100
Acoustical wall treatment	098000
LOOSE FURNISHINGS:	
L1 Portable ***markerboard***	
Miscellaneous:	
M1 Court markings ***(optional)***	
74' x 50' basketball court	
30'x60' volleyball court	
Provide wire guards on light fixtures and wall-mounted electrical devices.	

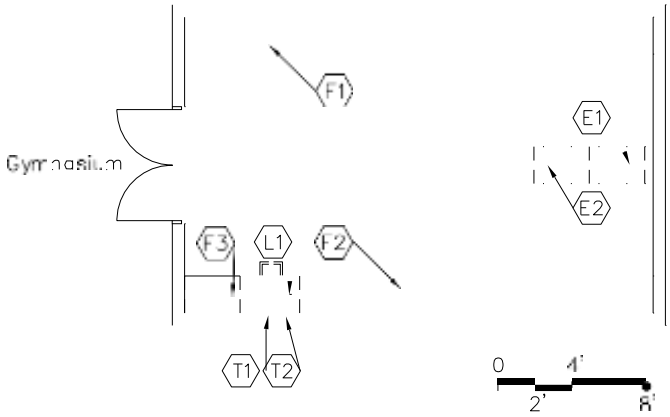
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Volleyball sleeves and standards with cart	116623
F2 Safety wall wainscot (see note 2)	116623
F3 Basketball backstops, fiberglass, adjustable height (2 main court, 2 side practice)	116623
F4 Ropes and climbing bars (optional)	116623
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Drinking fountain directly outside the entrance	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Multi-level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
8 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Means of egress lighting per code	265100
Electrical connections to P.E. equipment where necessary	262726
Emergency lighting	265100
Telecommunications Grounding	270526/260526
Communications:	
T1 2 ***projector*** video ports, 1 monitor with cart	271543/274119
T2 2 data ports	271513
Clock with wire guards	275313
Central sound system	275123
Gymnasium sound system	275124
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Extend safety wall wainscot 5 feet beyond side game lines at both ends of main basketball court.
3. The OFCC does not co-fund telescoping bleachers in elementary schools. District may provide telescoping bleachers in accordance with section 126600 at district's expense.

200 SF



400 SF



PROGRAM ACTIVITIES:
- Storage for P. E. equipment
- Workroom for P. E. teacher

SPATIAL RELATIONSHIPS:
- Adjacent to gymnasium

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	200 - ***600*** SF
ANCILLARY SPACES:	Gymnasium E-PE-1

NOTES:

P.E. WORKROOM/STORAGE
E-PE-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	
Option: Rated gypsum wallboard	092116
Walls:	
Unpainted concrete masonry units	042000

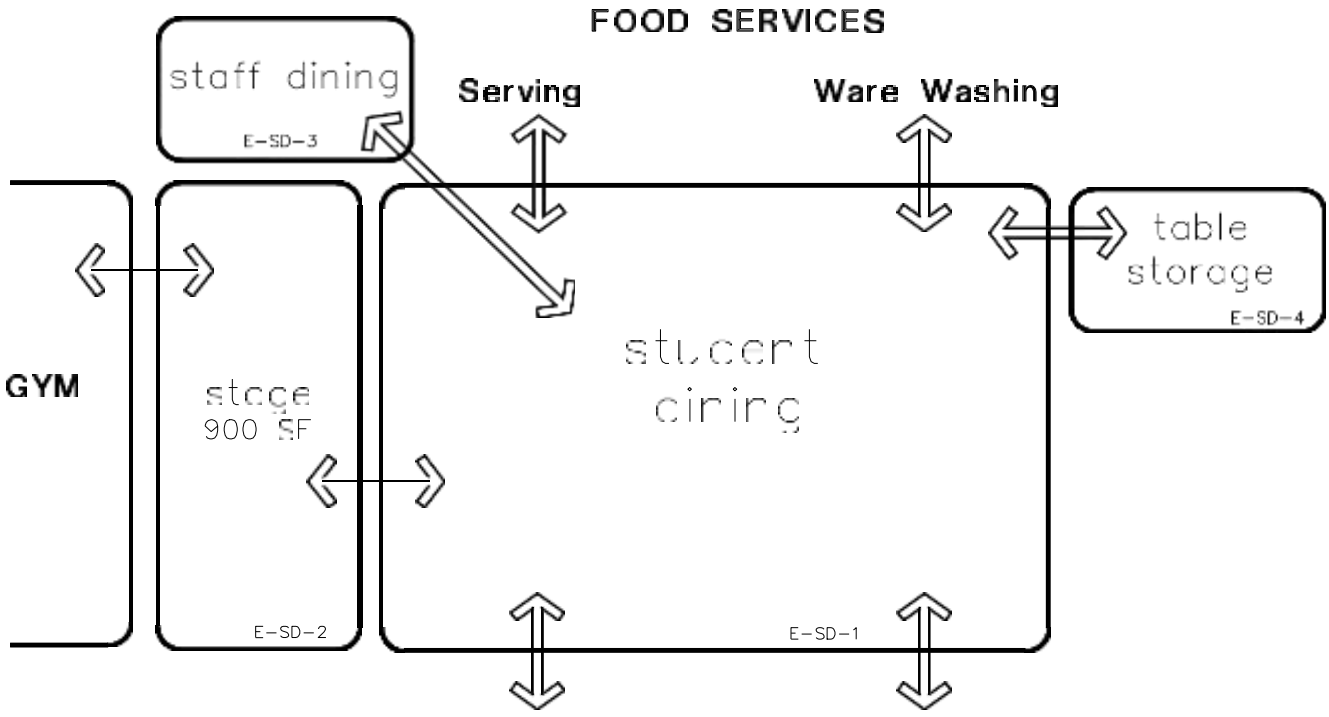
LOOSE FURNISHINGS:
L1 Teacher desk and chair
Wastebasket

EQUIPMENT:
E1 Tumbling mats on carts
E2 Ball carts

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 18' – 30' of open shelving depth may vary (fixed or loose)	123550
F2 16' – 26' of tall storage cabinets	123550 F3
Tall wardrobe	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Double duplex receptacle adjacent to data port	262726
Communications:	
T1 1 voice port and phone	271513/***273123***
T2 1 data port near workstation	271513
Central sound system	275123
Gymnasium sound system	275124
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



NOTES:

This is an example of how the student dining spaces in an elementary school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Student Dining space plates:

E-SD-1 Student Dining
E-SD-2 Stage
E-SD-3 Staff Dining
E-SD-4 Table Storage
E-SD-5 Family Restroom

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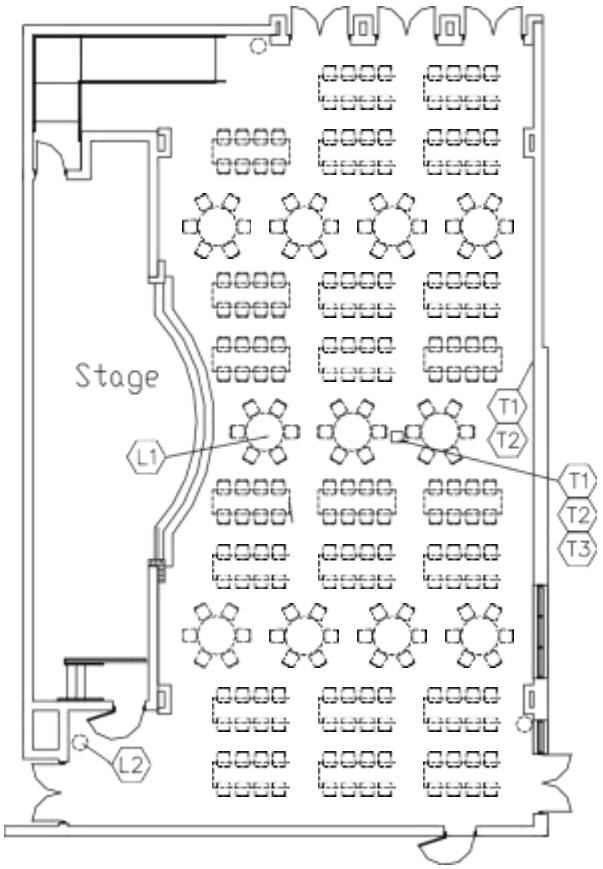


PROGRAM ACTIVITIES:
- Space for student dining and assembly-type programs

SPATIAL RELATIONSHIPS:
- Adjacent to kitchen
- Near staff dining
- Adjacent to Stage

ENVIRONMENTAL CONSIDERATIONS:
- Stain-resistant floor covering
- Natural lighting
- Environmental sound control - wall minimum STC ***60***

MISCELLANEOUS:
- Based on 3 serving periods, the size of the dining area is computed by dividing the student capacity by 3, then multiplying by 15 SF per student. The minimum size of a dining space is 3,000 SF.

CAPACITY:	1/3 of the student capacity
SIZE:	Student capacity divided by 3, multiplied by 15 SF per student 3,000 SF minimum
ANCILLARY SPACES:	Stage, E-SD-2 Kitchen, E-FS-1

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

STUDENT DINING
E-SD-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber, ET,	096500
sheet vinyl, porcelain tile,	096516
polished concrete finishing,	033510
or colored concrete finishing	033519
Base:	
Resilient base	096500
Optional: Porcelain tile base	093000
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
Acoustical wall treatment and diffusers	098000

LOOSE FURNISHINGS:

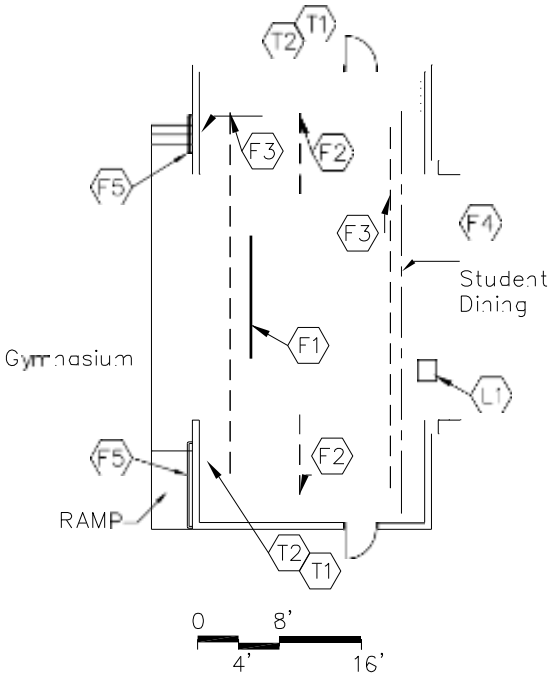
L1 Tables and chairs or long tables with attached stools
L2 Large waste receptacles
Folding or high density stack chairs for large assembly use
Carts for chairs
Recycling bins

Note: Cafeteria tables with attached stools shall be securely anchored to walls when not in use or be kept in secure storage area when not in use.

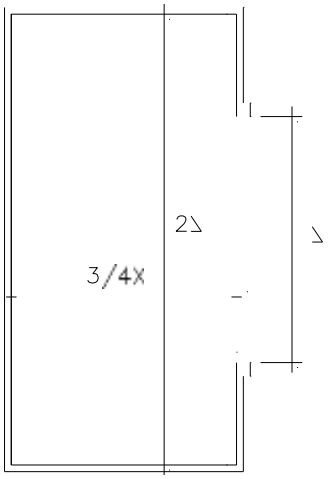
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Drinking water cooler	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
Multilevel switching	262726
8 duplex receptacles	262726
Double duplex receptacles adjacent to each data and video port	262726
Means of egress lighting per code	265100
Emergency lighting	265100
Telecommunications Grounding	270526/260526
Communications:	
T1 2 ***projector*** video ports	271543
T2 2 data ports	271513
Student dining/cafeteria sound system[2]	275122
Clock	275313
Central sound system	275123
T3 ***Ultra-short throw interactive*** projector	274119
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Windows with integral blinds or windows with shading devices (optional)	081113/ 088000

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Student dining sound system is to be used in conjunction with the stage.



Pr portions are re ommended – not mandatory.



ASPECT RATIO OF STAGE

CAPACITY: N/A
SIZE: x = proscenium opening
see diagram for dimensions
ANCILLARY SPACES: Student Dining
E-SD-1

PROGRAM ACTIVITIES:
- Space for speakers, presentations, and performances

SPATIAL RELATIONSHIPS:
- Adjacent to student dining
- Near staff dining room
- Adjacent to gymnasium

ENVIRONMENTAL CONSIDERATIONS:
- Uniform lighting
- Resilient floor covering
- Area should be raised slightly above student dining floor
- Provide handicapped accessibility (ADA)

NOTES:

STAGE
E-SD-2

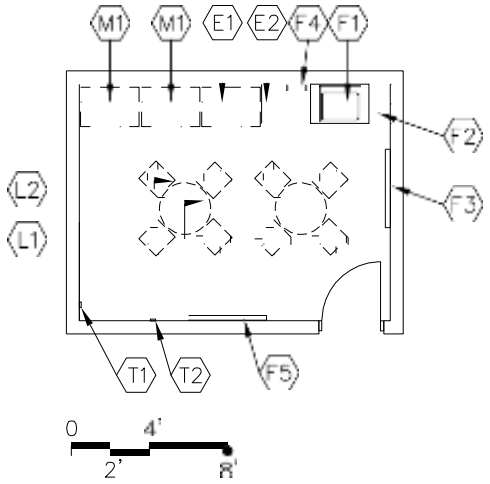
FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, sheet vinyl, linoleum, rubber or wood stair accessories	096500 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Podium

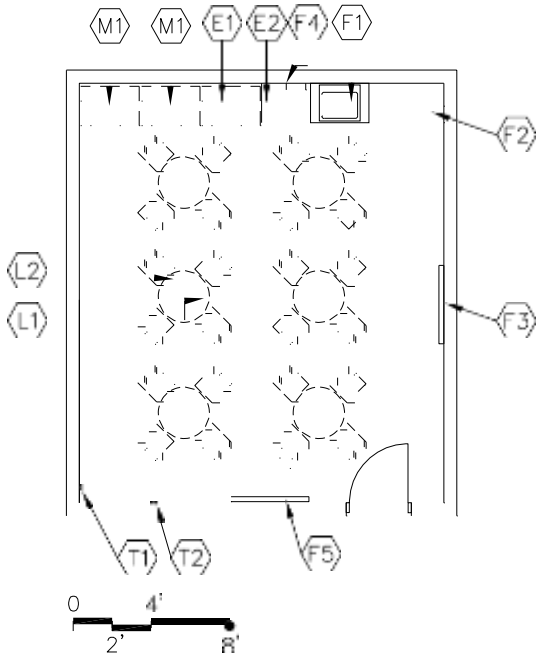
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Projection screen	116143
F2 Curtain	116143
F3 Front curtain and valance	116143
F4 Operable partition (optional)	102226
F5 Pipe handrail	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Temperature control with with student dining area	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting	265100
Means of egress lighting per code	265100
Telecommunications Grounding	270526/260526
Communications:	
T1 2 data ports (1 on each side of proscenium opening)	271513
T2 2 ***projector*** video ports (1 on each side of proscenium opening)	271543
Student dining/cafeteria sound system[2]	275122
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Student dining sound system is to be used in conjunction with the student dining area.
3. Provide a reflective strip on floor at edge of stage.

200 SF



300 SF



CAPACITY: 8 - 24 staff
SIZE: 200 - ***400*** SF
ANCILLARY SPACES: Student Dining
E-SD-1

PROGRAM ACTIVITIES:
- Space for staff dining

SPATIAL RELATIONSHIPS:
- Near student dining
- Near food services

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 60
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

STAFF DINING
E-SD-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, linoleum, rubber, sheet vinyl, or porcelain tile	096500 096516 093000
Base:	
Resilient base	096500
Optional: Porcelain tile base	093000
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Tables
L2 Chairs
Waste receptacle

EQUIPMENT:
E1 Refrigerator
E2 Microwave

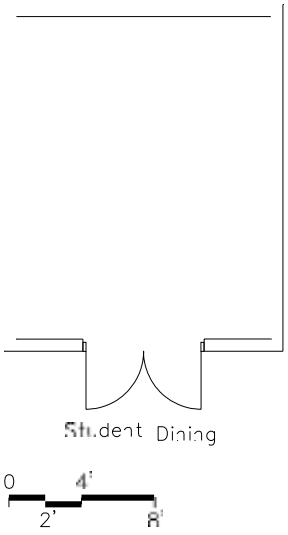
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 3' sink base cabinet with wall cabinets above	123550
F2 About 8' of base and wall cabinets	123550
F3 4' of tack board	101100
F4 Towel dispenser	102813
F5 4'-6' marker board (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each video port	262726
Receptacles for vending machines, refrigerator, and microwave	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
The following items are to be funded by the school district:
M1 Vending machines

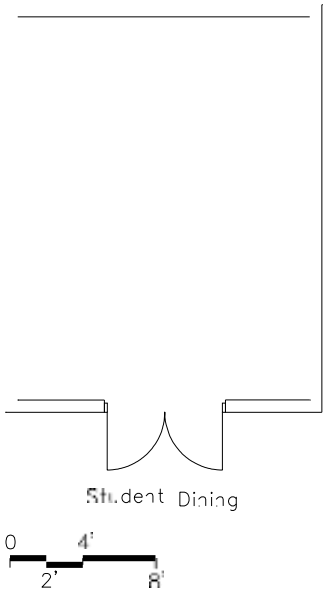
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

200 SF



300 SF



CAPACITY: N/A
SIZE: 200 - 300 SF
ANCILLARY SPACES: Student Dining
E-SD-1

PROGRAM ACTIVITIES:
- Storage for tables and chairs

SPATIAL RELATIONSHIPS:
- Adjacent to student dining
- Near food services

ENVIRONMENTAL CONSIDERATIONS:
- Resilient floor covering

NOTES:

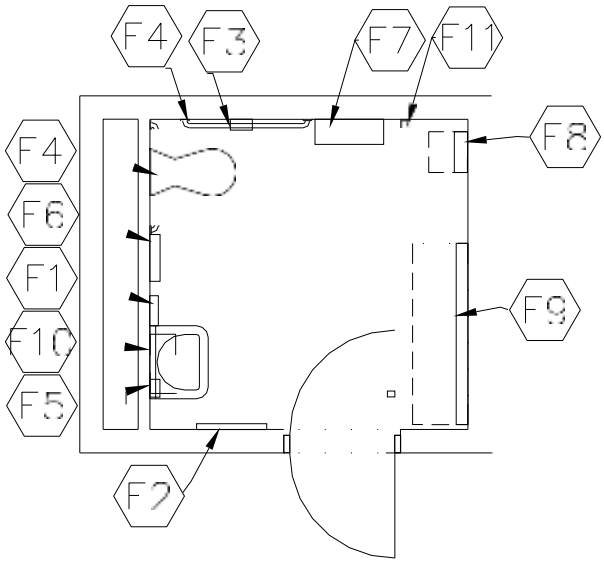
TABLE STORAGE
E-SD-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	
Option: Rated gypsum wallboard	092116
Walls:	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



CAPACITY: 2 people
SIZE: 80 SF

PROGRAM ACTIVITIES:

- Personal, health, and handicap needs for all building occupants

SPATIAL RELATIONSHIPS:

- Located where best accessible to all building occupants and the public

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

NOTES:

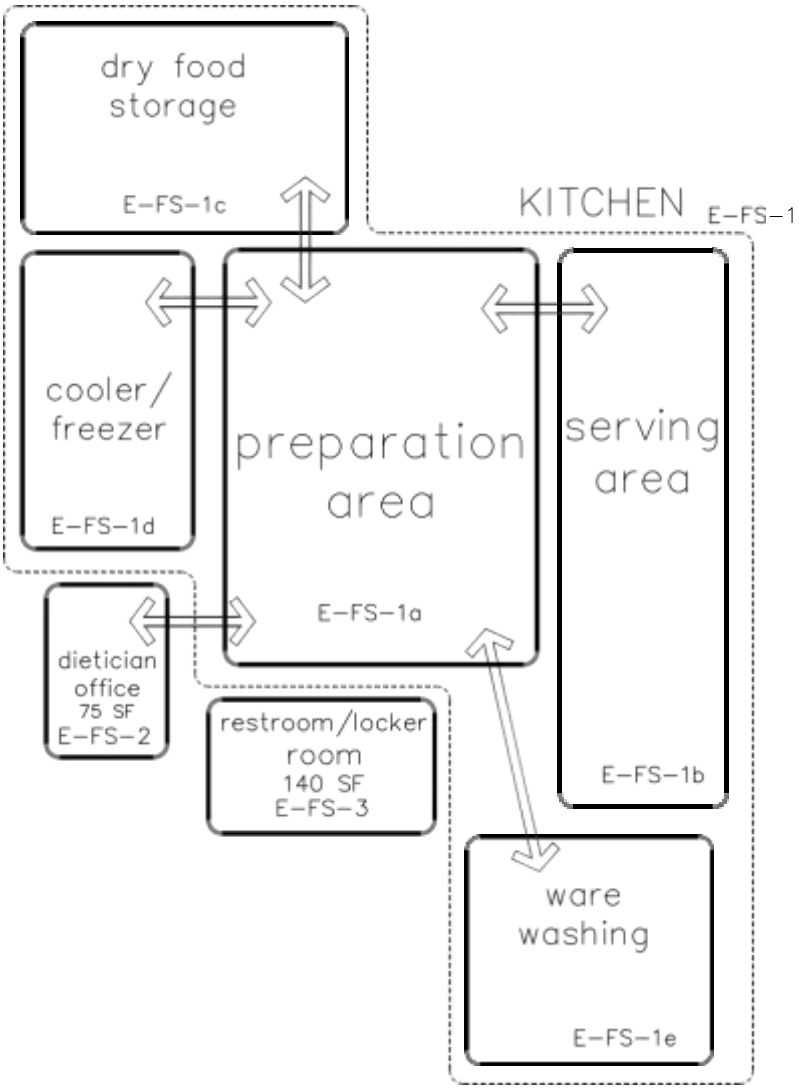
FAMILY RESTROOM
E-SD-5

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, sheet vinyl,	093000
or ceramic mosaic tile	096500
Optional: Ceramic mosaic tile,	093000
porcelain tile, or	096723
resinous flooring	
Base:	
Resilient base	096500
Optional: Ceramic mosaic tile, porcelain tile, resinous flooring flooring, or integral vinyl cove base	093000 096723
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Wastebasket	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 24" x 60" mirror	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Sanitary napkin dispenser/disposal	102813
F7 Folding utility shelf	102813
F8 Mounted child seat	102813
F9 Adult/child changing station	102813
F10 16” x 24” mirror with shelf	102813
F11 Coat hooks	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



NOTES:

This is an example of how the food service spaces in an elementary school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

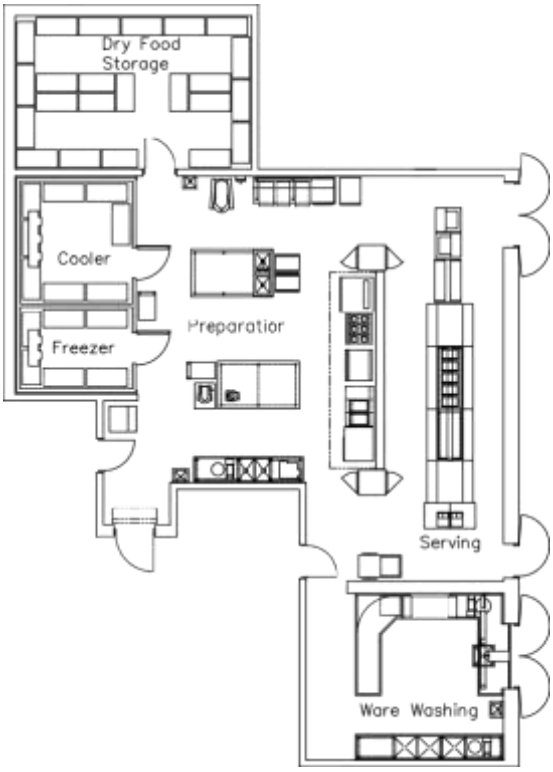
Following are the Food Service space plates:

E-FS-0	Warming Kitchen
E-FS-1	Kitchen
E-FS-1a	Preparation Area
E-FS-1b	Serving Area
E-FS-1c	Dry Food Storage
E-FS-1d	Cooler/Freezer
E-FS-1e	Ware Washing
E-FS-2	Dietician Office
E-FS-3	***Restroom/Locker Room***

KITCHEN
E-FS-1

This space consists of various areas:
- Preparation Area
- Serving Area
- Dry Food Storage
- Cooler/Freezer
- Ware Washing

A space plate follows for each of these areas.



CAPACITY: 3 – 10 persons
SIZE: Student capacity multiplied by 3.5 SF per student
ANCILLARY SPACES: Student Dining E-SD-1
Loading/Receiving Area E-BS-9

PROGRAM ACTIVITIES:
- Space for the planning, ordering, preparation, and serving of the meals, and for providing meals for the students and staff

SPATIAL RELATIONSHIPS:
- Adjacent to student dining
- Near staff dining
- Near table storage
- Adjacent to loading/receiving area

ENVIRONMENTAL CONSIDERATIONS:
- Compliance with State Board of Health requirements

MISCELLANEOUS:
- The sizing of the kitchen area assumes: Type “A” meal service only at 80% of the student capacity and 3, 30-minute serving periods.

NOTES:

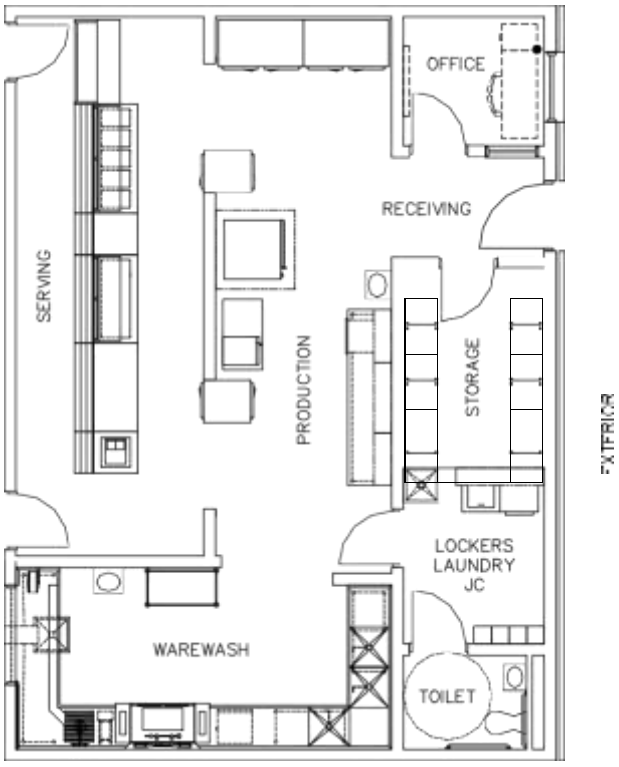
This kitchen layout is to be used only for a central kitchen operation.

This space consists of various areas:

Production Area	25%
Serving Area	35%
Warewash	25%
Storage	10%
Receiving	5%

Additional areas to be added:

Office	75 SF
Toilet	50 SF
Lockers/Laundry/Janitorial Closet	125 SF



CAPACITY: 3 - 7 persons
SIZE: Student capacity multiplied by 2.0 SF per student
ANCILLARY SPACES: Student Dining E-SD-1
Loading/Receiving Area E-BS-1

PROGRAM ACTIVITIES:

- Space for receiving, organizing, and serving of the meals prepared in the central kitchen.

SPATIAL RELATIONSHIPS:

- Adjacent to student dining
- Near staff dining
- Near table storage
- Adjacent to loading/receiving area

ENVIRONMENTAL CONSIDERATIONS:

- Compliance with State Board of Health requirements

MISCELLANEOUS:

- Kitchen area must be located adjacent to exterior loading dock area to receive transported food from central kitchen.

NOTES:

WARMING KITCHEN
E-FS-0

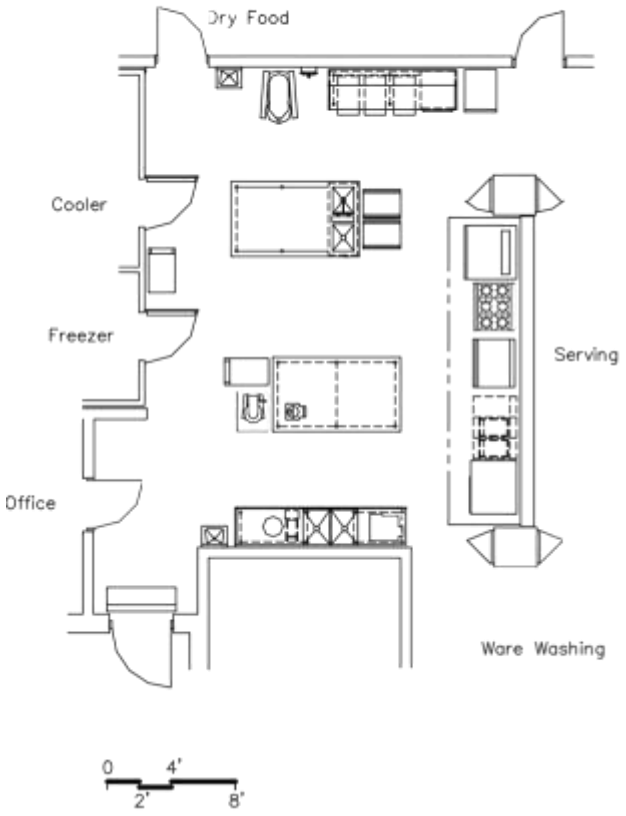
FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile, ***resinous flooring***	093000 ***096723***
Base:	
Quarry tile base, ***integral base***	093000
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Option: Ceramic wall tile	093000
or latex paint	099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Connections to food service eqpt.	224000
Plumbing connections	224000
Gas connections	226313
Hand washing lavatory	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Kitchen canopy exhaust system	Div. 23
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
10 duplex receptacles	262726
Duplex receptacle at each cash register	262726
Emergency lighting	265100
Connections to food service eqpt.	262726
Means of egress lighting per code	265100
Communications:	
1 voice port and phone	271513/***273123*** 1
data port at cash register(s)	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.

KITCHEN - Preparation Area
E-FS-1a



PROGRAM ACTIVITIES:
- Space and equipment for the preparation of food for students and staff

SPATIAL RELATIONSHIPS:
- Adjacent to the serving area
- Near the cooler/freezer
- Near the dry food storage

ENVIRONMENTAL CONSIDERATIONS:
- Proper ventilation of space to remove cooking odors
- Cleanable building surfaces

CAPACITY: 3 – 10 persons
SIZE: Based on 36% of the kitchen area
ANCILLARY SPACES: Part of the kitchen

NOTES:

1. This is an example of a preparation area. Food service equipment will vary from school district to school district.

KITCHEN - Preparation Area

E-FS-1a

FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile ***or resinous flooring***	093000 ***096723***
Base:	
Quarry tile base or ***integral base***	093000
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Option: Ceramic wall tile	093000
or latex paint	099100

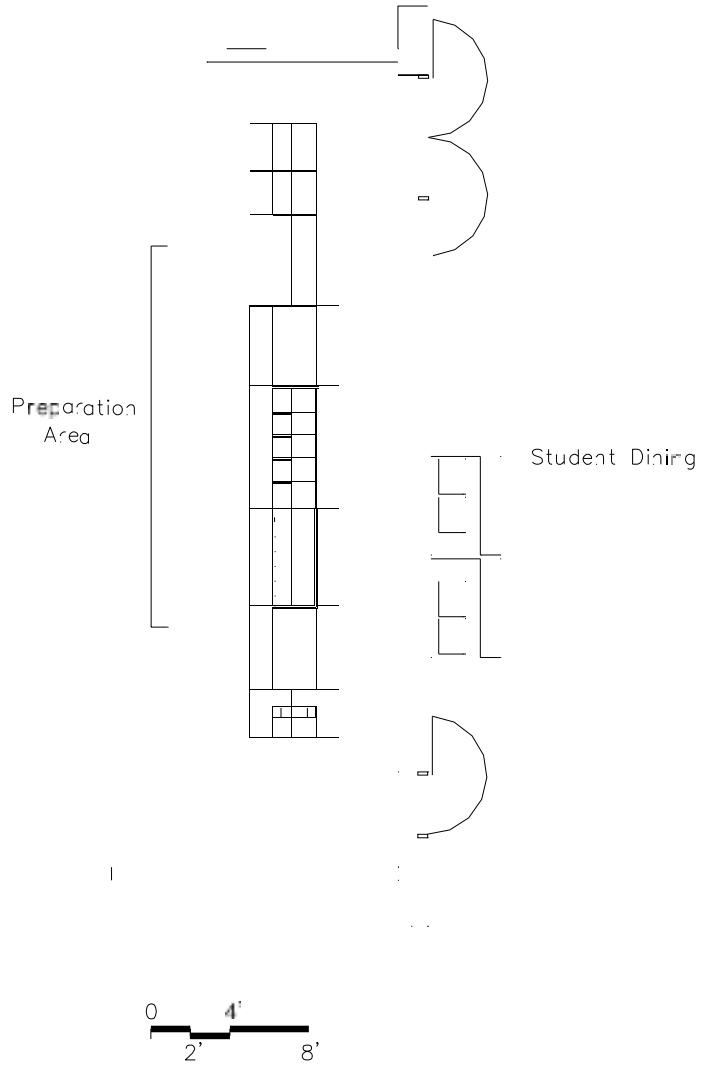
LOOSE FURNISHINGS:

N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Connections to food service equipment	224000
Plumbing connections	224000
Gas connections	226313
Hand washing lavatory	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Kitchen canopy exhaust system	Div. 23
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
4 duplex receptacles	262726
Emergency lighting	265100
Connections to food service equipment	262726
Means of egress lighting per code	265100
Communications:	
1 voice port and phone	271513/***273123***
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.



PROGRAM ACTIVITIES:
- Space for serving of food

SPATIAL RELATIONSHIPS:
- Adjacent to student dining
- Adjacent to preparation area

ENVIRONMENTAL CONSIDERATIONS:
- Cleanable building services

CAPACITY: N/A
SIZE: Based on 34% of the kitchen area
ANCILLARY SPACES: Part of the kitchen

NOTES:

1. This is an example of a serving area. Food service equipment will vary from school district to school district.

KITCHEN - Serving Area
E-FS-1b

FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile or ***resinous flooring***	093000
Optional: porcelain tile	***096723***
Base:	
Quarry tile base or ***integral base***	093000
Optional: porcelain tile base	
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Option: Ceramic wall tile	093000
or latex paint	099100

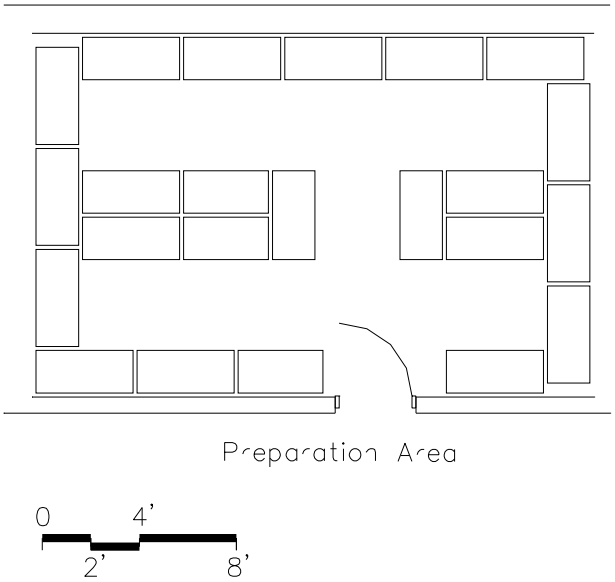
LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Connections to food service equipment	224000
HVAC:	
Supply/return air system	Div. 23
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
4 duplex receptacles	262726
Connections to food service equipment	262726
Emergency lighting	265100
Means of egress lighting per code	265100
Duplex receptacle at each cash register	262726
Communications:	
Data port(s) at cash register(s)	271513
Clock	275313
Central sound system	275123
1 Voice port and phone	271513/***273123***
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.

KITCHEN - Dry Food Storage
E-FS-1c



PROGRAM ACTIVITIES:
- Lockable space to store dry food products and government commodities for 15 to 30 days

SPATIAL RELATIONSHIPS:
- Near the food preparation area
- Access to the loading/receiving area

ENVIRONMENTAL CONSIDERATIONS:
- Continuous conditioning of air
- Cleanable building surfaces

CAPACITY: N/A
SIZE: Based on 11% of the kitchen area
ANCILLARY SPACES: Part of the kitchen

NOTES:

1. This is an example of a dry food storage area. Food service equipment will vary from school district to school district.

KITCHEN - Dry Food Storage

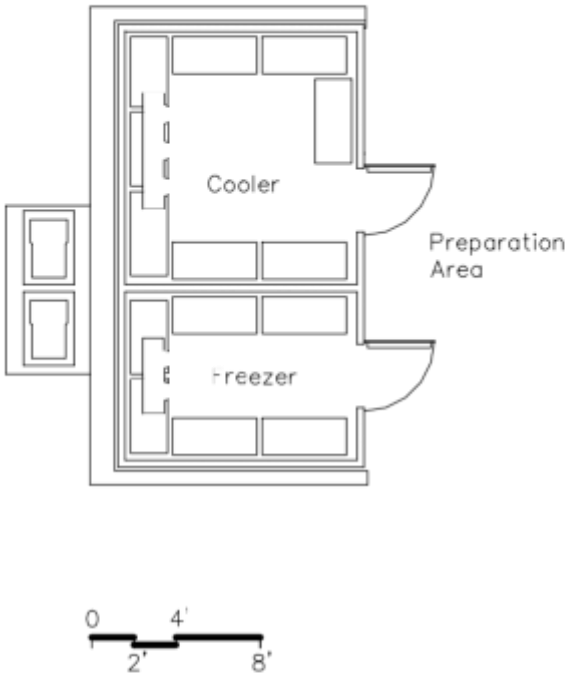
E-FS-1c

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, ET, or sheet vinyl	096500
	096516
Option: Quarry tile or ***resinous flooring***	093000 ***096723***
Base:	
Resilient base	096500
Option: Quarry tile or ***integral base***	093000
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Option: Ceramic wall tile or latex paint	093000 099100
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supply/return air system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.



PROGRAM ACTIVITIES:
- Space for refrigerated storage of perishable products

SPATIAL RELATIONSHIPS:
- Adjacent to food preparation area
- Access to the loading/receiving area

ENVIRONMENTAL CONSIDERATIONS:
- Ventilation for refrigeration machinery
- Cleanable building surfaces
- Floor to be flush with adjacent kitchen floor

CAPACITY: N/A
SIZE: Based on 10% of the kitchen area
ANCILLARY SPACES: Part of the Kitchen

NOTES:

1. This is an example of a cooler/freezer. Food service equipment will vary from school district to school district.

KITCHEN - Cooler/Freezer

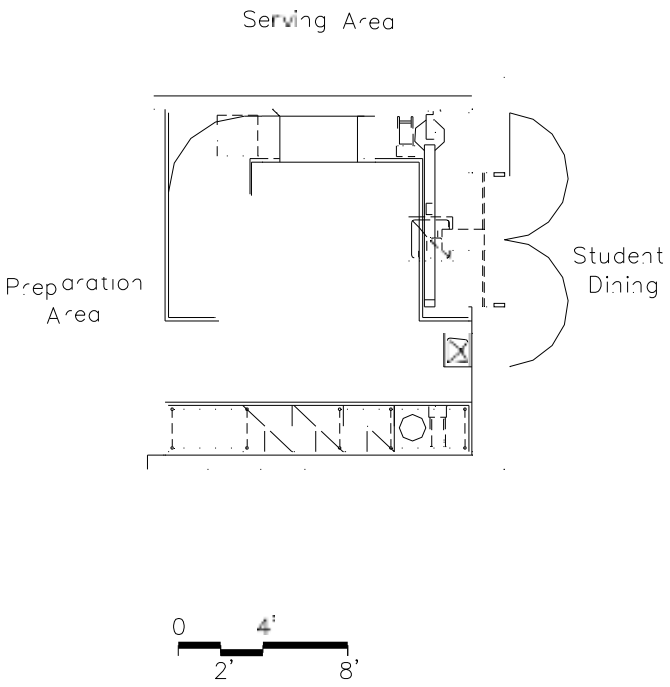
E-FS-1d

FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile or resinous flooring	093000 096723
Base:	
Quarry tile base or integral base	093000
Ceiling:	
Manufactured insulated panel	114000
Walls:	
Manufactured insulated panel	114000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system for compressors	Div. 23
Electrical:	
Single level switching	262726
Fluorescent or LED lighting	265100
Illumination level: See Table 8600-6	
Electrical connections to freezer/cooler refrigeration equipment	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.



PROGRAM ACTIVITIES:
- Space and equipment to scrape, wash, air dry, and store serving trays and utensils

SPATIAL RELATIONSHIPS:
- Adjacent to student dining

ENVIRONMENTAL CONSIDERATIONS:
- Proper ventilation of space to remove steam and condensation
- Cleanable building surfaces

CAPACITY: N/A
SIZE: Based on 9% of the kitchen area
ANCILLARY SPACES: Part of the kitchen

NOTES:

1. This is an example of a ware washing area. Food service equipment will vary from school district to school district.

KITCHEN - Ware Washing

E-FS-1e

FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile or ***resinous flooring***	093000 ***096723***
Base:	
Quarry tile base or ***integral base***	093000
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Option: Ceramic wall tile	093000
or latex paint	099100

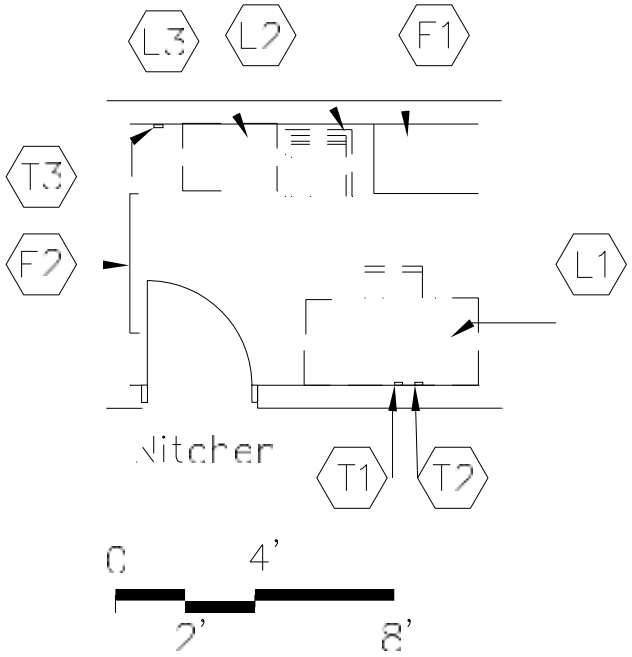
LOOSE FURNISHINGS:

N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Lavatory	224000
Connections to food service equipment	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Exhaust hood system	Div. 23
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Connections to food service equipment	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.



PROGRAM ACTIVITIES:
- Space for the dietician to plan menus and meet with various vendors

SPATIAL RELATIONSHIPS:
- Adjacent to kitchen

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC ***45***
  ceiling minimum CAC 35, NRC ***0.70***
- ***Optional – window with integral blind***

CAPACITY:	1 - 2 persons
SIZE:	75 SF
ANCILLARY SPACES:	Kitchen E-FS-1

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

DIETICIAN'S OFFICE
E-FS-2

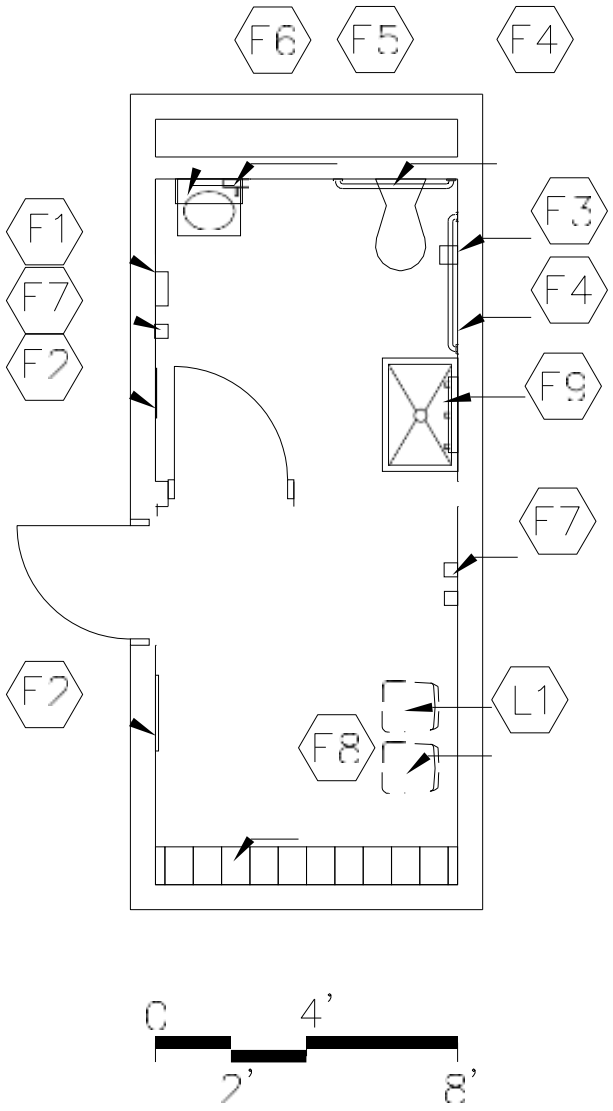
FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, ET, or sheet vinyl	096500 096516
Option: Quarry tile or resinous flooring	093000 096723
Base:	
Resilient base	096500
Option: Quarry tile	093000
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chair
L3 File cabinet
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe (optional)	123550
F2 4' of tack board	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window (optional)	081113 /088000

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed equipment or loose furnishings can either be all fixed or all loose.



CAPACITY: 2 persons
SIZE: 140 SF
ANCILLARY SPACES:

PROGRAM ACTIVITIES:
- Personal and health needs for food service staff

SPATIAL RELATIONSHIPS:
- Adjacent to ***kitchen***

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

NOTES:

RESTROOM / LOCKER ROOM

E-FS-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET or sheet vinyl	096500
Optional: quarry tile or ***resinous flooring***	093000 ***096723***
Base:	
Resilient base	096500
Optional: quarry tile, integral vinyl cove base, or ***integral resinous base***	093000 ***096723***
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:

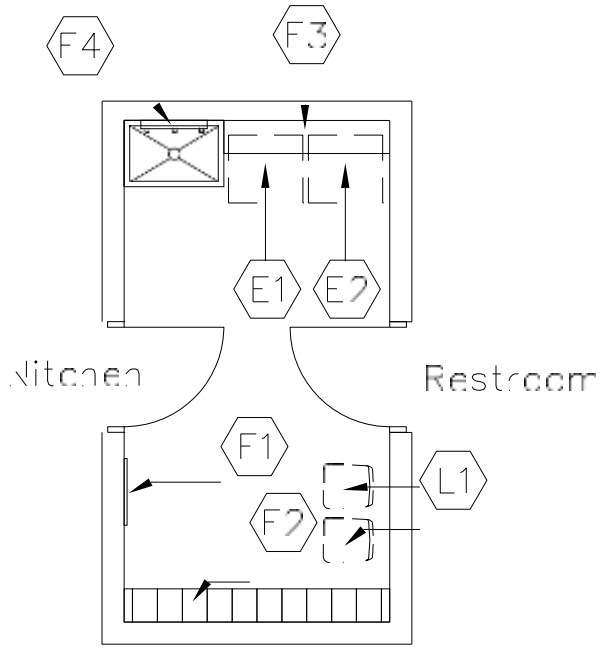
L1 Chairs
Wastebasket

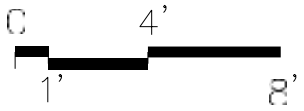
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 2, 24" x 60" mirrors	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Mirror with shelf above sink(optional)	102813
F7 Coat hooks	102813
F8 Lockers 12” x 12” x 60”	105113
F9 Mop holder	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Floor service sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
2 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
N/A

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

LOCKER ROOM
E-FS-4





CAPACITY: 2 persons
SIZE: 125 SF
ANCILLARY SPACES: Kitchen, E-FS-1
Restroom, E-FS-3

PROGRAM ACTIVITIES:
- Space for the food service staff to store their personal belongings and to change their clothing
- Space for the washing, drying, and storage of towels, aprons, etc.

SPATIAL RELATIONSHIPS:
- Adjacent to kitchen
- Adjacent to restroom

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

LOCKER ROOM

E-FS-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sheet vinyl, ***quarry tile***,	096500
or resinous flooring	096723
	093000
Base:	
Resilient base, resinous flooring,	096500
integral vinyl cove base, ***quarry***	096723
tile or integral resinous base	***093000***
Ceiling:	
Suspended, acoustical with high-impact, hold-down clips	095113
Option: exposed, painted pre-cast units	099100
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:

L1 Chairs

Wastebasket

EQUIPMENT:

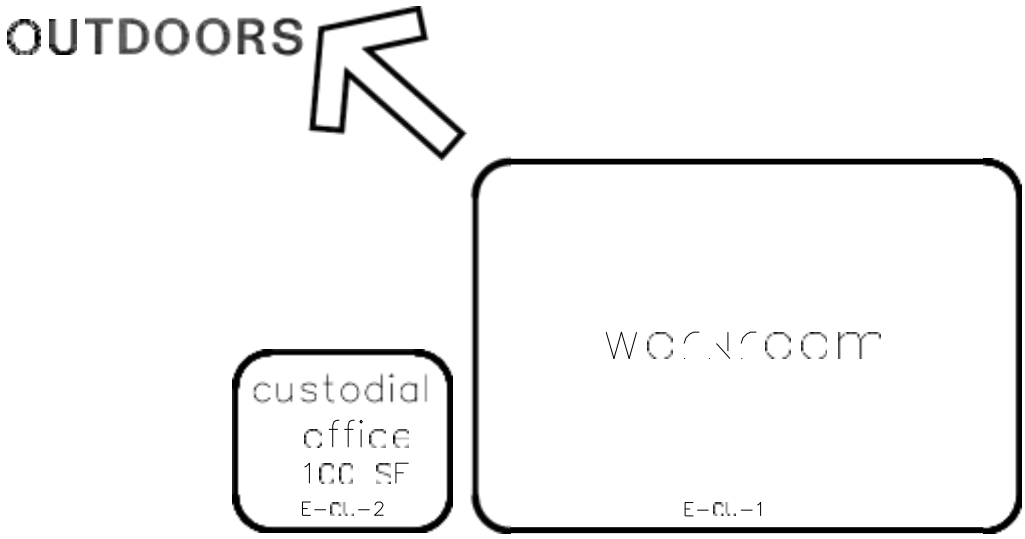
E1 Washer

E2 Dryer

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 24" x 60" mirror (optional)	102813
F2 Lockers 12" x 12" x 60"	105113
F3 6’ of wall cabinets or shelf (optional)	123550
F4 Mop holder	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	224000/221116/221119
Floor service sink	224000
Washer connection	224000
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Dryer vent system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Connections for washer and dryer	262726
Communications:	
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Provide storage cabinet for supplies if required by governing agency.	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



NOTES:

This is an example of how the custodial spaces in an elementary school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Custodial space plates:

E-CU-1 Workroom
E-CU-2 Custodial Office

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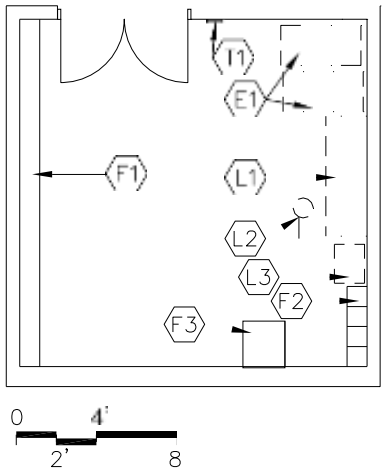
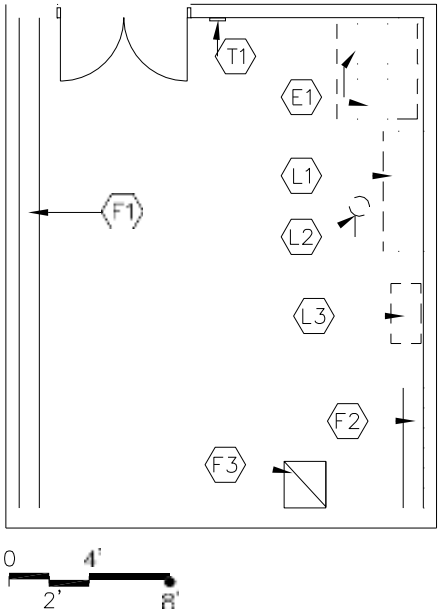
200 SF



400 SF



CAPACITY: N/A
SIZE: 200 - 400 SF

PROGRAM ACTIVITIES:
- Space for storage of custodial equipment needed to maintain the building
- Space for equipment repair

SPATIAL RELATIONSHIPS:
- Near central storage area
- Near custodial office

ENVIRONMENTAL CONSIDERATIONS:

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

WORKROOM
E-CU-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete,	***033000***
polished concrete finishing	033510
or colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

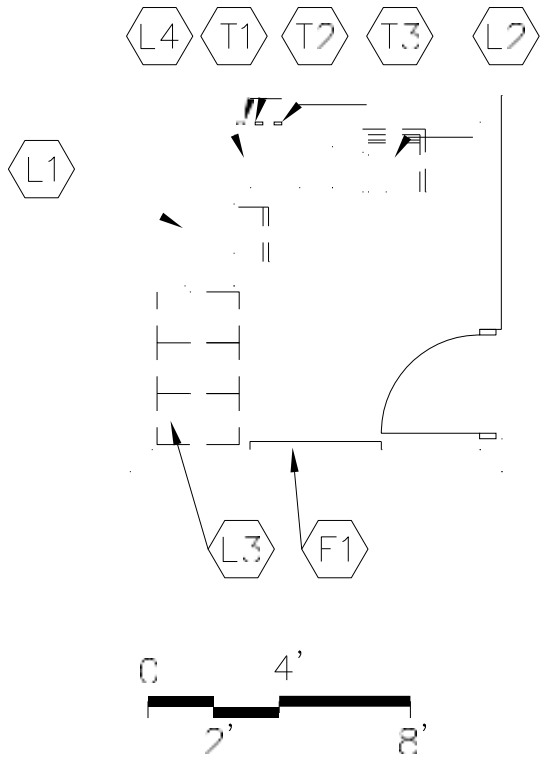
LOOSE FURNISHINGS:
L1 Workbench
L2 Stool
L3 Tool cabinet
Waste receptacles

EQUIPMENT:
E1 Recycling bins

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 10' - 24' of open shelving, depth may vary (fixed or loose)	123550
F2 4 - 6 lockers	105113
F3 Mop holder	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Floor service sink	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Single level switching	262726
4 duplex receptacles (minimum)	262726
Electrical receptacles for custodial equipment	262726
Communications:	
T1 1 voice port and phone	271513/***273123***
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



PROGRAM ACTIVITIES:
- Office for the custodian for scheduling, ordering, and inventory

SPATIAL RELATIONSHIPS:
- Near custodial workroom

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control - wall minimum STC 45 ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blind

CAPACITY:	N/A
SIZE:	100 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

CUSTODIAL OFFICE
E-CU-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, ET, sheet vinyl***,***	096500
rubber,	096516
sealed concrete,	***033000***
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

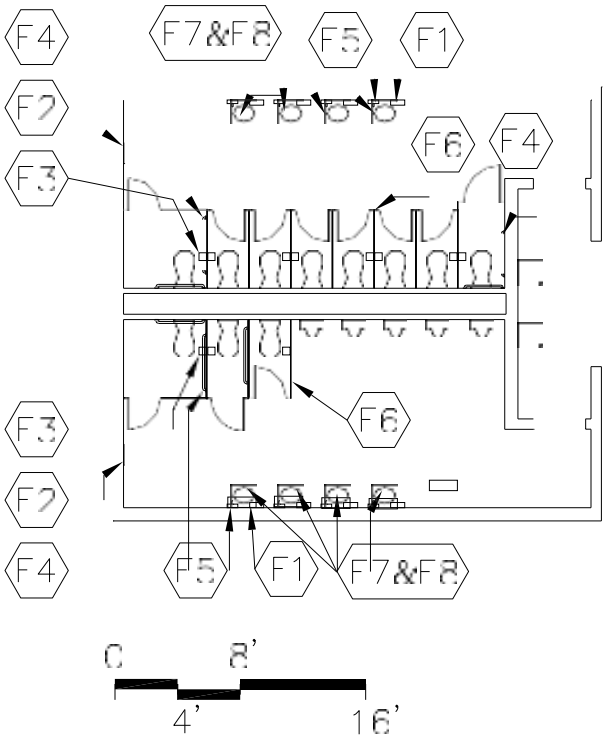
LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chair
L3 File cabinets
L4 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 4' of tack board (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and modem port	262726
Communications:	
T1 Modem port for temperature controls computer	271513
T2 1 voice port and phone	271513/***273123***
T3 1 data port near workstation	271513
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window (optional)	081113/088100

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.

Spaces to be determined by Design Professional based on the number of fixtures required.



CAPACITY: Based on size of program area
SIZE: Based on the sum of the program areas excluding building services, multiplied by 3.5%

PROGRAM ACTIVITIES
- Personal and health needs for the students

SPATIAL RELATIONSHIPS:
- Near student dining area
- Near public use areas, such as media center and gymnasium
- Near academic core area
- Restrooms located in several areas throughout building

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control –
  wall minimum STC 53
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Where individual restrooms are provided in lieu of large group restrooms, refer to E-BS-10.

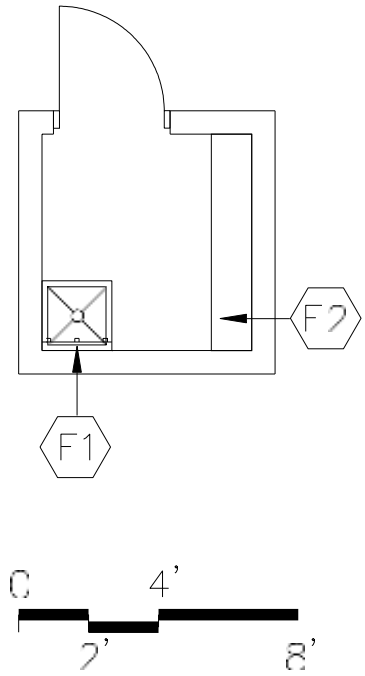
LARGE GROUP RESTROOMS
E-BS-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Ceramic mosaic tile	093000
Optional: porcelain tile,	096723
unbacked sheet vinyl with welded seams,	***096500***
or resinous flooring	
Base:	
Ceramic mosaic tile base	093000
Optional: structural glazed tile,	042000
porcelain tile base, or	096723
resinous flooring***, integral vinyl base***	
Ceiling:	
Suspended, acoustical	095113
Optional: Abuse resistant gypsum wallboard	092116
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Waste Receptacles	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispensers	102813
F2 24" x 60" mirror	102813
F3 Toilet tissue holders	102813
F4 36" and 42" grab bar	102813
F5 Soap dispensers	102813
F6 Toilet partitions	102113
F7 16” x 24” mirrors with shelf (optional)	102813
F8 Shelves (optional)	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closets	224000
Wall-mounted urinals	224000
Wall-mounted lavatories or wash fountains	224000
Wall hydrants	221119
Plumbing connections	224000/221116/221119
Drinking water coolers	224000
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Emergency lighting	265100
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Optional: electric hand dryers



PROGRAM ACTIVITIES:

- Space for storage of custodial supplies throughout the building

SPATIAL RELATIONSHIPS:

- Near large group restrooms

ENVIRONMENTAL CONSIDERATIONS:

CAPACITY:	N/A
SIZE:	50 SF

NOTES:

CUSTODIAL CLOSET
E-BS-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
Resilient base	096500
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Mop holder	102813
F2 Fixed or loose shelving (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Service sink or floor drain sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726

Communications:
N/A

Electronic Safety and Security:
N/A

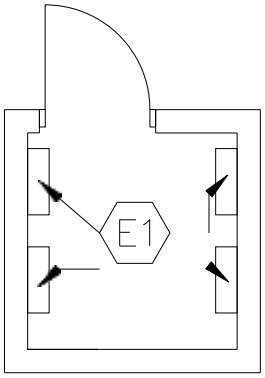
Miscellaneous:
N/A

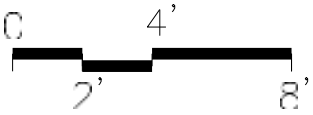
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

ELECTRICAL CLOSET
E-BS-3

Space to be determined by Design Professional.





PROGRAM ACTIVITIES:
- Space for electrical wiring and panels

SPATIAL RELATIONSHIPS:
N/A

ENVIRONMENTAL CONSIDERATIONS:

CAPACITY:	N/A
SIZE:	50 SF

NOTES:

ELECTRICAL CLOSET

E-BS-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls:	
Unpainted concrete masonry units	042000

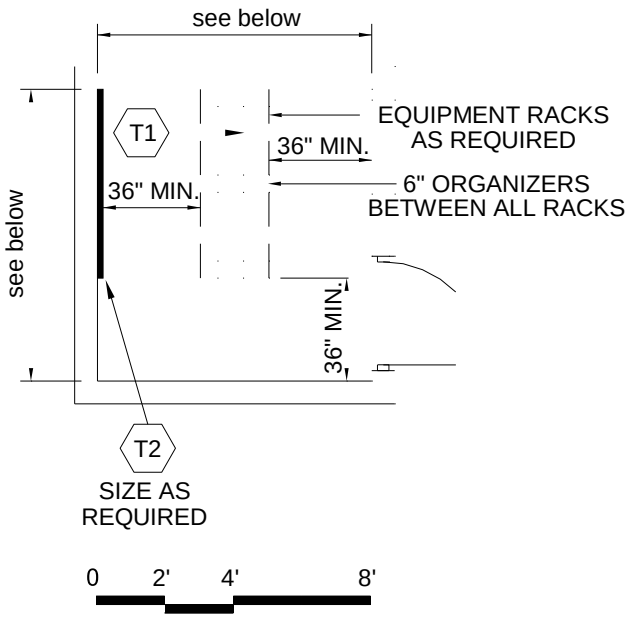
LOOSE FURNISHINGS

N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
E1 Electrical switchboard	262413/262416
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



CAPACITY: N/A

SIZE:

TR Serving Zone > 188 ports:
minimum 10 ft. x 12 ft.
TR Serving Zone of 96-188 ports:
minimum 8 ft. x 10 ft.
TR Serving Zone of < 96 ports:
minimum 8 ft. x 8 ft.

PROGRAM ACTIVITIES:

- Space for technology needs

SPATIAL RELATIONSHIPS:

N/A

ENVIRONMENTAL CONSIDERATIONS:

NOTES:

1. This is an example of a telecommunications room. The equipment and layout will vary from school district to school district.
2. ***Verify and coordinate TR quantity, size and location with technology designer during programming phase.***
3. ***Multiple TR's may be required.***

TELECOMMUNICATIONS ROOM

E-BS-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete,	033000
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls:	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Cooling and exhaust air system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
1 duplex receptacle	262726
Telecommunications Grounding	270526/260526
Standby power	263213/263600
Communications:	
T1 Technology equipment	
Central sound system	275123
Telephone Wiring	271313/271513
Integrated Telephone System	273123
Video Wiring	271543
Digital on Demand Delivery System	274125
Local Area Network Wiring	271513/271323
Local Area Network Electronics	272100/273123
Grounding & Infrastructure Equipment	270526/271100
T2 ***3/4"*** plywood back board	271313
Electronic Safety and Security:	
Security System	281300/281600/282300
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

- Corridors shall be a minimum of 8 feet wide.
- Instructional and activity areas shall be accessible by corridors without passing through another instructional or activity area.
- The corridors are to meet the egress requirements of applicable codes.
- Stairs, ramps, and elevators are included under the corridor category.
- It is recommended that stairs in multi-story buildings not be enclosed unless required by code.

CAPACITY: Based on size of program area

SIZE: Based on the sum of the program areas excluding building services, multiplied by 20%

PROGRAM ACTIVITIES:
- Circulation space

SPATIAL RELATIONSHIPS:
N/A

ENVIRONMENTAL CONSIDERATIONS:
- Uniform lighting

VESTIBULES
- Area of vestibules to be included within area allotted for corridors.
- Width of vestibules can be no less than minimum width of adjacent corridor.
- Minimum corridor length to be 8'-0" between doors.
- Vestibules are to be provided at major entrances/exits and may be eliminated at minor entrances/exits as determined by the Design Professional.
- Provide automatic door operator on one leaf of main entrance/exit door and related vestibule door.
- Provide a five-step or fifteen foot walk off mat extending from main outside entry doors into the building and as wide as the entry doors.
- Option – entrance floor grilles. See Chapter 9, Section 124816.
- ***Lockers are not part of the construction factor, but are a part of the circulation/corridor factor.***

NOTES:

CORRIDORS
E-BS-5

FINISHES[1]:	Spec. Ref.#
Flooring[2]:	
Linoleum, ET, sheet vinyl,	096500
carpet, carpet tile, rubber,	096516
polished concrete finishing,or	096816
colored concrete finishing	096813
	033510
	033519
Base:	
Resilient base	096500
Optional: Structural glazed tile	042000
Ceiling:	
Suspended, acoustical	095113
Option in vestibules: Abuse resistant gypsum wallboard	092116
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Recycling bins and waste receptacles	
Fixed or loose benches	

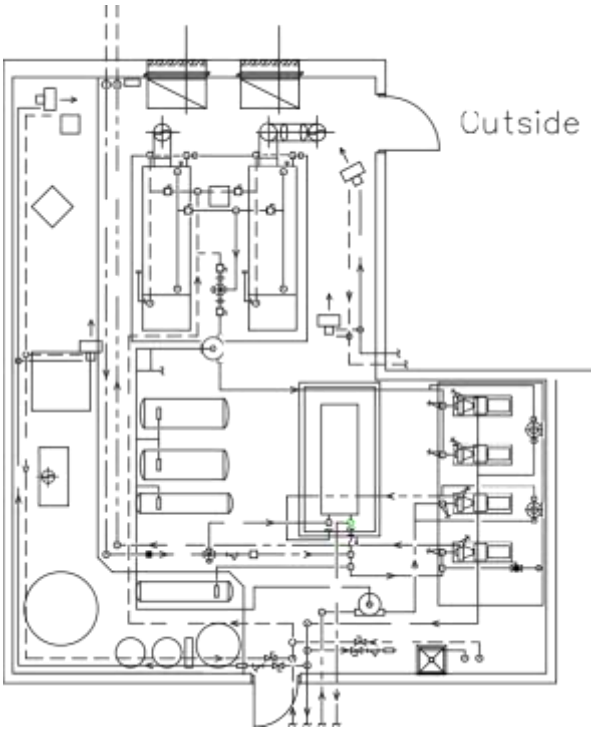
NOTE: At entries adjacent to dining/ commons area, match dining/commons flooring.

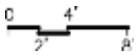
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Fire extinguishers and cabinets	104400
Recessed vinyl floor mats or surface mats	124813
Tack board or tackable wall surface	101100
Fire Suppression:	
N/A	
Plumbing:	
Drinking water coolers	224000
HVAC:	
Supply/return air system	Div. 23
Temperature control from adjacent instructional spaces	230923
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
Duplex receptacles	262726
Means of egress lighting per code	265100
Emergency lighting	265100
Communications:	
Central sound system	275123
Clocks	275313
Wireless access points	271513/272100/272133
Video ports	271543
Electronic Safety and Security:	
Life safety devices per code	283111
Security System	281300/281600/282300
Miscellaneous:	
Display cases	
Directory	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Linoleum, VET, or sheet vinyl is to be used in vestibules, stairwells, and elsewhere as appropriate. Porcelain tile is optional in lobbies, with resilient or structural glazed tile base.

Space to be determined by Design Professional.





CAPACITY: Based on size of program area
SIZE: Based on the sum of the program areas excluding building services, multiplied by 6.9%

PROGRAM ACTIVITIES:
- Space for mechanical and electrical equipment

SPATIAL RELATIONSHIPS:
- Accessible for maintenance and repair
- Access to outside
- Isolate from main area of building
- Near loading/receiving area
- Near custodial area

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control –
  wall minimum STC 60
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. This is an example of a mechanical room. The equipment and layout will vary depending upon the heating, ventilating, and air conditioning system used.
2. A penthouse is considered a mechanical room.

MECHANICAL/ELECTRICAL SPACE/DECKS

E-BS-6

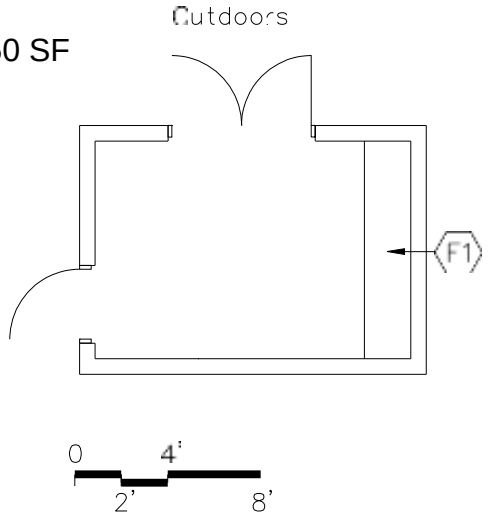
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls: (note 2)	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
To be determined by Design Professional	
Fire Suppression:	
To be determined by Design Professional	
Plumbing:	
To be determined by Design Professional	
HVAC:	
To be determined by Design Professional	
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Others as determined by Design Professional	
Communications:	
Central sound system	275123
Voice port and phone	271513/***273123***
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

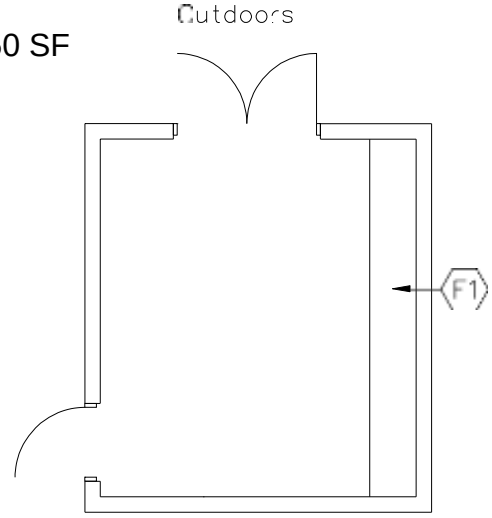
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Option for penthouse to use metal panel on concrete masonry or metal panel on metal framing wall systems.

150 SF



250 SF



CAPACITY: N/A
SIZE: 150 - ***350*** SF

PROGRAM ACTIVITIES:
- Space for storage of outdoor custodial equipment

SPATIAL RELATIONSHIPS:
- Near custodial office
- Near custodial workroom
- Direct access to outdoors

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

STORAGE AREA
E-BS-7

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls:	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 10‘ - 16’ of open tall shelving, depth may vary (fixed or loose)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

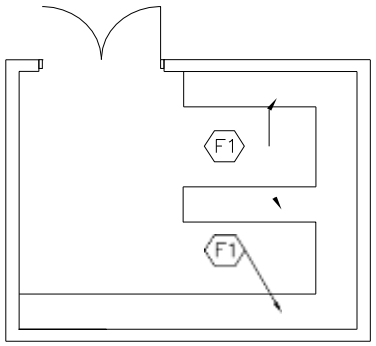
NOTES:

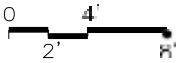
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.

CENTRAL STORAGE AREA
E-BS-8

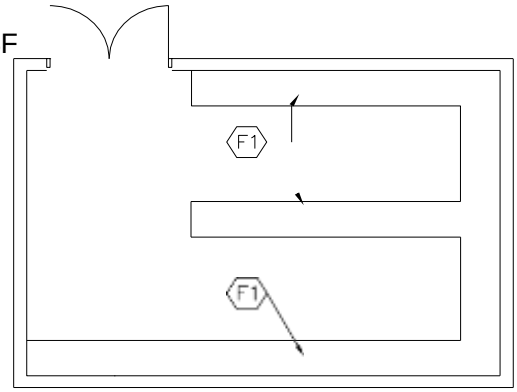
Space to be determined by Design Professional.

250 SF





400 SF



CAPACITY: N/A
SIZE: ***170 - 540*** SF

PROGRAM ACTIVITIES:
- Storage for paper products, utensils, supplies, etc., to be used throughout the entire building

SPATIAL RELATIONSHIPS:
- Near loading/receiving area
- Direct access to building circulation

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

CENTRAL STORAGE AREA

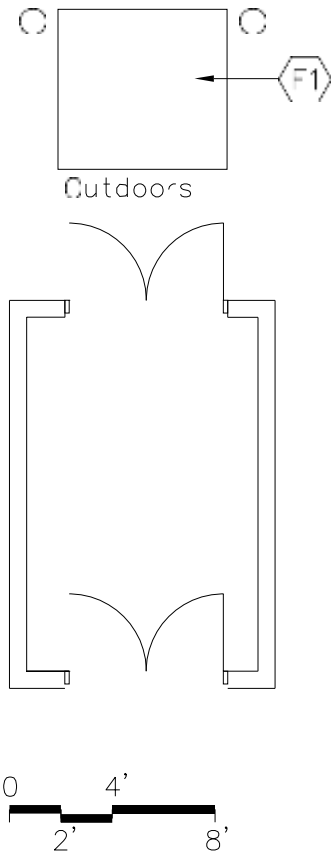
E-BS-8

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls:	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 26' - 32' of open tall shelving, depths may vary (fixed or loose)	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



PROGRAM ACTIVITIES:
- Delivery of materials and goods to be used throughout the building

SPATIAL RELATIONSHIPS:
- Near food service spaces
- Near central storage area
- Near mechanical room
- Adjacent to loading dock

ENVIRONMENTAL CONSIDERATIONS:
N/A

MISCELLANEOUS:
- Refer to Chapter 3, Section 3201, for site vehicular circulation requirements

CAPACITY:	N/A
SIZE:	120 SF

NOTES:

LOADING/RECEIVING AREA

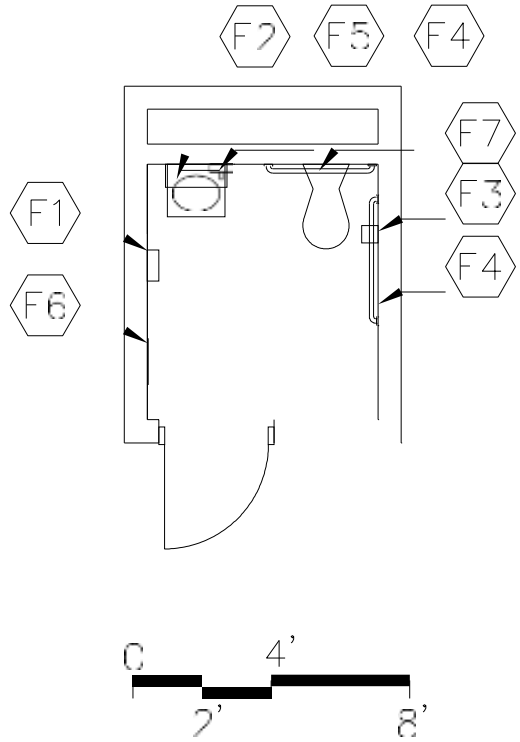
E-BS-9

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	
Walls:	
Epoxy-painted concrete masonry units	042000 / 099100
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Loading dock leveler and dock bumpers	111300
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Personal and health needs for the building occupants

SPATIAL RELATIONSHIPS:
- Near academic area

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

CAPACITY: 1 person
SIZE: ***60*** SF

NOTES:

1. Separate restrooms must be provided for male and female students

RESTROOM
E-B S-10

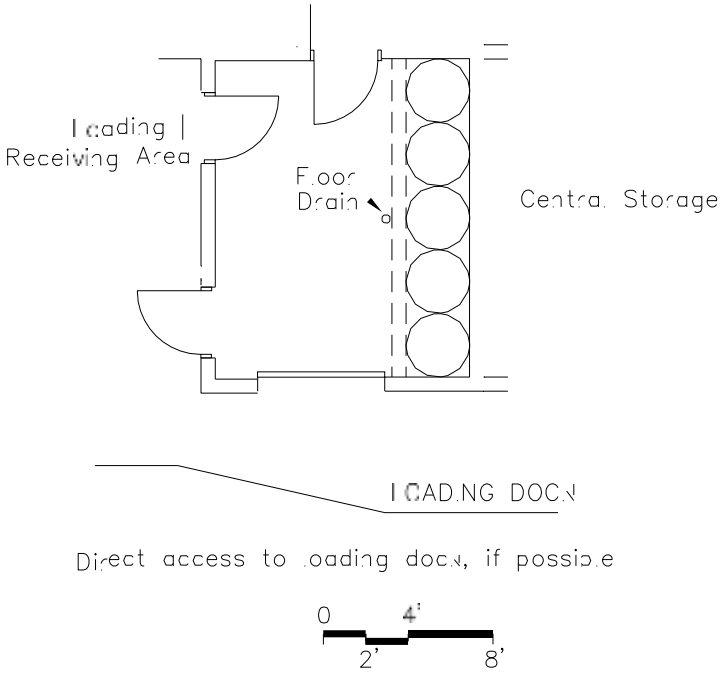
FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, sheet vinyl	096516
	096500
Optional: quarry tile, or	093000
resinous flooring	096723
Base:	
Resilient base	096500
Optional: quarry tile, resinous	093000
flooring, or integral vinyl cove base	096723
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 Mirror with shelf above sink(optional)	102813 F3
Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Sanitary product dispenser	102813
F7 Sanitary product receptacle	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-4	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. F6 and F7 required for female restroom only.



Direct access to loading dock, if possible.

CAPACITY: N/A
SIZE: 80 - 160 SF

PROGRAM ACTIVITIES:
- Provide recyclable collection for paper, cardboard, glass, plastics and metals

SPATIAL RELATIONSHIPS:
- Near food service spaces
- Near central storage area
- Near mechanical room
- Adjacent to loading dock

ENVIRONMENTAL CONSIDERATIONS:
N/A

MISCELLANEOUS:
- Refer to Chapter 3, Section 3201, for site vehicular circulation requirements

NOTES:

1. Contact local collection agency to see if co-mingling of materials is permitted. Design team should meet the LEED intent when designing the recycling area.

LOOSE FURNISHINGS

Loose furnishings are to be funded by the Ohio School Facilities Commission. The loose furnishings requirements are to be coordinated with the district's educational program. As an example, some spaces may require tables with student chairs and other spaces may require student desks with chairs.

* The intent of the loose furnishings shown on the space plates is not necessarily to be all-inclusive of furniture options or mandate items which may not be needed in a particular district, but rather to provide a general concept of how a particular space could be laid out. Some items listed as loose furnishings could be provided as fixed casework and items listed as fixed casework, if appropriate, could be provided as loose furnishings depending on the building design and types of technology used. Construction and loose furnishings budgets should be coordinated appropriately.

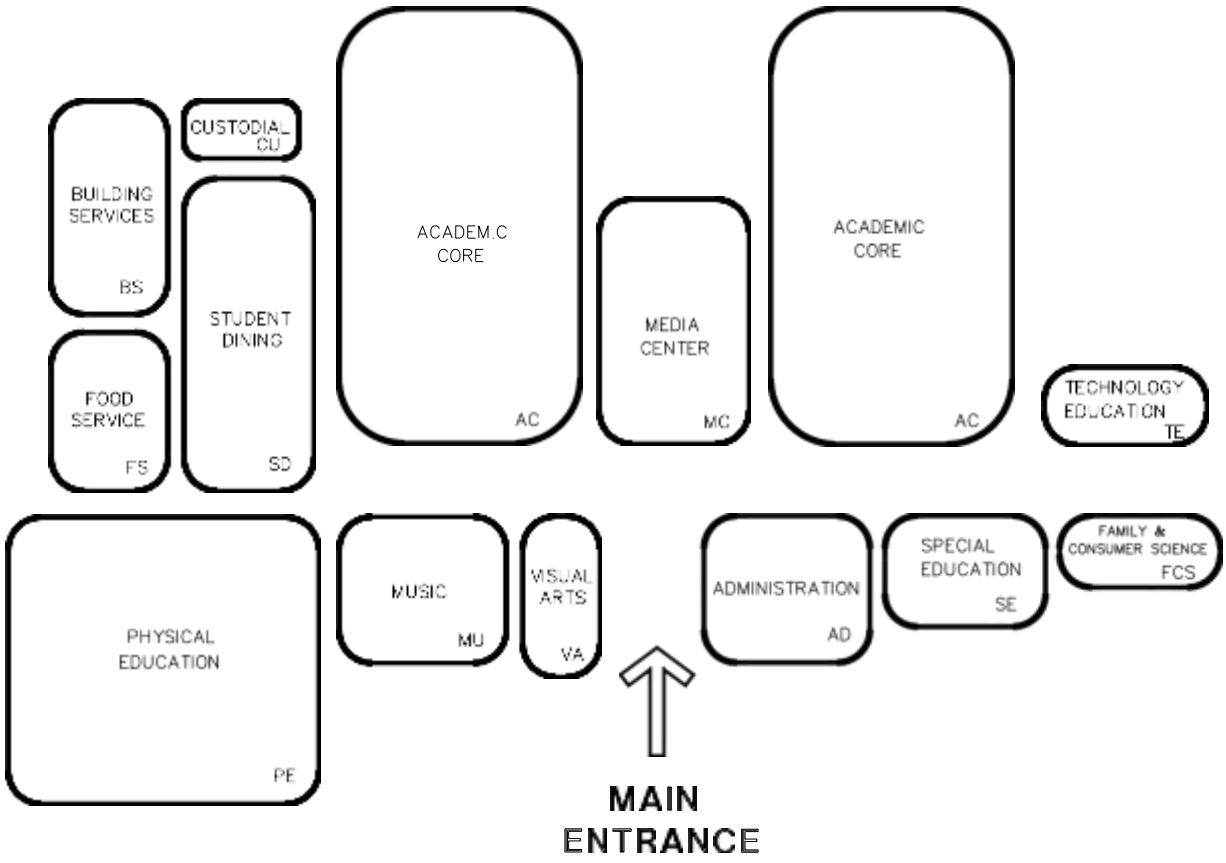
FEATURES

Features identified on the space plates are recommended for these rooms. These features include Fixed Items, Plumbing, Heating, Ventilating and Air Conditioning, Electrical, and Technology systems as well as Miscellaneous Items. Exact sizes of items may need to be modified slightly to interface with the exact size and proportions of the actual space.

Casework and Visual Display Boards should reflect the needs of the district's educational program. The intent of this list is not to mandate casework or visual display boards that may not be needed by a particular district, but rather to be used as a guideline for items that are generally used in this type of space. Some items listed as "fixed casework" could also be provided by mobile casework or loose furnishings if appropriate. Construction and loose furnishings budgets should then be adjusted appropriately.

TECHNOLOGY

The location of projectors, in spaces where required, shall be carefully coordinated between the Design Professionals in relation to the projection surface and ADA requirements. Note that classroom projectors are required to be ultra-short throw interactive projectors (refer to Section 274119). Classroom instructor AV interfaces and AV equipment are to be comprised of digital systems. Coordination is required between the Design Professionals to accommodate the digital solution that is selected by the District. Refer to Section 271543 and Figure 1, within that section, for a general overview of classroom equipment and interconnectivity requirements. The District's Digital Media Management System requires Design Professionals coordination for adequate dedicated rooftop space for current and potential future system antennas for incorporation of digital broadcast media sources as selected by the District (refer to Section 274125). Design Professionals should especially note that the classroom's dedicated 4 student data ports and associated work stations have been removed. A robust Wireless Local Area Network (WLAN), capable of supporting 1:1 and/or Bring Your Own Device (BYOD) throughout all educational areas is now required. Refer to Section 272133 for all of the new requirements for the District's WLAN.



NOTES:

This is just one example of how the spaces in a middle school could be arranged. This is meant only to demonstrate the relationships between various spaces of the building.

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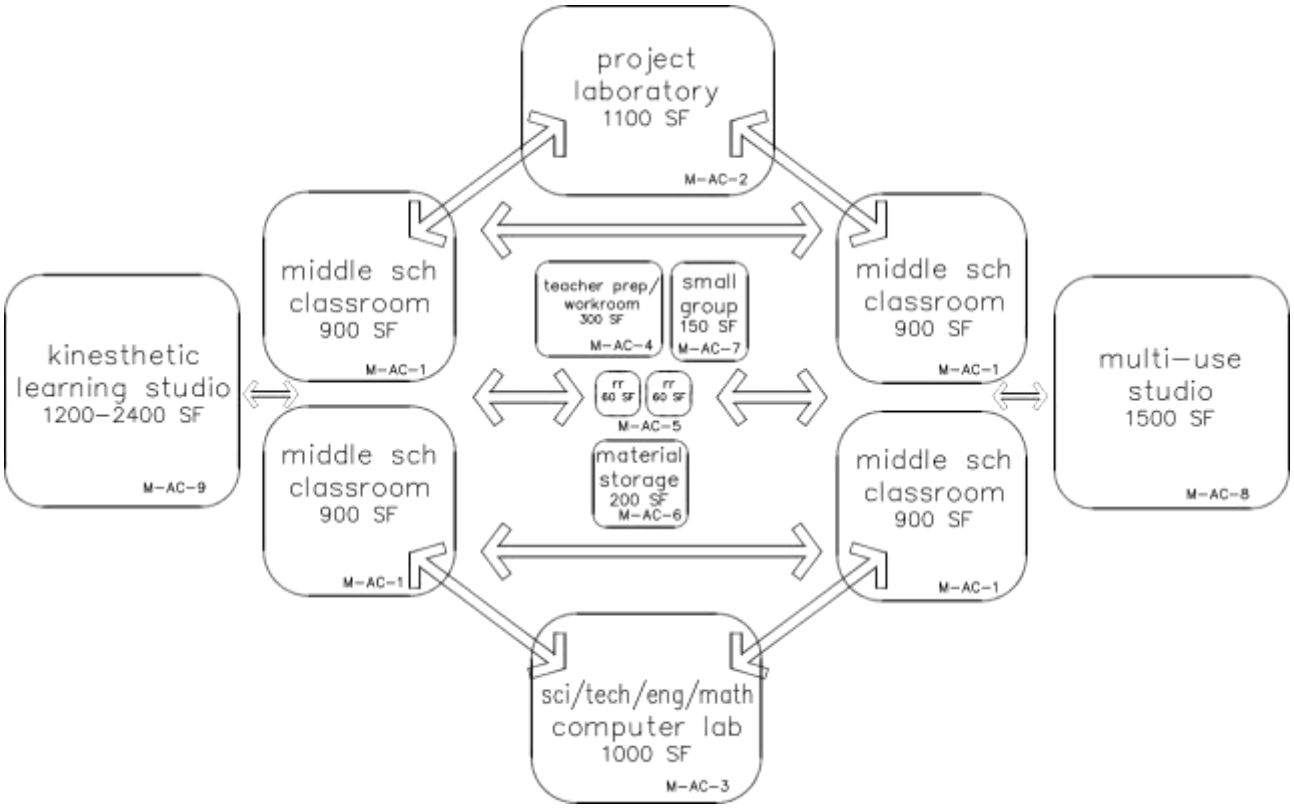

NOTES:

This is an example of how the academic core spaces in a middle school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Academic Core space plates:

- M-AC-1 Middle School Classroom
- M-AC-2 Project Laboratory
- ***M-AC-3 Sci/Tech/Eng/Math/Computer Lab***
- M-AC-***4*** Teacher Prep Area/Workroom
- M-AC-***5*** Individual Restroom
- M-AC-***6*** Instructional Material Storage
- M-AC-***7*** Small Group Room
- ***M-AC-8 Multi-Use Studio***
- ***M-AC-9 Kinesthetic Learning Studio***

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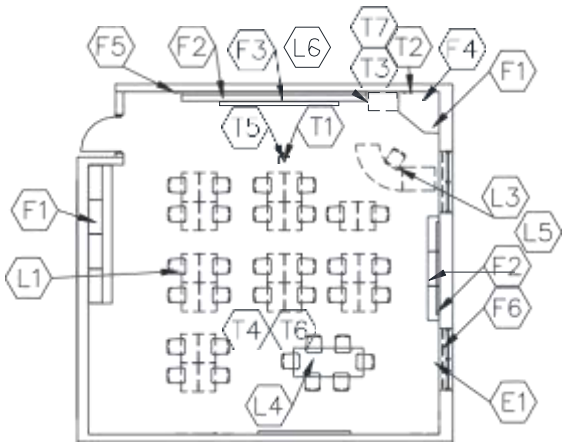
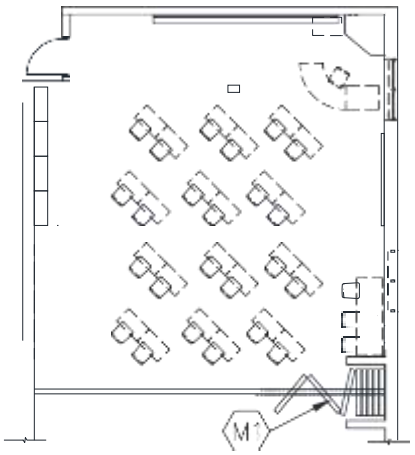




CLASSROOM WITH OPTIONAL OPERABLE WALL

CAPACITY: 25 students
SIZE: 900 SF
ANCILLARY SPACES:

PROGRAM ACTIVITIES:

- Serves the instructional programs for the following disciplines: language arts, social studies, and mathematics.
- Instructional program shall provide developmental experiences, improve communication skills, changes in social development and in-depth academic understandings.
- The methodology for delivery of programs will involve the traditional strategies, but will include interdisciplinary activities, a variety of groupings, team teaching, and learning and manipulative exercises.

SPATIAL RELATIONSHIPS:

- Classrooms should have easy and quick access to the media center, administrative services, physical education areas, and the arts.

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Flexibility of space

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this classroom or could be placed in a teacher prep area/workroom.

MIDDLE SCHOOL CLASSROOM
M-AC-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile	096816
Optional: linoleum, ET,	096500
sheet vinyl, or rubber	096516 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	
099100	

LOOSE FURNISHINGS:
L1 Student desks or tables and chairs
L2 Reserved
L3 Teacher desk or workstation/computer support and chair
L4 Activity table
L5 9' of low bookcases (fixed or mobile)
L6 File cabinet
Wastebasket
Note: Must keep wastebasket
L3 can be loose or fixed.`

Electronic Safety and Security	
Life safety devices per code	283111

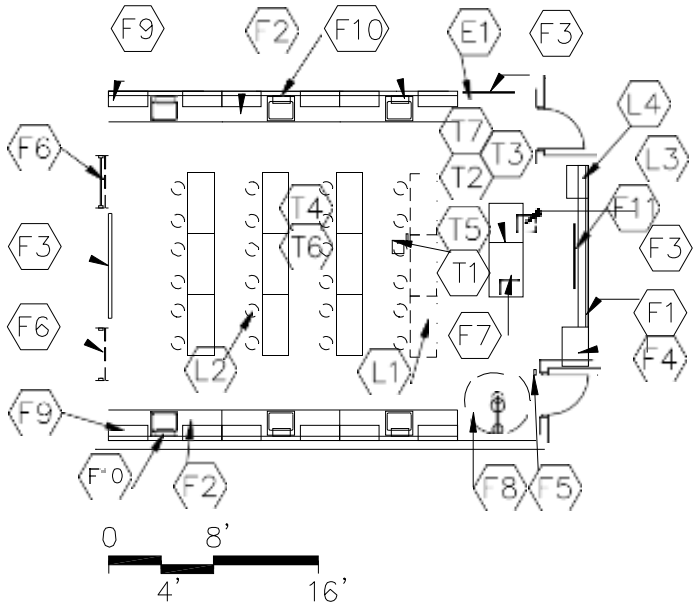
Miscellaneous:
Pencil sharpener (optional)
M1 Operable partitions are optional between classrooms 102226

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 12'-24' combination tall wardrobe, base and wall cabinets	123550
F2 22'-32' combination marker board, tack board & tackable wall surface	123550
F3 Projection screen (optional)	115213
F4 Technology support casework	123550
F5 Pencil sharpener support (optional)	062000
F6 Windows with integral blinds	085113
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher work station	271513
T4 Wireless access point cable above ceiling	
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Where appropriate, some casework may be mobile to add flexibility and could become part of loose furnishings.
4. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.



CAPACITY: 24-28 students
SIZE: 1,100 SF
ANCILLARY SPACES:

PROGRAM ACTIVITIES:

- Primary use of this laboratory will be science instruction and scientific discovery activities, but this laboratory may be used for instruction and hands-on experiences in other discipline areas, especially mathematics.
- Will serve multi-discipline groups of five classrooms.
- There will be lecture, experiment, discussion, and manipulation activities during each class session.

SPATIAL RELATIONSHIPS:

- Easy and quick access to other academic areas.
- Easy access to large group restrooms, lockers, teacher prep/workroom, and instructional material storage.
- Adjacent to at least one academic classroom which has resources for mathematics instruction.
- Each room will have an area for preparation of materials by students and staff.
- Easy access to administrative services and related curriculum instructional areas.

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Acid- and stain-resistant work and floor surfaces

NOTES:

1. Loose furnishings shown represent two of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this laboratory or could be placed in a teacher prep area/workroom.
3. Option: Small, bay window-type, pre-manufactured greenhouse. No additional square footage allowed.
4. The layouts shown do not restrict or reflect the variety of arrangements available to the Design Professional.

PROJECT LABORATORY
M-AC-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Vinyl sheet flooring, linoleum,	096516
rubber, ET,	096500
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:
L1 Student work tables
L2 Student stools/chairs
L3 Teacher desk or workstation/ computer support and chair
L4 File cabinet
L5 Reserved

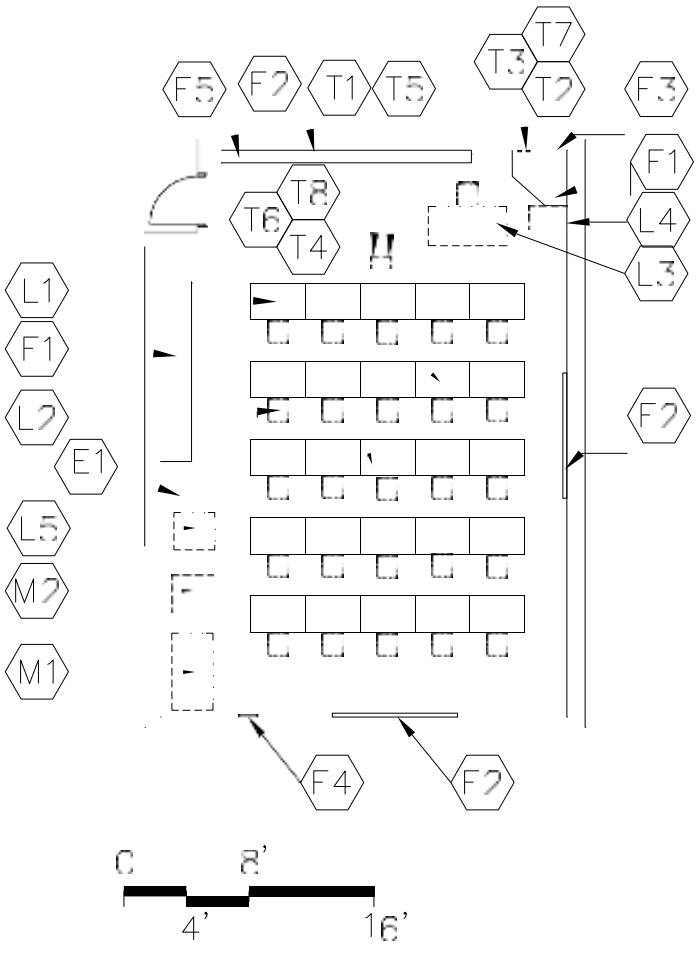
Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123550
F2 40'-58' lab station casework or loose cabinets with 6 sinks	123550
F3 22'-32' combination marker board, tack board & tackable wall surface	101100
F4 Technology support casework	123550
F5 Pencil sharpener support (optional)	062000 F6
Windows with integral blinds	085113
F7 Demonstration table	123550
F8 Emergency shower/eyewash(option)	123550
F9 24'-40' of wall cabinets	123550
F10 Towel dispensers (optional)	102813
F11 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sinks	224000
Plumbing connections	224000/221116/221119
Emergency shower/eyewash Connection (optional)	224000
Gas connections (optional)	226313
Master shutoff for gas (optional)	226313
Compressed air connections(option)	221500
HVAC:	
Supply/return air system	Div. 23
Manually controlled exhaust air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles (optional)	262726
Double duplex receptacle adjacent to each data and video port	262726
Means of egress lighting per code	265100
Emergency lighting	265100
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher work station	271513
T4 Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Overhead projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:

- Contains computer workstations for group instruction and individual work
- Activities include computer instruction, media production, and individual project work

SPATIAL RELATIONSHIPS:

- Near reading room/circulation
- Near media specialist office
- Near academic core classrooms

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

MISCELLANEOUS:

- Due to the changing nature of technology, a computer lab is to be designed for flexibility of use.

CAPACITY:	25 students
SIZE:	1,000 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

SCI/TECH/ENG/MATH/COMPUTER LAB

M-AC-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile	096816
Optional: ET or sheet vinyl	096813 096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:

L1 Computer workstation furniture (could be fixed)
L2 Student chairs
L3 Teacher desk**/**computer support and chair
L4 File cabinet
L5 Printer / scanner stand
Wastebasket

Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:

Pencil sharpener (optional)

The following items are to be funded by the school district:

M1 Classroom area network file server
M2 Printer

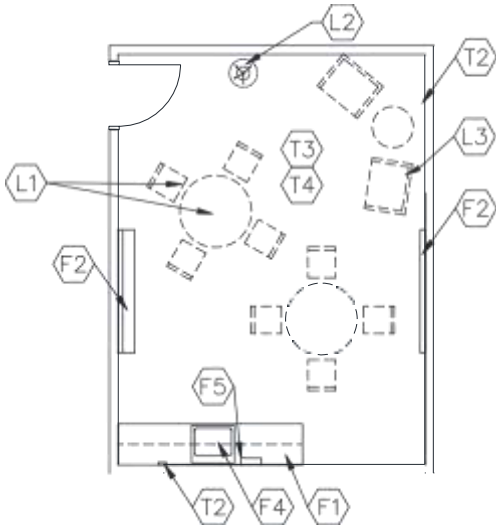
E1 Duplex receptacle with dedicated circuit for wireless devices

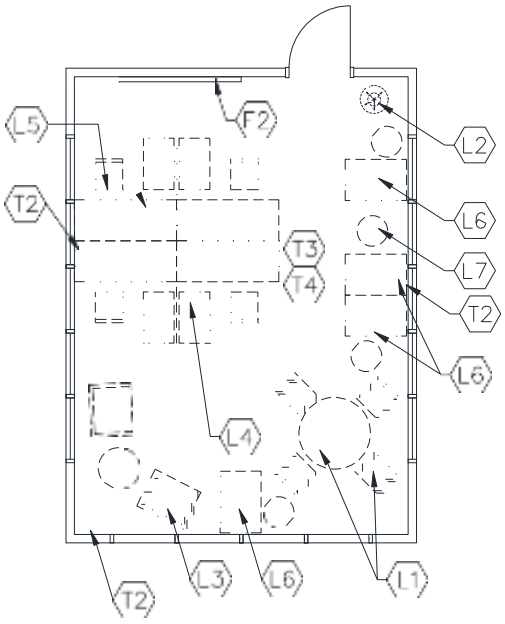
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 8'-20' combination tall wardrobe, base & wall cabinets	123550
F2 Combination marker board, tack board, & tackable wall surface	101100
F3 Technology support casework	123550
F4 Pencil sharpener support (optional)	062000
F5 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting with ***computer aided*** lenses	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Classroom area network	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127
T8 Wireless access point cable above ceiling	271513

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

Note: Some casework may be mobile for flexibility and could become part of loose furnishings.





CAPACITY: ***4 - 8 teachers***
SIZE: ***150-300 SF***

PROGRAM ACTIVITIES:

- Teachers and other staff members hold team meetings and prepare for class
- Professional interaction should be encouraged to improve communication, professional development, and team building.
- ***Collaboration of grade level grouped or subject grouped instructors.***
- ***Collaboration spaces should support the exchange of ideas, remain instantly flexible, and provide an area for both individual study and group collaboration.***

SPATIAL RELATIONSHIPS:

- Near academic core classrooms
- Near individual restroom
- Near instructional material storage

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- ***Transparent walls or windows to adjacent rooms***

<u>Collaboration Note:</u>

- ***Collaboration is the vehicle by which individuals communicate their vision, desires, opinions, thoughts, and insight to their fellow colleagues. It is the means to address all aspects of the educational process, themes of focus, professional and personal relationships, and to build the camaraderie and teamwork to meet the ever changing educational needs of students of all ages.***

<u>NOTES</u>:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this teacher prep area/workroom or could be placed in a classroom.

TEACHER PREP AREA/WORKROOM

M-AC-4 CHAPTER 5: MIDDLE SCHOOL

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet***,*** ET, linoleum,	096816
sheet vinyl, or rubber	096500
	096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:

L1 Tables and chairs
L2 Coat Rack
L3 Soft Seating
L4 Teacher computer trucks
L5 Teacher workstation furniture and chair
L6 42" high teacher cabinet with work surface top
L7 Stools
Wastebasket

Miscellaneous:

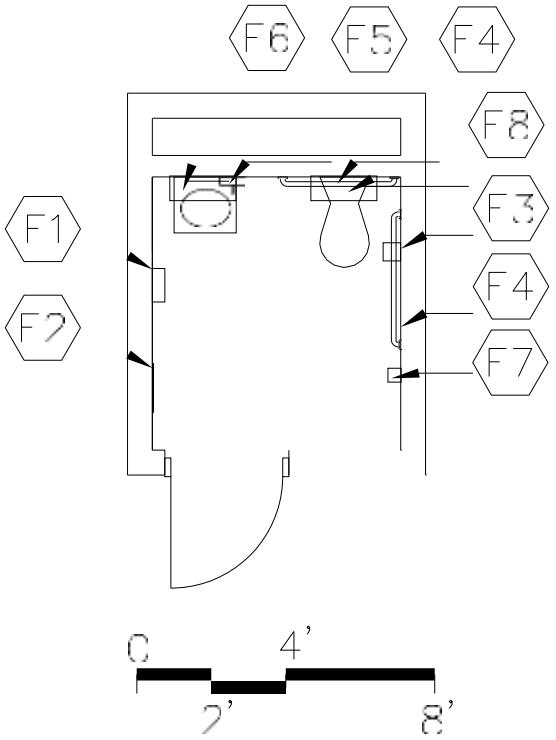
Copier by school district

E1 Reserved

FEATURES[1]:		Spec. Ref.#
Fixed Items:		
F1	15'-20' combination base and wall cabinets	123550
F2	***50-75 sf*** combination marker board, tack board & tackable wall surface	10110
F3	Reserved	
F4	3' sink base cabinet	123550
F5	Towel dispenser (optional)	102813
Fire Suppression:		
	Fire suppression systems	211000
Plumbing:		
	Sink	224000
	Plumbing connections	224000/221116/221119
HVAC:		
	Supply/return air system	Div. 23
	Independent temperature control	230923
Electrical:		
	Single-level switching	262726
	Fluorescent lighting	265100
	Illumination level: See Table 8600-5	
	3 duplex receptacles	262726
	Double duplex receptacle adjacent to each data and video port	262726
	Duplex receptacles for office equipment	262726
	Receptacle for copier (if applicable)	262726
Communications:		
T1	***Reserved***	
T2	***Voice ports and phones***	271513/273123
T3	***Wireless access point cable above ceiling***	***271513***
T4	***Wireless access point (WAP) as determined by design – refer to note 3***	***271533***
	Clock	275313
	Central sound system	275123
Electronic Safety and Security:		
	Life safety devices per code	283111

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***When collaboration area is selected, teacher computer trucks are provided in lieu of teacher desks in classrooms.***
3. ***Baseline includes WAP cable. WAP device quantity/placement per 272133 requirements.***



PROGRAM ACTIVITIES:
- Personal and health needs for teachers, staff, and other individuals

SPATIAL RELATIONSHIPS:
- Near academic core classrooms
- Near teacher prep area/workroom

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

CAPACITY: 1 person
SIZE: ***60*** SF

NOTES:

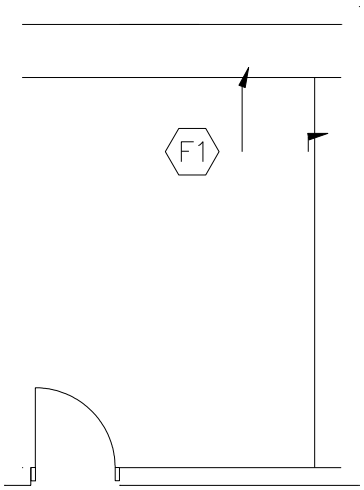
INDIVIDUAL RESTROOM
M-AC-*5*

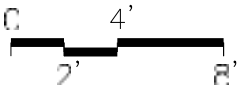
FINISHES[1]:	Spec. Ref.#
Flooring:	
ET or sheet vinyl	096500
Optional: Ceramic mosaic tile, porcelain tile, or resinous flooring	093000 096723
Base:	
Resilient base	096500
Optional: Ceramic mosaic tile, porcelain tile, resinous flooring integral vinyl cove base	093000 096723 or
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Wastebasket	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 24" x 60" mirror	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Shelf above sink (optional)	102813
F7 Coat hook	102813
F8 Wall cabinet above toilet (optional)	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-**5**	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.





PROGRAM ACTIVITIES:
- Storage of supplies, textbooks, and equipment

SPATIAL RELATIONSHIPS:
- Near teacher prep area/workroom

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	200 SF

NOTES:

INSTRUCTIONAL MATERIAL STORAGE

M-AC-*6*

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber***, ET or sheet vinyl***	096500 ***096516***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry	042000/099100

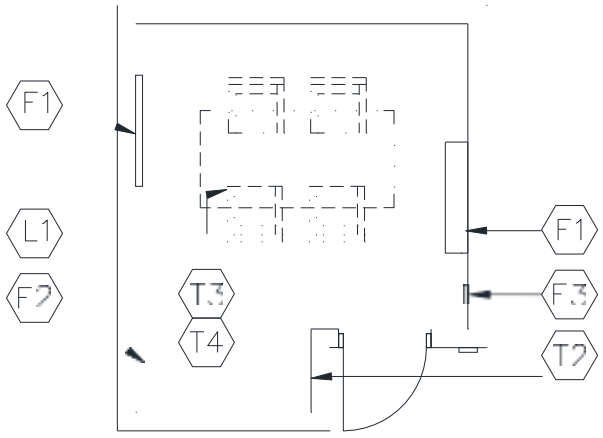
LOOSE FURNISHINGS:

N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 20'-30' of open shelving, depths may vary (fixed or loose)	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Student small group work
- Independent student work
- Small group meetings

SPATIAL RELATIONSHIPS:
- Near academic core classrooms

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	4 - 5 students
SIZE:	150 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

SMALL GROUP ROOM
M-AC-*7*

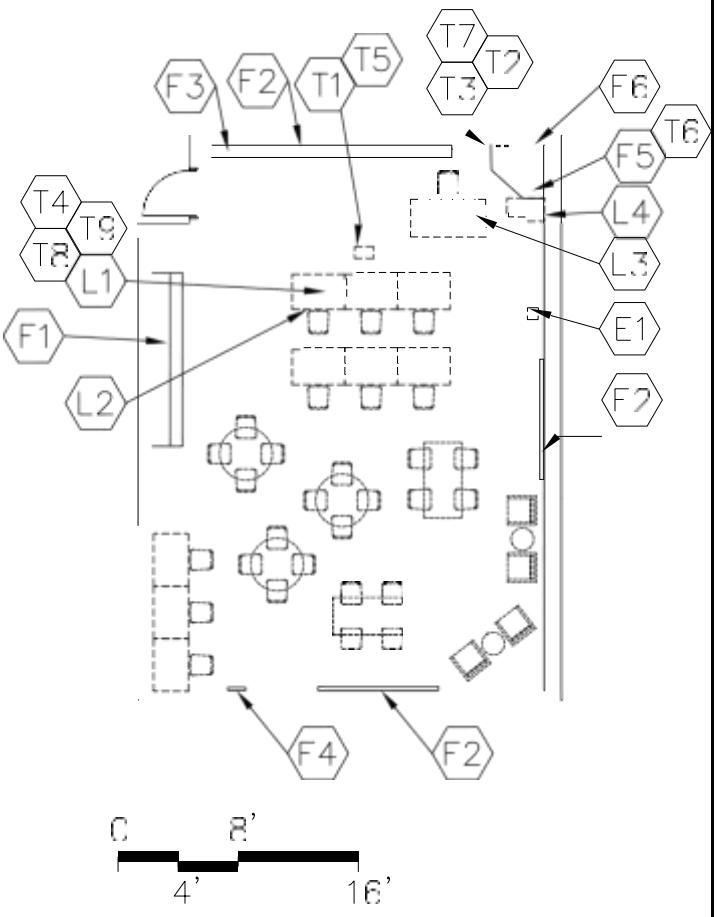
FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, sheet vinyl, linoleum, or rubber	096500 096516 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Work tables and chairs
L2 Reserved
Wastebasket

Miscellaneous:
Interior windows (optional) 081113/088000
Pencil sharpener (optional)

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 8'-10' combination marker board, tack board, & tackable wall surface	101100
F2 4'-6' of work surface fixed or loose (optional)	123550
F3 Pencil sharpener support (optional)	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Fluorescent lighting: Illumination level: See Table 8600-5	265100
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 Reserved	
T2 voice port with phone	271513/273123
T3 Wireless access point cable above ceiling	***271513***
T4 Wireless access point (WAP) as determined by design – refer to note 2	***271533***
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior windows (optional)	081113/088000
Pencil sharpener (optional)	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:
- Group instruction and individual work
- Activities include instruction, production, and individual project work
- "Wet / Dry" activities

SPATIAL RELATIONSHIPS:
- Near kinesthetic studio
- Near academic core classrooms

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

MISCELLANEOUS:
- Due to the changing nature of the activities anticipated, a multi-use studio is to be designed for flexibility of use.

CAPACITY:	25 students
SIZE:	1,500 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

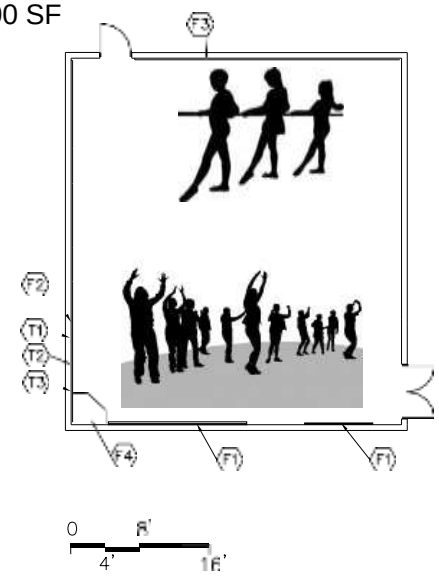
MULTI-USE STUDIO
M-AC-8

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, sheet vinyl, linoleum, rubber	096500 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
L1 Flexible furniture	
L2 Student chairs	
L3 Teacher desk and chair	
L4 File cabinet	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
E1 Duplex receptacle with dedicated circuit for wireless devices	

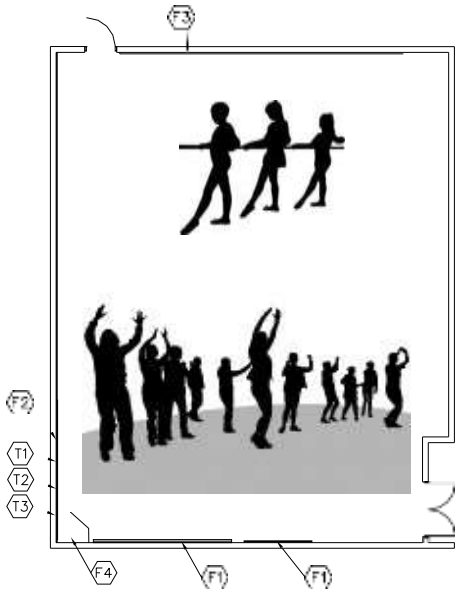
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 4'-16' of base & wall cabinets	123550
F2 18'-28' combination marker board, tack board, or tackable wall surface	101100
F3 Projection screen (optional)	115213
F4 Pencil sharpener support (optional)	062000
F5 Tall wardrobe with file drawers	123550
F6 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing: N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Classroom area network (10 ports minimum)	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Combination i-Pod / CD Player unit and Mixer/Amp unit, located in the wardrobe, serving room overhead distributed speakers	
T7 Classroom technology center video port	271543, 274116, 274119, 275127
T8 Wireless access point cable above ceiling	271513
T9 Wireless access point (WAP) as determined by Design – refer to Note 3	272133

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

1,600 SF



2,400 SF



CAPACITY: 22-25 students
SIZE: 1,200 – 2,400 SF

PROGRAM ACTIVITIES:
- Gross motor activities
- Dance
- Aerobics
- Gymnastics
- "Movement" activities

SPATIAL RELATIONSHIPS:
- Near multi-use studio
- Near academic core spaces

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Flexibility of space

NOTES:

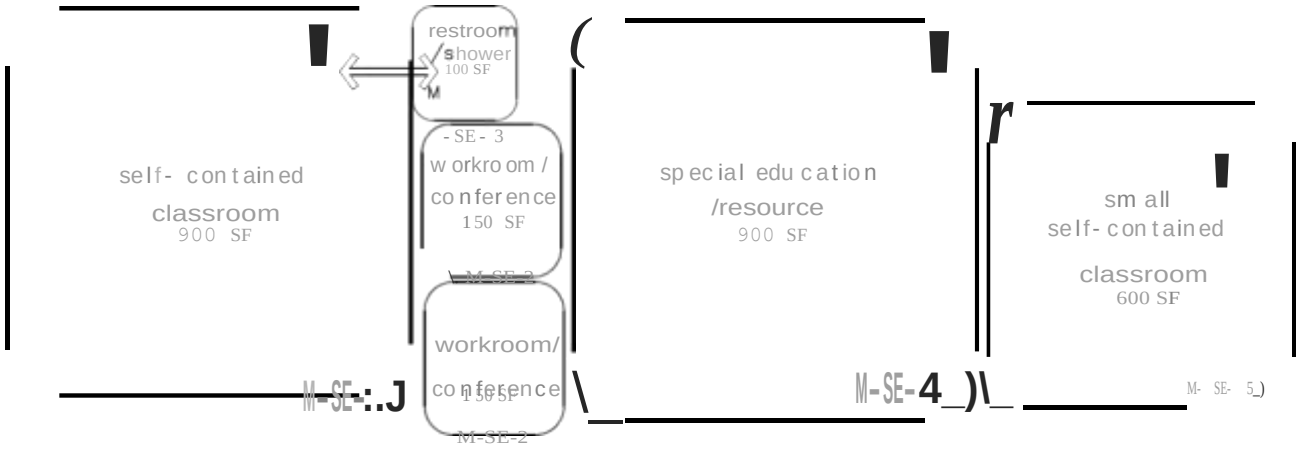
KINESTHETIC LEARNING STUDIO
M-AC-9

FINISHES[1]:	Spec. Ref.#
Flooring:	
Fluid applied athletic flooring	096766
Base:	
Resilient base	096500
Ceiling:	
Painted exposed structure	099100
Walls:	
Paint	
099100	

FEATURES:	Spec. Ref.#
Fixed Items:	
F1 8’-24' combination marker board, tack board, or tackable wall surface	101100
F2 Mirrors	102813
F3 Dance bars	116615
F4 Tall wardrobe with file drawers	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
Dimmable lighting	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Means of egress lighting	265100
Emergency lighting per code	265100
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port	271513
Clock	275313
Central sound system horns	275123
T4 Combination i-Pod / CD Player unit and Mixer/Amp unit, located in the wardrobe, serving room overhead distributed speakers	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



NOTES:

This is an example of how the special education spaces in a middle school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Special Education space plates:

M-SE-1	Self-contained Classroom
M-SE-2	Workroom/Conference
M-SE-3	Restroom/Shower
M-SE-4	Special Education/Resource
M-SE-5	Small Self-contained Classroom

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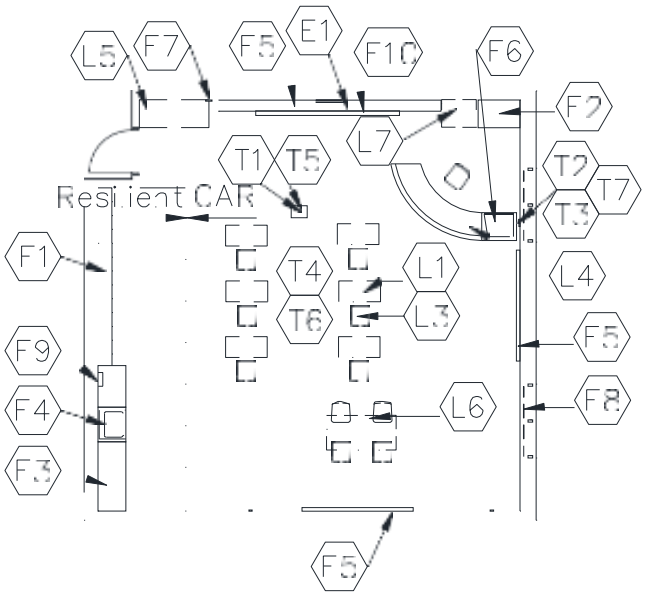


PROGRAM ACTIVITIES:

- Accommodates students who have special needs and are unable to be included in regular instructional program areas a majority of the school day.
- Activities include, but are not limited to: group and individual work to improve auditory, tactile, visual, kinesthetic and academic skills.

SPATIAL RELATIONSHIPS:

- Near academic core classrooms
- Adjacent to special education restroom/ shower

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Resilient and stain-resistant floor covering
- Special consideration for wheelchair access and physical accessibility needs (ADA)

CAPACITY:	Based on disability. See Chapter 1, Section 1110.
SIZE:	900 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this classroom or could be placed in a workroom/conference area.
3. See Chapter 1, page 1110-16 for specific areas needed for each disability.

SELF-CONTAINED CLASSROOM
M-SE-1

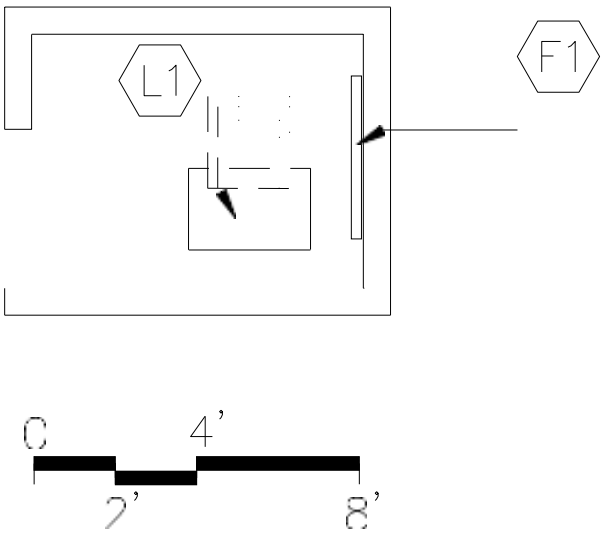
FINISHES[1]:	Spec. Ref.#
Flooring:	
Combination carpet, carpet tile, with resilient options	096816 096500
Optional: All ET, sheet vinyl, linoleum, or rubber	096516
096813	
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100
LOOSE FURNISHINGS:	
L1 Student desks/tables	
L2 Reserved	
L3 Student chairs	
L4 Teacher workstations/computer support and chair	
L5 8'-10' of low bookcases (fixed or mobile)	
L6 Reading table	
L7 File cabinet	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
E1 Duplex receptacle with dedicated circuit for wireless devices	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Open casework – student coats and personal items with wall cabinets above (optional) or base/wall/tall cabinets	123550
F2 Tall wardrobe w/file drawers	123550
F3 8'-10' of base & wall cabinets	123550
F4 3' sink base cabinet	123550
F5 24'-32' combination marker board, tack board or tackable wall surface	101100
F6 Technology support casework	123550
F7 Pencil sharpener support (optional)	062000
F8 Windows with integral blinds	085113
F9 Towel dispenser (optional)	102813
F10 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink with drinking fountain	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Wireless access point cable above ceiling	
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

Note: Some casework may be mobile for flexibility and could become part of loose furnishings.

WORKROOM/CONFERENCE (Quiet Area) M-SE-2



PROGRAM ACTIVITIES:

- Could be used for emotionally disturbed or other students requiring a quiet individual area.
- Preparation and storage of instructional materials and equipment.

SPATIAL RELATIONSHIPS:

- Close proximity to academic classrooms
- Integral part of self-contained classroom or special education/resource room

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	1 - 2 persons
SIZE:	150 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Walls floor to ceiling and an open area for ½ of the fourth wall.
3. See Chapter 1, page 1110-16 for specific areas needed for each disability.

WORKROOM/CONFERENCE
M-SE-2 (Quiet Area)

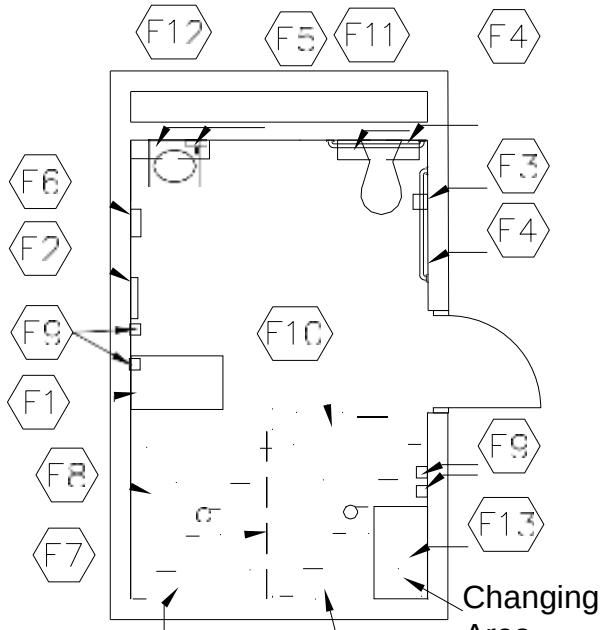
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, ET, linoleum,	096816
or sheet vinyl	096500
	096516
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

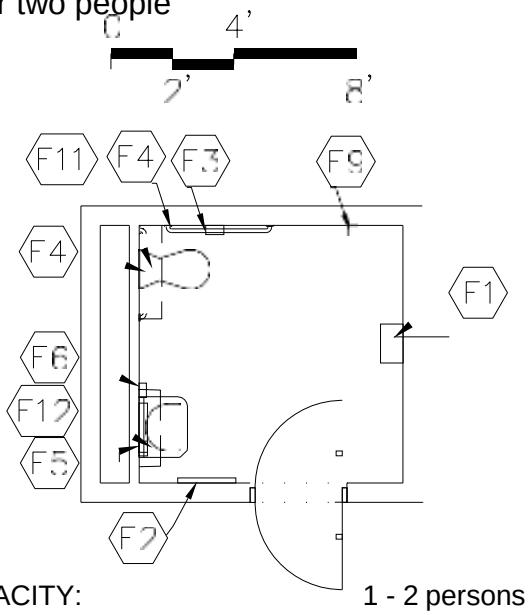
LOOSE FURNISHINGS:
L1 Student desk and chair
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 4' of tack board or	
marker board (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Dimmable lighting	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
1 duplex receptacle	262726
Communications:	
Clock (optional)	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window with blinds (optional)	081113/088000

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.





CAPACITY: 1 - 2 persons
SIZE: 100 SF

ANCILLARY SPACES:

PROGRAM ACTIVITIES:
- Changing area
- Toilet / shower needs

SPATIAL RELATIONSHIPS:
- Next to self-contained classroom

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- ☐ Moisture- and stain-resistant finishes
- ☐ Special consideration for wheelchair access and physical accessibility needs (ADA)

NOTES:

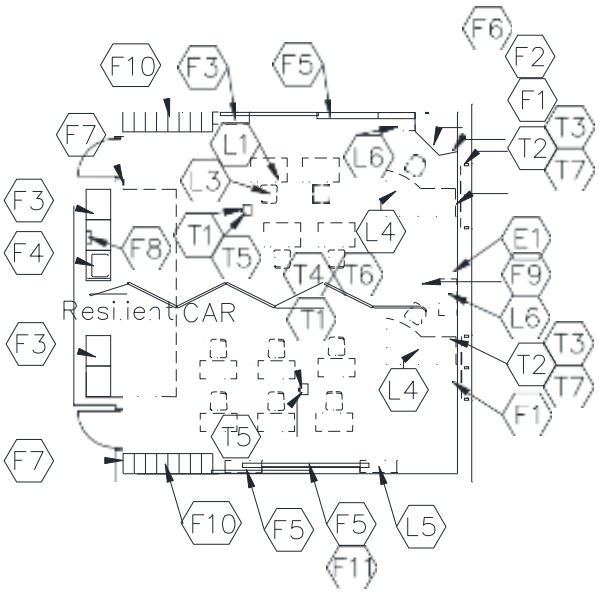
1. See Chapter 1, page 1110-16 for specific areas needed for each disability.

RESTROOM/SHOWER
M-SE-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Ceramic mosaic tile, porcelain tile, ET, vinyl sheet, rubber sheet flooring	096516 096500
Shower: Ceramic mosaic tile or porcelain tile	093000
Base:	
Restroom: Resilient base, ***ceramic mosaic, porcelain tile, or 093000*** integral vinyl cove base	096500
Shower: Ceramic mosaic tile base, porcelain tile, or integral vinyl cove base	093000
Ceiling:	
Restroom: Suspended, acoustical	095113
Shower: Painted portland cement plaster or interior finish system	092400/099100 092513
Walls:	
Epoxy painted concrete masonry units or ceramic wall tile in shower and latex paint in restroom	042000/099100 093000 099100
LOOSE FURNISHINGS:	
Wastebasket	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Base cabinets	123550
F2 24" x 60" mirror	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Towel dispenser	102813
F7 Shower curtain and rod	102813
F8 ADA shower accessories	102813
F9 (2) towel hooks	102813
F10 Cubicle curtain	102813
F11 8” deep wall cabinet above toilet	102813
F12 Shelf (optional)	102813
F13 Changing station ***(fixed or loose)***	123550
Fire Suppression:	
Fire suppression system	283111
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
ADA shower controls and head	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Refer to ADAAG 4.21 for grab bar and control locations.



PROGRAM ACTIVITIES:

- Accommodates students who have special needs with cognitive disability, hearing impairment, visual impairment, emotional disturbance, orthopedic impairment, autism, brain injury, learning-deaf-blindness disabilities.
- Variety of special services such as one-on-one instruction and small group instruction.
- Activities include, but are not limited to: group discussions, demonstrations, music activities, life skills, coping skills, speech, and visual and hearing support services.

SPATIAL RELATIONSHIPS:

- Near academic core classrooms
- The space will be used to accommodate the specific IEP requirements of each student

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control –
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: Based on disability.
See Chapter 1, Section 1110.

SIZE: 900 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this room or could be placed in a workroom/conference area.
3. See Chapter 1, page 1110-16 for specific areas needed for each disability.

SPECIAL EDUCATION/RESOURCE
M-SE-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Combination carpet, carpet tile	096816
with resilient options	096500
Option: All ET, sheet vinyl,	096516
linoleum, or rubber	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	

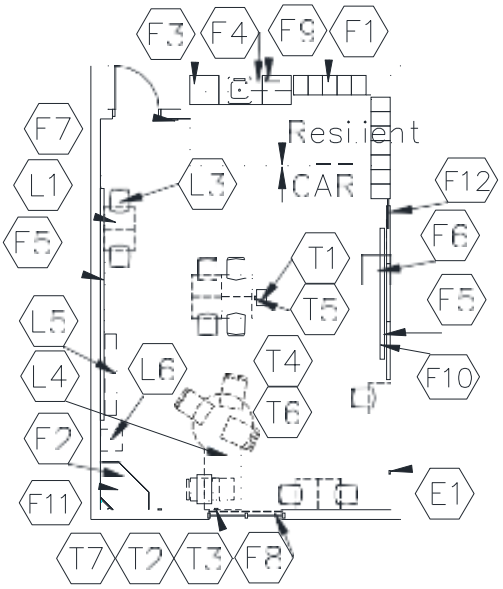
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Windows with integral blinds	085113
F2 Tall wardrobe with file drawers	123550
F3 8'-12' of base cabinets	123550
F4 3' sink base cabinet	123550
F5 20'-32' combination chalk/marker board, tack board, tackable wall surface	101100 F6
Technology support casework	123550
F7 Pencil sharpener support (optional)	062000 F8
Towel dispenser (optional)	102813
F9 Operable partition (optional)	102226
F10 Open casework coats and personal storage w/wall cabinets above	123550

E1 Duplex receptacle with dedicated circuit for wireless devices	
Communications (cont'd):	
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
~~T7 Classroom technology center video port~~	~~271543, 274116, 274119, 275127~~

T1 1 projector video port	271543
T2 1 voice port and phone	271513/237123
T3 1 data port near each teacher workstation	271513
T4 Wireless access point cable above ceiling	271513
Clock	275313
Sound reinforcement system	275127
Central sound system	275123
T5 Ultra-short throw interactive projector	274119

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.



CAPACITY: Based on disability.
See Chapter 1, Section 1110.

SIZE: 600 SF

PROGRAM ACTIVITIES:

- Can accommodate students with cognitive, hearing, speech, language, emotional, orthopedic, autistic, brain injury, learning, deaf, and blindness. Services to include occupational, physical, and speech therapy.
- Accommodates students who have special needs and are unable to be included in regular instructional program areas.
- Activities include, but are not limited to: group discussions, demonstrations, music activities, listening skills, presentations, art and science projects, and small group activities.

SPATIAL RELATIONSHIPS:

- Distributed throughout academic core areas.

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Resilient and stain-resistant floor covering
- Special consideration for wheelchair access and physical accessibility needs (ADA)

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this classroom or could be placed in a workroom/conference area.
3. See Chapter 1, page 1110-16, for specific areas needed for each disability.

SMALL SELF-CONTAINED CLASSROOM

M-SE-5 (Special Education) CHAPTER 5: MIDDLE SCHOOL

FINISHES[1]:	Spec. Ref.#
Flooring:	
Combination carpet, carpet tile, with resilient options	096816 096516
Option: All ET,sheet vinyl, linoleum or rubber	096500 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:

L1 Student desks/tables

L2 Reserved

L3 Student chairs

L4 Teacher workstations/computer support and chair

L5 6' of low bookcases (fixed or mobile)

Wastebasket

Electronic Safety and Security:

Life safety device per code 283111

Miscellaneous:

Pencil sharpener (optional)

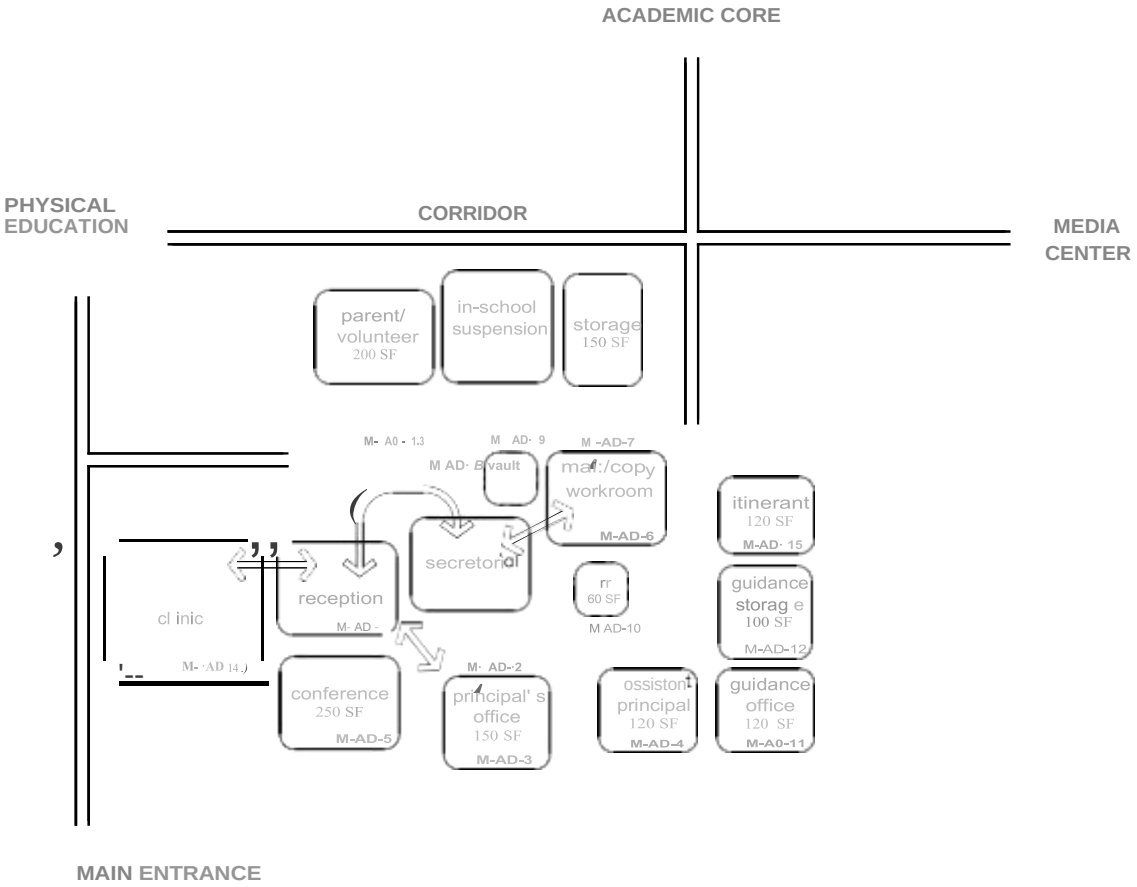
E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Open casework – coats and personal items with wall cabinets above (optional) or base/wall/tall cabinets	123550
F2 Tall wardrobe w/file drawers	123550
F3 About 6' of base & wall cabinets	123550
F4 3' sink base cabinet	123550
F5 20'-28' combination marker board, tack board, & tackable wall surface	101100
F6 Mobile storage cabinet (optional)	123550
F7 Pencil sharpener support (optional)	062000
F8 Windows with integral blinds	085113
F9 Towel dispenser (optional)	102813
F10 Projection screen (optional)	115213
F11 Technology support casework	123550
F12 Mirror (optional)	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink with drinking fountain	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting Illumination level: See Table 8600-5	265100
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projectorvideo port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.



NOTES:

This is an example of how the administrative spaces in a middle school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Administrative space plates:

M-AD-1	Reception Area
M-AD-2	Secretarial Area
M-AD-3	Principal's Office
M-AD-4	Assistant Principal's Office
M-AD-5	Conference Room
M-AD-6	Mail/Work/Copy Room
M-AD-7	Administrative Storage
M-AD-8	Vault/Records Storage
M-AD-9	In-school Suspension
M-AD-10	Restroom
M-AD-11	Guidance Counselor's Office
M-AD-12	Guidance Records/Storage
M-AD-13	Parent/Volunteer Room
M-AD-14	Health Clinic (includes restroom)
M-AD-15	Itinerant Personnel Office

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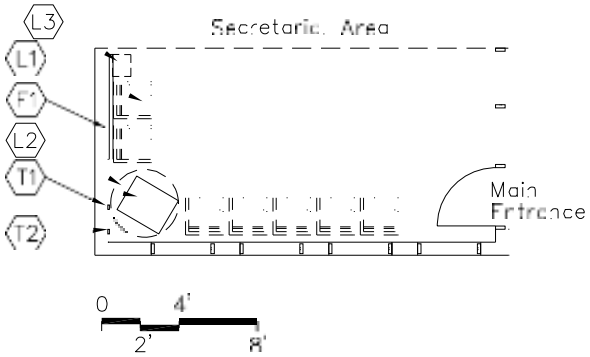
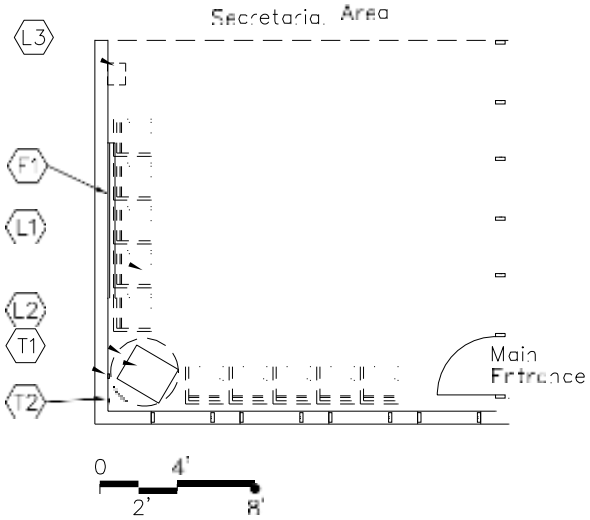
200 SF



400 SF



PROGRAM ACTIVITIES:
- Serves as the main entry to the building
- Visitors may wait or are directed to other areas of the building.

SPATIAL RELATIONSHIPS:
- Access to all areas of the building
- Open to secretarial area
- Near principal's office
- Near main entrance to the building
- Visual access to main entrance of the building

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 40
  ceiling minimum CAC 35, NRC 0.70
- Audio and visual control from secretarial area

CAPACITY:	6 - 8 or 8 - 10 visitors
SIZE:	200 - ***450*** SF
ANCILLARY SPACES:	Secretarial Area M-AD-2

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

RECEPTION AREA
M-AD-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

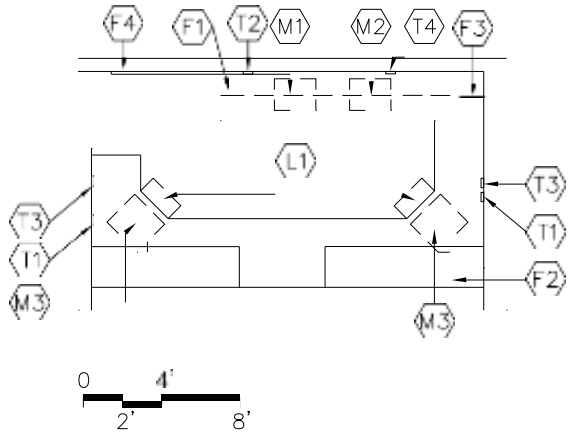
LOOSE FURNISHINGS:
L1 Visitor chairs
L2 End table
L3 Racks for forms (optional)
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tack board or tackable wall surface (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
2 duplex receptacles	262726
Double duplex receptacle adjacent to video port	262726
Means of egress lighting per code	265100
Communications:	
T1 1 ***projector*** video port, monitor, and brackets	271543/274119
T2 1 voice port and phone	271513/273123
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior windows	081113/088000

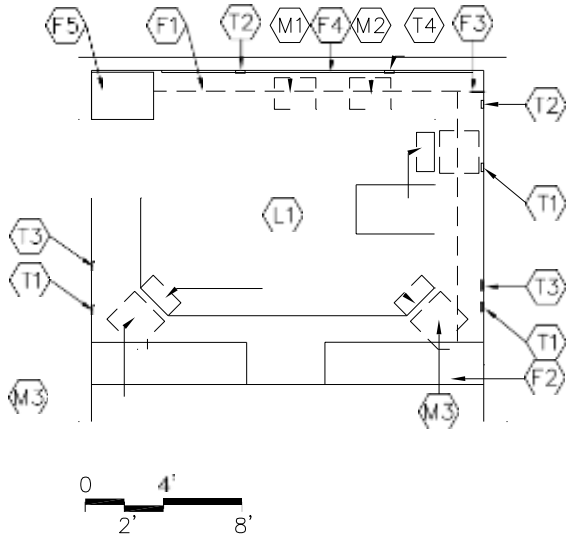
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

200 SF ADA Compliant Approach



400 SF ADA Compliant Approach



CAPACITY:	1 - 2 or 2 - 3 staff
SIZE:	200 - ***450*** SF
ANCILLARY SPACES:	Reception Area M-AD-1

PROGRAM ACTIVITIES:

- Conduct administrative support duties, and receive and direct visitors

SPATIAL RELATIONSHIPS:

- Easy access to all areas of the building
- Open to reception area
- Near principal's office
- Near main entrance to the building
- Visual access to main entrance of the building

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 40
  ceiling minimum CAC 35, NRC 0.70
- Audio and visual control of reception area

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

SECRETARIAL AREA
M-AD-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

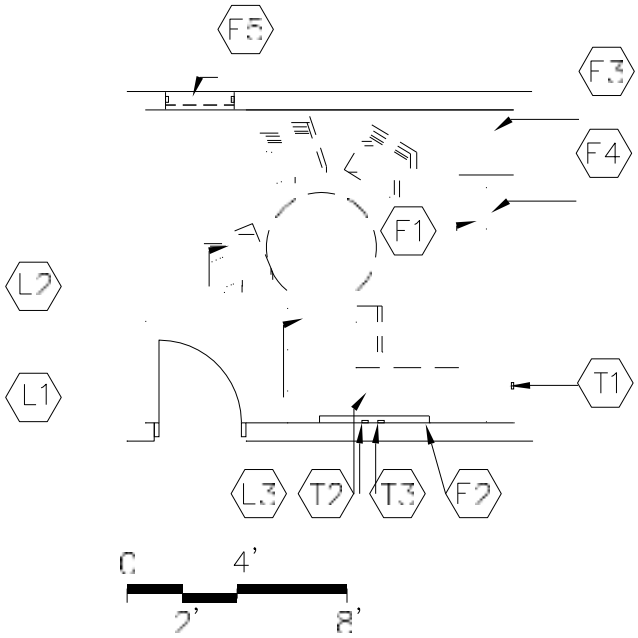
LOOSE FURNISHINGS:
L1 Secretarial chairs
Wastebasket

Miscellaneous:
The following items are to be funded by the school district:
M1 Fax machine
M2 Printer
M3 Computer/typewriter

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 24’ - 60’ of work surface with file drawers	123550
F2 42” high counter top with portion of counter 34” high or lower	123550
F3 16’-24’ of wall cabinets ***(optional)*** for forms, supplies, books, and manuals	123550
F4 Tackable wall surface (optional)	101100
F5 Tall cabinet for coats (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Temperature control with reception area (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
3 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Emergency lighting	265100
Communications:	
T1 1 voice port and phone at each secretarial workstation	271513/***273123***
T2 1 fax port	271513/273113
T3 1 data port at each secretarial workstation	271513
T4 1 data port for printer	271513
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown illustrate quantities for the smallest and largest possible room size.



PROGRAM ACTIVITIES:

- Instructional and administrative leader of the building
- One-on-one conferences with parents, small group meetings, and coordination of administrative tasks

SPATIAL RELATIONSHIPS:

- Near reception area
- Near secretarial area
- Easy access to school circulation areas
- Near main entrance to the building
- Near conference room

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: 1 - 4 persons
SIZE: 150 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

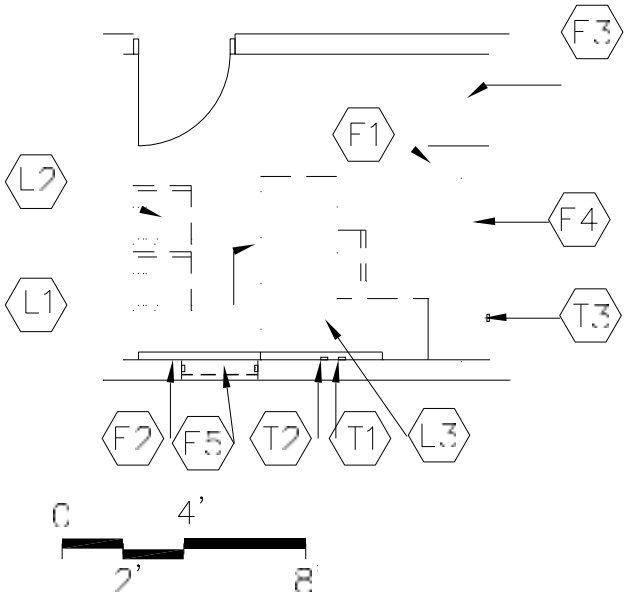
PRINCIPAL'S OFFICE
M-AD-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550 F2
4' of tack board, marker board or tackable wall surface	101100
F3 Tall wardrobe (optional)	123550
F4 Wall cabinets above work surface	123550 F5
Window with integral blinds	085113
Coat hook (optional)	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near workstation	271513
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.



CAPACITY: 1 - 3 persons
SIZE: 120 SF

PROGRAM ACTIVITIES:
- To assist principal in administrative tasks
- One-on-one conferences with parents and coordination of administrative tasks

SPATIAL RELATIONSHIPS:
- Near reception area
- Near secretarial area
- Direct access to school circulation areas
- Near main entrance to the building
- Near or accessible to principal's office
- Near conference room

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

ASSISTANT PRINCIPAL'S OFFICE
M-AD-4

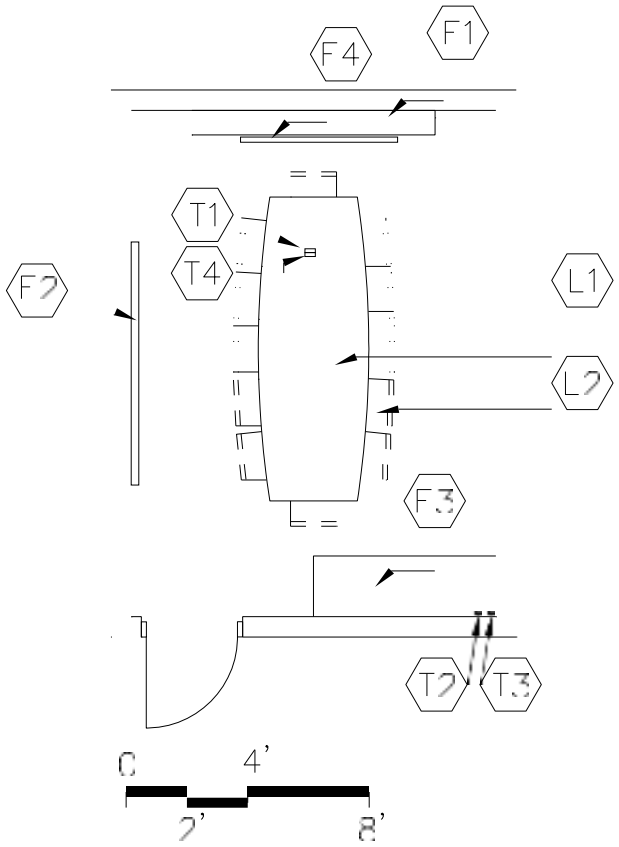
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550 F2
4' of tack board, marker board, or tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets above work surface	123550 F5
Window with integral blinds	085113
Coat hook (optional)	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.



CAPACITY: 12 – 15 persons
SIZE: 250 SF

PROGRAM ACTIVITIES:

- Conferences with staff, students, parents, and other community groups

SPATIAL RELATIONSHIPS:

- Near principal's office
- Near assistant principal's office
- Near reception area
- Near secretarial area

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blind

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

CONFERENCE ROOM
M-AD-5

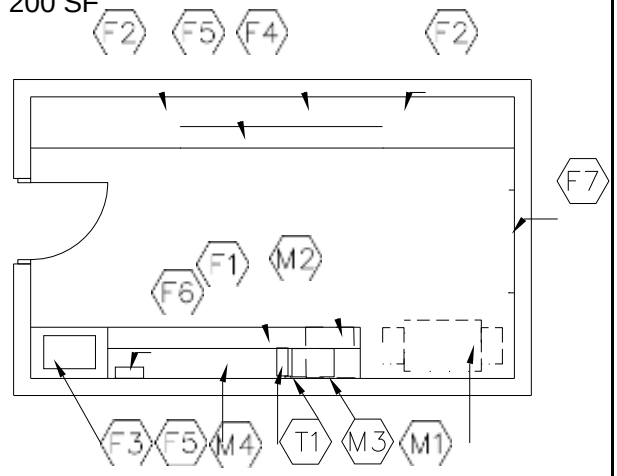
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Conference table
L2 Chairs
Wastebasket

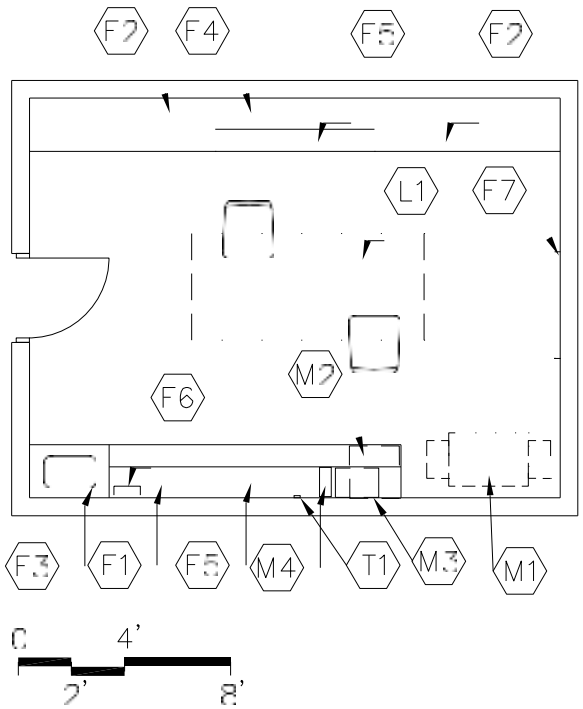
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 About 16' combination marker board, tack board, & tackable wall surface or media display cabinet	101100
F2 Reserved	
F3 Base cabinets (optional)	123550
F4 Projection screen (optional)	115213
Coat hooks (optional)	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Multilevel switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
3 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123 T3
1 data port	271513
Clock	275313
Central sound system	275123
T4 ***Ultra-short throw interactive*** projector	274119
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.

200 SF



300 SF



CAPACITY: N/A
SIZE: 200 - ***400*** SF

PROGRAM ACTIVITIES:

- Distribution area for preparation/copying of mail and materials.
- Staff receives messages and obtains supplies.

SPATIAL RELATIONSHIPS:

- Near secretarial area

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 40
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. The mail cubicles can be either on the wall or through the wall.

MAIL/WORK/COPY ROOM
M-AD-6

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, rubber, linoleum, ET or sheet vinyl	096500 ***096813 096816 096516***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

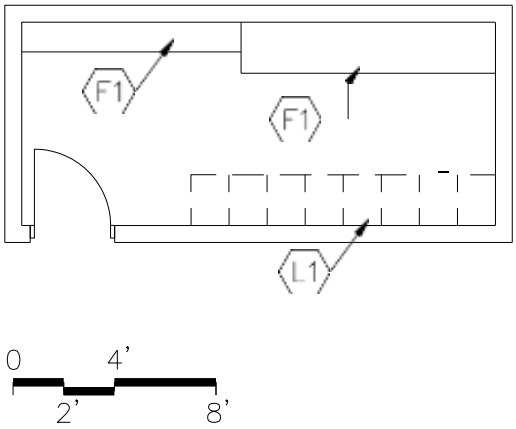
LOOSE FURNISHINGS:
L1 Work table and chairs (applicable in 300 SF space only)
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 About 10' of base & wall cabinets	123550
F2 8'-12' of tall storage cabinets or about ***28'-32' combination*** storage cabinets	123550
F3 3' sink base cabinet	123550
F4 Mail cubicles for all staff	123200
F5 ***Reserved***	
F6 Towel dispenser (optional)	102813
F7 4' tack board ***or marker board*** (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
3 - 5 duplex receptacles	262726
Receptacle for copier	262726
Communications:	
T1 1 voice port and phone	271513/***273123***
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
The following item is to be funded by the school district:
M1 Copier
M2 Undercounter refrigerator
M3 Microwave
M4 Coffee maker

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:

- Supplies, books, records, forms, and equipment storage

SPATIAL RELATIONSHIPS:

- Near mail/work/copy room
- Near vault/records storage

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	150 ***- 200*** SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

ADMINISTRATIVE STORAGE
M-AD-7

FINISHES[1]:	Spec. Ref.#
Flooring:	
Rubber, ***carpet, carpet tile, linoleum, ET or sheet vinyl***	096500 ***096813 096816 096516***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

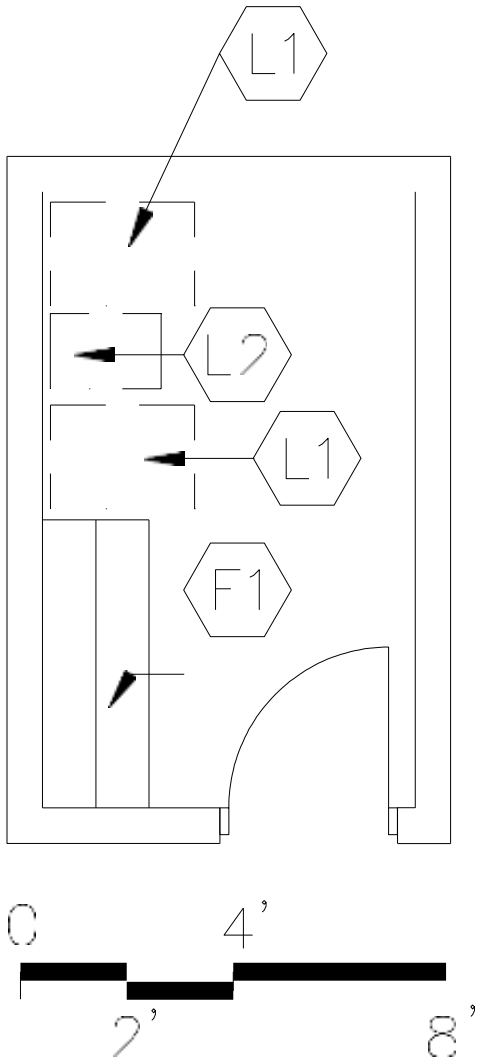
LOOSE FURNISHINGS:
L1 File cabinets

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 10'-20' of open shelving, depth may vary ***(optional – or additional files)***	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

80 SF



CAPACITY: N/A
SIZE: ***80 - 115*** SF

PROGRAM ACTIVITIES:
- Storage of records and security files in a secure area

SPATIAL RELATIONSHIPS:
- Access to guidance area
- Access to secretarial personnel

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

VAULT/RECORDS STORAGE
M-AD-8

FINISHES[1]:	Spec. Ref.#
Flooring:	
Rubber***, carpet, carpet tile, linoleum, ET or sheet vinyl***	096500 ***096813*** ***096816*** ***096516***
Base:	
Resilient base	096500
Ceiling:	
Rated 2-hour construction	---
Walls:	
Rated 2-hour construction	
Painted concrete masonry units or	042000/099100
Painted gypsum wallboard over metal studs	092116/099100

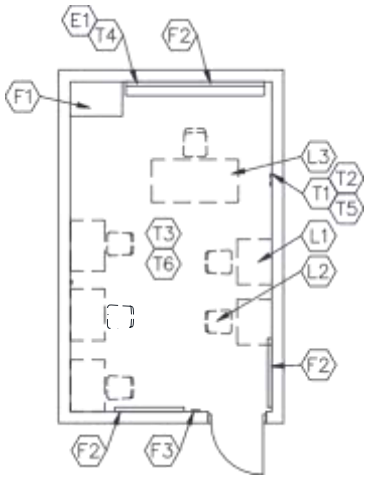
LOOSE FURNISHINGS:
L1 File cabinet***s***
L2 Safe (loose or fixed)

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 3'-6' of open shelving, ***(optional – or additional files)*** (depth may vary) (fixed or loose)	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
Wall, ceiling, and door construction to have a 2-hour fire rating	

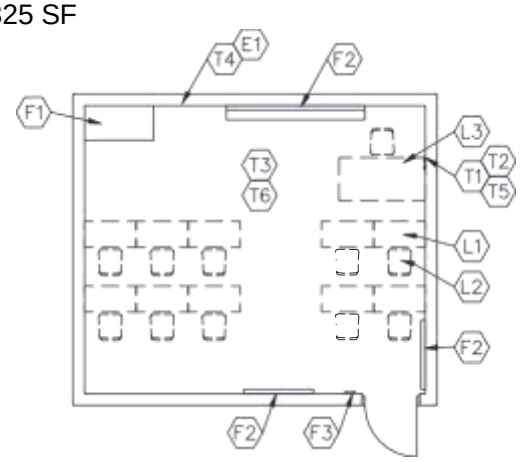
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

200 SF



325 SF



CAPACITY: 5 - 8 students
SIZE: 200 - 600 SF

PROGRAM ACTIVITIES:

- Instructional area for students who require time away from the normal classroom due to behavioral problems

SPATIAL RELATIONSHIPS:

- Near principal's office
- Near secretarial area

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blind

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

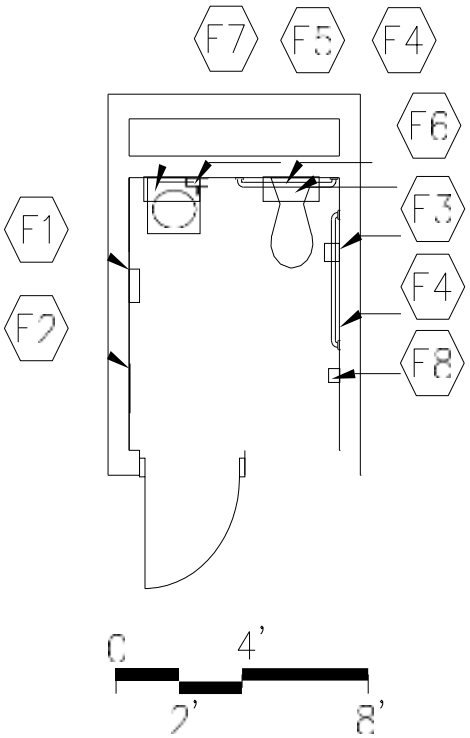
IN-SCHOOL SUSPENSION
M-AD-9

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, ET, linoleum, rubber, or sheet vinyl	096816 096500 096516 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint 092113	
LOOSE FURNISHINGS:	
L1 Student carrels and/or desks	
L2 Student chairs	
L3 Teacher workstation and chair	
L4 Reserved	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111
E1 Duplex receptacle with dedicated circuit for wireless devices	
Miscellaneous:	
Pencil sharpener (optional)	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 3'-4' of base cabinets (optional)	123550
F2 10'-16' combination marker board, tackboard or tackable wall surface	101100
F3 Pencil sharpener support (optional)	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123
T2 1 data port near teacher workstation	271513
T3 Wireless access point cable above ceiling	271513
T4 1 projector video port	271543
Clock	275313
Central sound system	275123
T5 Classroom technology center video port	271543, 274116, 274119, 275127
T6 Wireless access point (WAP) as determined by Design – refer to Note 2	272133

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:
- Personal and health needs for teachers and staff
- Restroom facilities for clinic

SPATIAL RELATIONSHIPS:
- Located in the administrative area

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC *48*
  ceiling minimum CAC 35**,** NRC 0.70
- Moisture- and stain-resistant finishes

CAPACITY: 1 person
SIZE: ***60*** SF

NOTES:

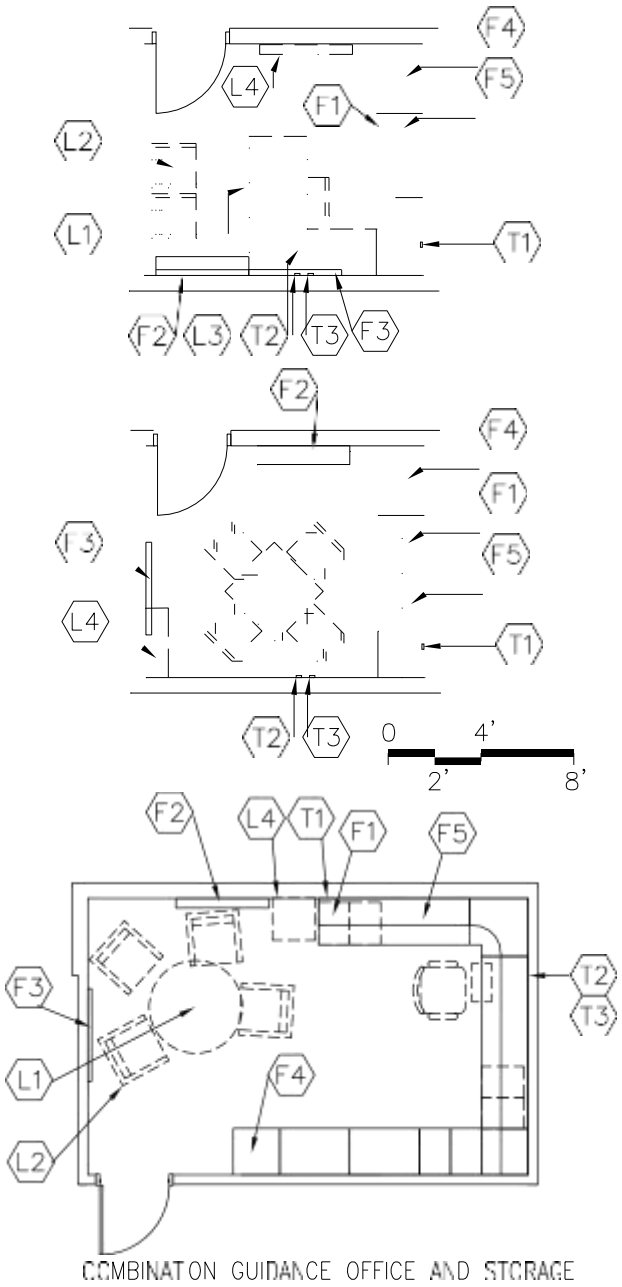
RESTROOM
M-AD-10

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET or sheet vinyl	096500
Optional: ceramic mosaic tile, porcelain tile, or resinous flooring	093000 096723
Base:	
Resilient base	096500
Optional: ceramic mosaic tile, porcelain tile, resinous flooring, or integral vinyl cove base	093000 096723
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
Optional: moisture & abuse-resistant gypsum wall board	092116/099100
LOOSE FURNISHINGS:	
Wastebasket	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 24" x 60" mirror	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 8” deep wall cabinet above toilet for supplies (optional)	102813 F7
Stainless steel shelf (optional)	102813 F8
Coat hook	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



COMBINATION GUIDANCE OFFICE AND STORAGE

CAPACITY: 1 - 3 persons
SIZE: 120 SF

PROGRAM ACTIVITIES:

- Guidance counselor to do individual work and provide assistance to students
- One-on-one conferences with parents and coordination of administrative tasks
- Could be combined with guidance records/storage

SPATIAL RELATIONSHIPS:

- Near guidance/records storage
- Near reception area
- Near secretarial area
- Access to school circulation areas

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blind

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

GUIDANCE COUNSELOR'S OFFICE
M-AD-11

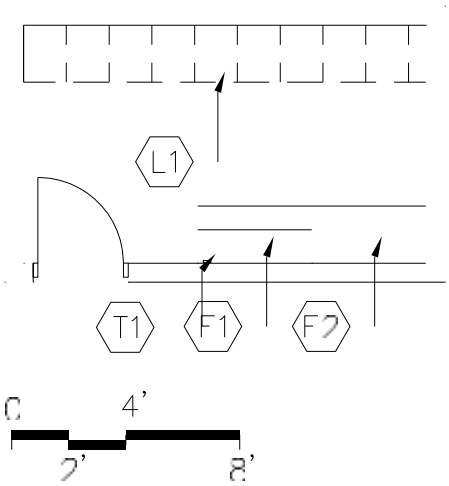
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Desk or table, with chair
L2 Visitor chairs
L3 Computer desk return
L4 Bookcase (fixed or loose)
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4'-8' combination marker board, tack board or tackable wall surface	101100
F3 Reserved	
F4 Tall wardrobe	123550
F5 Wall cabinets	123550
Coat hook (optional)	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near workstation	271513
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.



PROGRAM ACTIVITIES:

- Storage of supplies, files, and equipment in a secure area

SPATIAL RELATIONSHIPS:

- Near guidance counselor's office
- Could be combined with guidance counselor's office

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	100 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

GUIDANCE RECORDS/STORAGE
M-AD-12

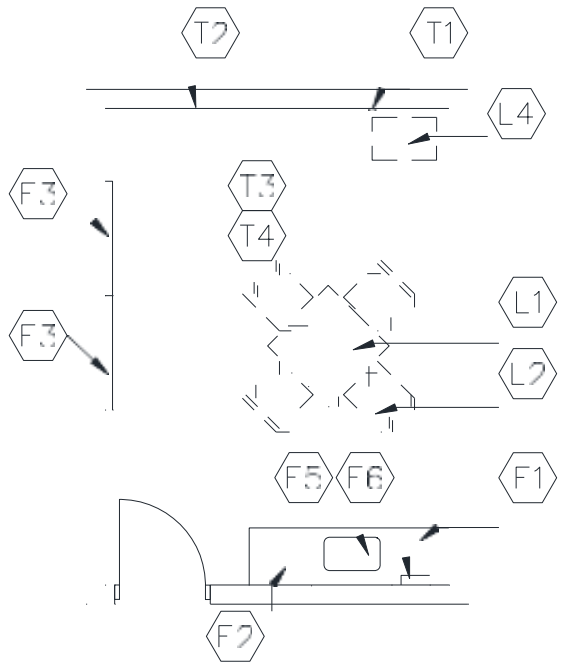
FINISHES[1]:	Spec. Ref.#
Flooring:	
Rubber***, carpet, carpet tile, linoleum, ET, or sheet vinyl***	096500 ***096813*** ***096816*** ***096516***
Base:	
Resilient base	096500
Ceiling:	
Rated 2-hour construction	---
Walls:	
Rated 2-hour construction	
Painted gypsum wallboard over metal studs or	092116/099100
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 File cabinets

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 ***6'-10' combination tall cabinets, base or wall cabinets (or additional file cabinets)***	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
T1 1 data port (optional)	271513
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Wall, ceiling, and door construction to have a 2-hour fire rating	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- After school meetings, community, and small group meetings

SPATIAL RELATIONSHIPS:
- Near administrative area

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blind

CAPACITY: 2 - 8 persons
SIZE: 200 - 300 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

PARENT/VOLUNTEER ROOM
M-AD-13

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Optional: ET, linoleum, or sheet vinyl	096500 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

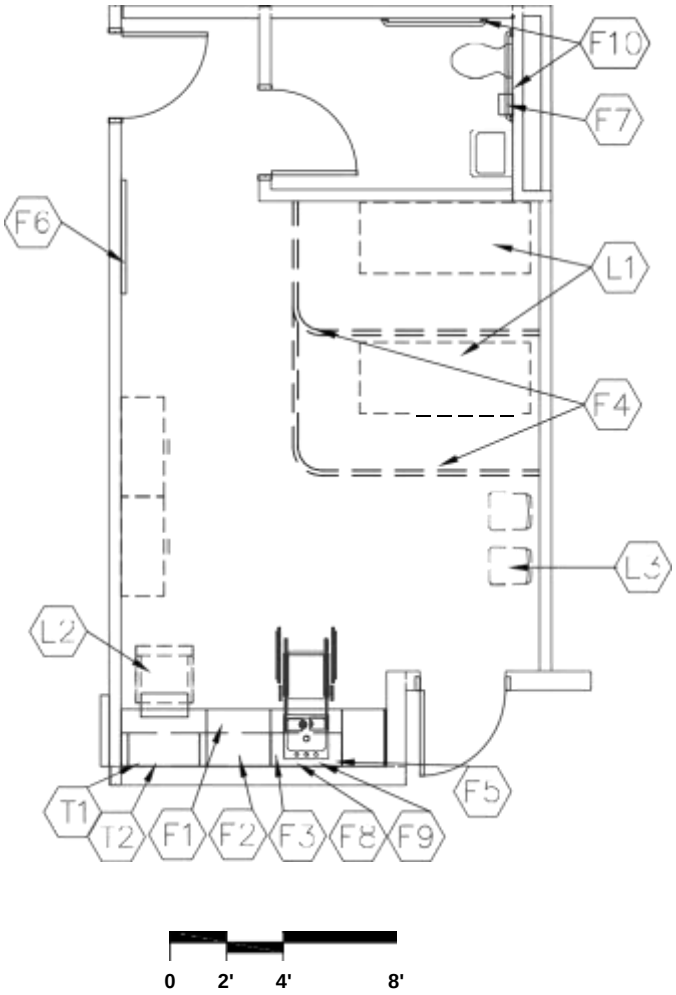
LOOSE FURNISHINGS:
L1 Table
L2 Chairs
L3 Reserved
L4 Monitor cart
Wastebasket

Miscellaneous:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 About 3' of base cabinets	123550
F2 Tall wardrobe	123550
F3 8'-12' combination marker board, tack board or tackable wall surface	101100
F4 Reserved	
F5 3' Sink base cabinet	123550
F6 Towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting Illumination level: See Table 8600-5	265100
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 Reserved	
T2 voice port with phone	271513/273123
T3 Wireless access point cable above ceiling	***271513***
T4 Wireless access point (WAP) as determined by design – refer to note 2	***27153***
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable. WAP device quantity / placement per 272133 requirements.

450 SF



CAPACITY: 2 - 3 patients
SIZE: Clinic…….***290 - 540*** SF
Restroom…..……60 SF
ANCILLARY SPACES: Secretarial Area
M-AD-2

PROGRAM ACTIVITIES:
- Treatment of minor injuries, administration of medication, and conduction of hearing or vision tests

SPATIAL RELATIONSHIPS:
- Near reception area
- Adjacent to individual restroom
- Near special education shower

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Stain-resistant floor covering

NOTES:

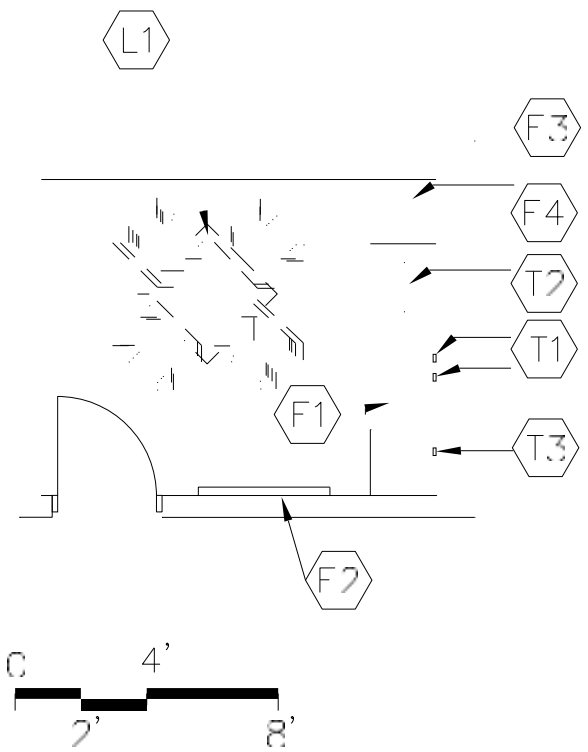
1. Loose furnishings shown represent one of many possible arrangements.

HEALTH CLINIC *(includes restroom)*
M-AD-14

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber, ET	096516
vinyl, or	096500
resinous flooring	096723
Restroom: ET, sheet vinyl, ceramic mosaic, porcelain or resinous flooring	093000
Base:	
Resilient base, resinous flooring, or integral vinyl cover base, ceramic mosaic or porcelain tile	096500 096730 093000
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100
LOOSE FURNISHINGS:	
L1 Cots	
L2 Desk and chair	
L3 Chairs	
Wastebasket	
EQUIPMENT	
E1 Refrigerator with ice making capabilities	
Miscellaneous:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 8'-10' combination base & wall cabinets, lockable	123550
F2 3' sink base cabinet	123550
F3 Reserved	
F4 Cubicle curtain and track	102123
F5 Towel dispenser	102813
F6 4’ of tack board or marker board	101100
F7 Sanitary napkin dispenser/disposal	102813
F8 Soap dispenser	102813
F9 24” x 60” mirror	102813
F10 36” and 42” grab bars	102813
Coat hooks (optional)	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Sink - with goose neck	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Exhaust directly to exterior	
Electrical:	
Single level switching with dimmer	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
2 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Receptacle for refrigerator	262726
Emergency lighting	265100
Communications:	
T1 1 voice port and phone	271513/273123
T2 1 data port near workstation	271523
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.



APACITY: 1 - 3 persons
SIZE: 120 SF

PROGRAM ACTIVITIES:

- Office and work area for specialists such as psychologist, reading specialist, etc., who regularly spend a portion of their schedule at one of several schools

SPATIAL RELATIONSHIPS:

- Near reception area
- Near secretarial area
- Direct access to school circulation areas
- Near main entrance to the building
- Near or accessible to principal's office and guidance counselor's office

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blind

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

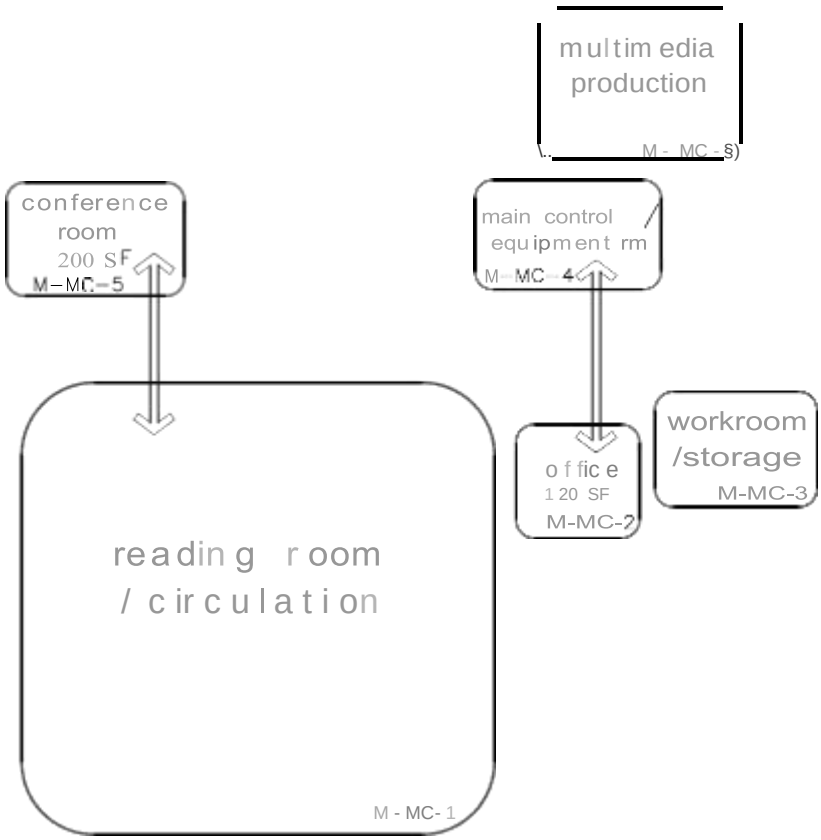
ITINERANT PERSONNEL OFFICE
M-AD-15

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Table and chairs
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers(optional)	123550
F2 4' of tack board**,** marker board, or tackable wall surface	101100
F3 Tall wardrobe (optional)	123550
F4 Wall cabinets	123550
Coat hook (optional)	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123
T2 1 data port	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.



NOTES:

This is an example of how the media center spaces in a middle school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Media Center space plates:

M-MC-1 Reading Room/Circulation M-MC-2 Media Specialist Office
M-MC-3 Workroom/Storage
M-MC-4 Main Control / Equipment Room
M-MC-***5*** Conference Room
M-MC-***6*** Multimedia Production Room

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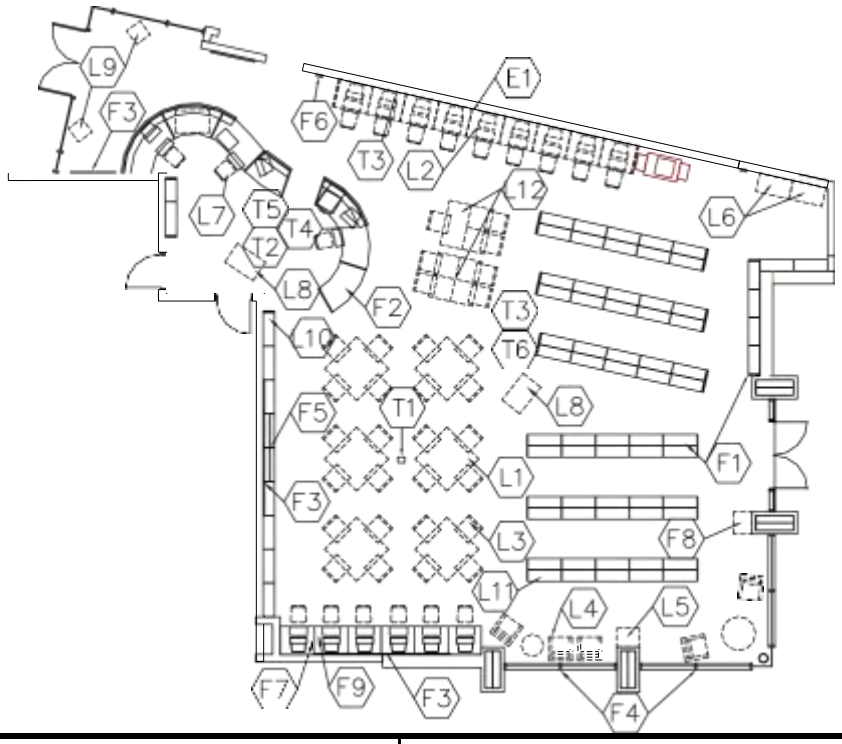


CAPACITY: 10% of student capacity
SIZE: 10% of student capacity multiplied by 35 SF per student

PROGRAM ACTIVITIES:

- Information laboratory that serves the instructional needs of the entire school.
- Recreational reading, research, accessing information, using technology, storing, cataloging, and reproduction of materials and information.
- Individual, small group, and class reading and researching.

SPATIAL RELATIONSHIPS:

- Centrally located and accessible to all areas of the facility
- Locate with access to academic core classrooms
- Easy access to public parking

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Visual awareness of space to students and staff through transparency to corridor

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

READING ROOM/CIRCULATION
M-MC-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
Acoustical wall treatment	098000

LOOSE FURNISHINGS:
L1 Student tables
L2 Computer workstation furniture
L3 Student chairs
L4 Casual seating/tables
L5 Atlas stand/dictionary stand (optional)
L6 Lateral file
L7 Circulation desk task chair
L8 Mobile book carts
L9 Paperback book racks
L10 Magazine display
L11 Newspaper rack
L12 Study carrels
Wastebaskets

Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior windows	081113/088000

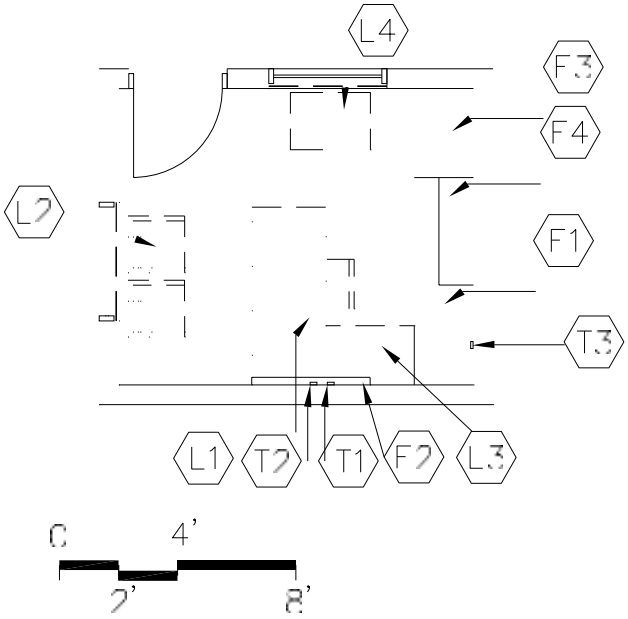
Pencil sharpener (optional)

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Library book shelving (see notes)	115123
F2 Circulation desk casework	123550
F3 20'-32' of tack board, marker board or tackable wall surface (optional)	101100
F4 Windows with integral blinds	085113
F5 Projection screen (optional)	115213
F6 Pencil sharpener support (optional)	062000
F7 Computer workstations (could be loose)	123550
F8 Search terminal stations	123550
F9 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temp control	230923
Electrical:	
Multi-level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
8 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Communications:	
T1 1 ***projector*** video port and video display device	271543/274119
T2 1 voice port and phone	271513/273123
T3 ***Wireless access point cable above ceiling***	271513
T4 1 data port for media center automation system	271513
Clock	275313
Central sound system	275123
T5 Classroom technology center video port	***271543, 274116, 274119, 275127***
T6 Wireless access point (WAP) as determined by Design – refer to Note 6	***272133***

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Circulation desk(s) and library shelving can be loose furnishings.
3. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
4. Fixed casework and loose furnishings can be interchangeable.
5. Up to 20% of book shelving can be movable.
6. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***



PROGRAM ACTIVITIES:
- Media specialist to conduct duties

SPATIAL RELATIONSHIPS:
- Near reading room/circulation area
- Near workroom/storage
- Could be part of the media center reading room

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	1 - 3 persons
SIZE:	120 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

MEDIA SPECIALIST OFFICE
M-MC-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

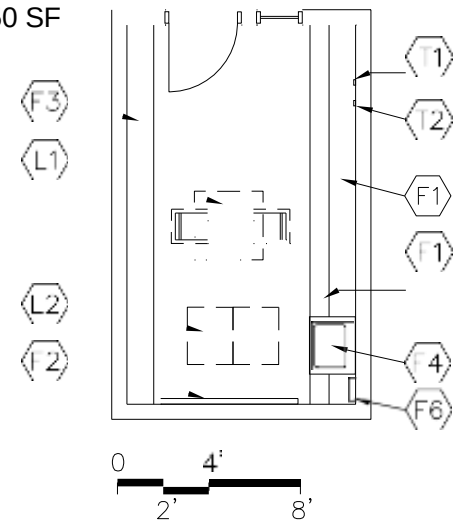
LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
L4 File cabinet
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board**,** marker board, or tackable wall surface	101100
F3 Tall wardrobe (optional)	123550
F4 Wall cabinets (optional)	123550
F5 Bookcases (optional)	123550
Coat hook (optional)	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window	081113/088000

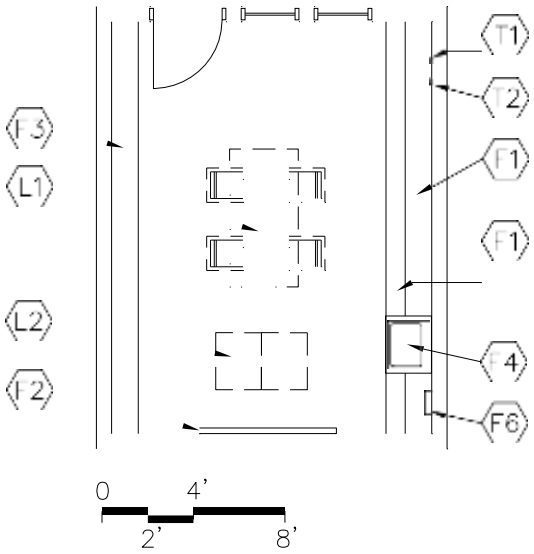
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can either be all fixed casework or all loose furnishings.

150 SF



250 SF



CAPACITY: 1 - 3 staff
SIZE: 150 - ***400*** SF

PROGRAM ACTIVITIES:
- Receiving, processing, and repairing media material

SPATIAL RELATIONSHIPS:
- Near reading room/circulation
- Near media specialist office

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Visual access to reading room/circulation

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

WORKROOM/STORAGE
M-MC-3

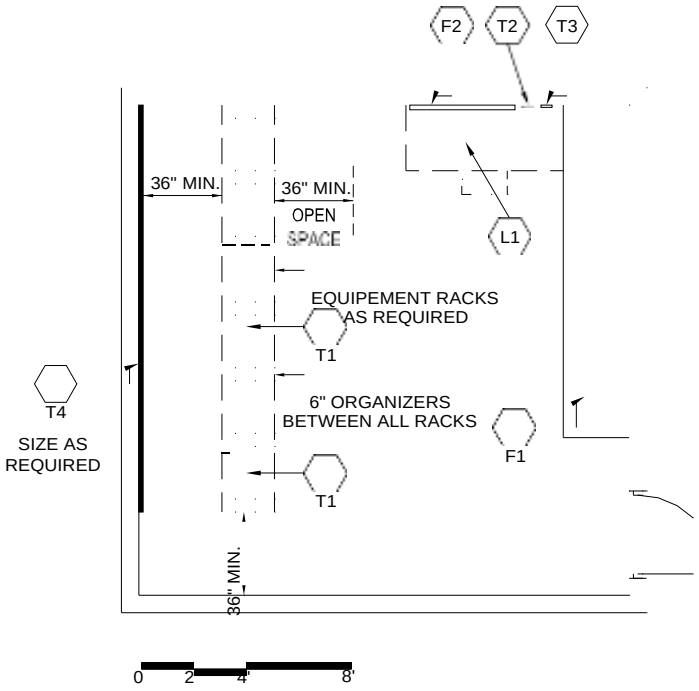
FINISHES[1]:	Spec. Ref.#
Flooring:	
Rubber***, linoleum, ET or sheet vinyl***	096500
Optional: Carpet or carpet tile	***096516***
	096813
	096816
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Table and chairs
L2 Book trucks
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 ***20'-34' combination base/wall/tall cabinets***	123550
F2 4'-8' of tack board ***or marker board***	101100
F3 10' - 18' of bookcases (optional)	123550
F4 3' sink base cabinet	123550
F5 ***Reserved***	
F6 Towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
3 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data port	262726
Communications:	
T1 1 voice port and phone	271513/***273123***
T2 1 data port	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window	081113/088000

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



PROGRAM ACTIVITIES:

- Collection and distribution hub for the voice, video, and data networks within the facility
- Contains racks for distribution equipment

SPATIAL RELATIONSHIPS:

- Near the center of the building ***to minimize the number of Telecommunication Rooms (TR)***

ENVIRONMENTAL CONSIDERATIONS:

- Ventilation and cooling of heat-generating electronic equipment

Note: Technology designer shall confer with school district technology director to determine equipment and space needed and coordinate with project designer.

CAPACITY: N/A
SIZE: ***(Baseline) (Minimum)*** 300 SF

ER Utilized as district N.O.C. – add minimum 150 SF
ER Utilized as building data center for central servers/thin client – add minimum 30 SF per 10 classrooms

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. ***Verify and coordinate ER size and location with the technology designer during programming phase.***

MAIN CONTROL / EQUIPMENT ROOM
M-MC-4 (ER)

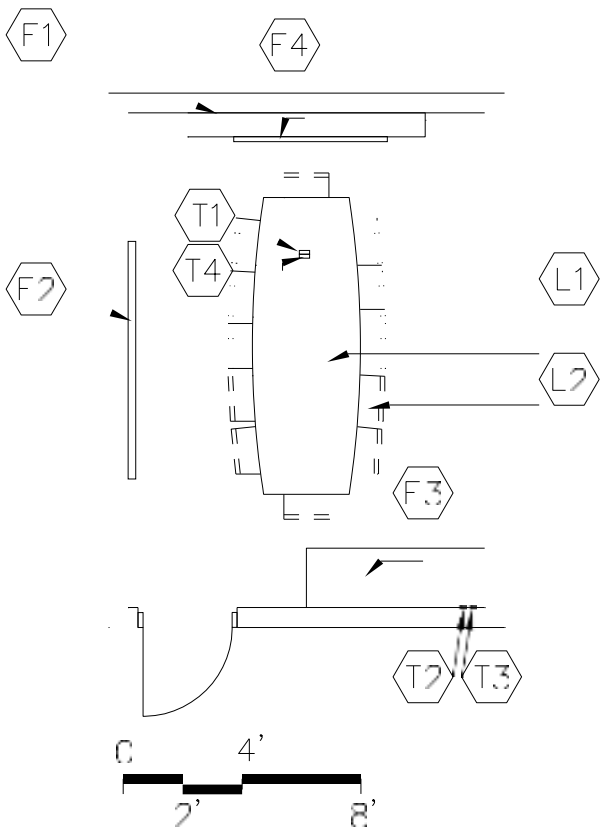
FINISHES[1]:	Spec. Ref.#
Flooring:	
ET or sheet vinyl (static dissipative flooring)	096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Desk and chair
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 8'-16' of open shelving, depths may vary (fixed or loose)	123550
F2 4' of tack board or marker board (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Independent, packaged system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
3 duplex receptacles	262726
Duplex receptacle for electronic systems	262726
Telecommunications Grounding	270526/260526
Standby power	263213/263600
Communications:	
T1 Technology Equipment	
Central sound system	275123
Telephone wiring	271313/271513
Integrated telephone system	273123
Video wiring	271543
Digital on demand delivery system	274125
Local area network wiring	271513/271323
Local area network electronics	272100/272133
Grounding & Infrastructure Equipment	270526/271100
T2 1 voice port and phone	271513/273123 T3
1 data port near workstation	271513
T4 ***3/4***" plywood back board	271313
Electrical Safety and Security:	
Life safety devices per code	283111
Security system	281300/281600/282300
Miscellaneous:	
Provide distribution equipment with an equipment electrical ground.	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Used primarily by students for group projects

SPATIAL RELATIONSHIPS:
- Near reading room/circulation

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC *45*
  ceiling minimum CAC 35**,** NRC 0.70
- Optional – window with integral blind

CAPACITY: 8 - 12 persons
SIZE: ***200 - 310 SF***

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

CONFERENCE ROOM
M-MC-*5*

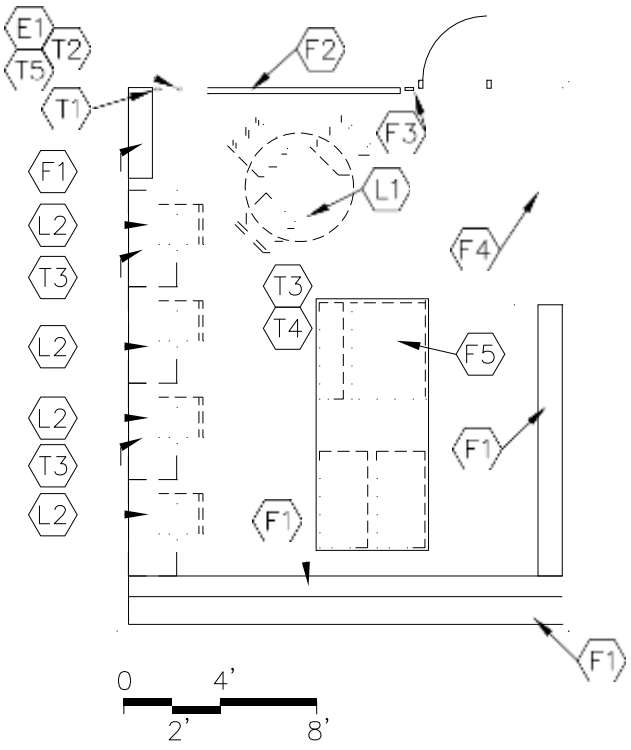
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Conference table
L2 Chairs
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 14'-18' combination marker board, tack board, and tackable wall surface	101100
F2 Reserved	
F3 Base cabinets (optional) (fixed or mobile)	123550
F4 Projection screen (optional)	115213
Coat hooks (optional)	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Multilevel switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
3 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123 T3
1 data port	271513
T4 ***Ultra-short throw interactive*** projector	274119
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed equipment or loose furnishings can be also all fixed equipment or all loose furnishings.



PROGRAM ACTIVITIES:

- Production of a variety of media
- Individual student project work and student instruction
- Putting together student project presentations in media such as PowerPoint, video, reports, 3D models, etc.

SPATIAL RELATIONSHIPS:

- Near workroom/storage
- Near media center

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control –
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	2 - 7 persons
SIZE:	400 SF
ANCILLARY SPACES:	

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. This space could be an area inside the media center.

MULTIMEDIA PRODUCTION ROOM
M-MC-*6*

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, ET, sheet vinyl, or rubber	096516 096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Tables and chairs/stools
L2 Computer workstation furniture
Wastebasket

Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
Pencil sharpener (optional)
Interior windows for supervision (optional) 081113/088000
The following items to be provided by the school district: copier, scanner, printers, binders, and laminators.

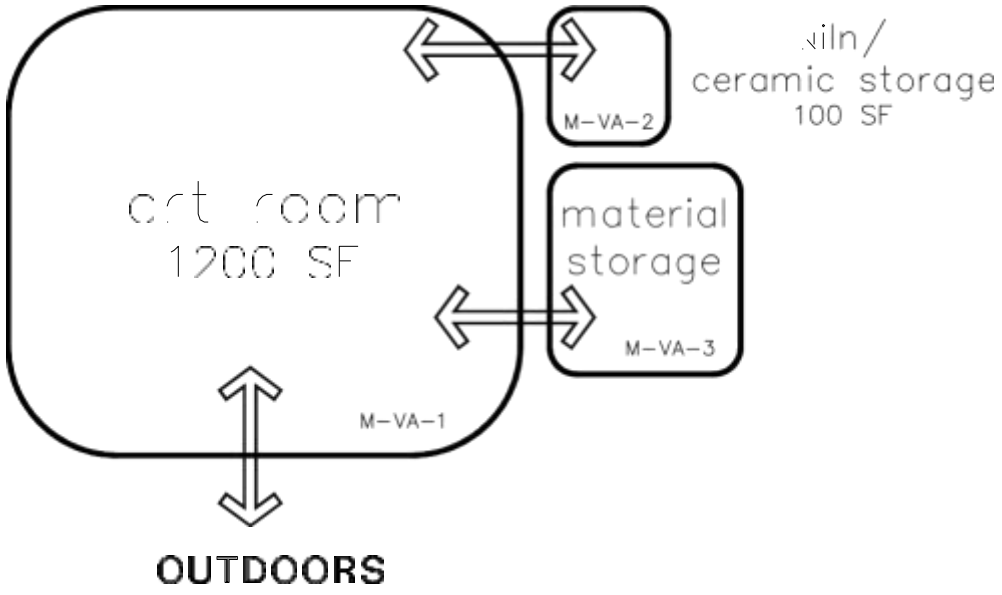
E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items[3]:	
F1 15'-35' combination tall cabinets, wall and base cabinets	123550
F2 4'-8' of combination tack board/ marker board	101100
F3 Pencil sharpener support (optional)	062000
F4 3' - 9' of tall cabinets	123550
F5 Work surface	123550
F6 Technology support casework (if applicable)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Multilevel switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726

Communications:
T1 1 ***projector*** video port and video display device 271543/274119
T2 1 voice port and phone 271513/273123
T3 ***Wireless access point cable above ceiling*** 271513
Clock 275313
Central sound system 275123
T4 Wireless access point (WAP) as determined by Design – refer to Note 3 272133
T5 Classroom technology center video port 271543, 274116, 274119, 275127

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.
3. Baseline includes WAP cable. WAP device quantity / placement per 272133 requirements.



NOTE:

This is an example of how the visual arts spaces in a middle school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Visual Art space plates:

M-VA-1	Art Room
M-VA-2	Kiln/Ceramic Storage
M-VA-3	Art Material Storage

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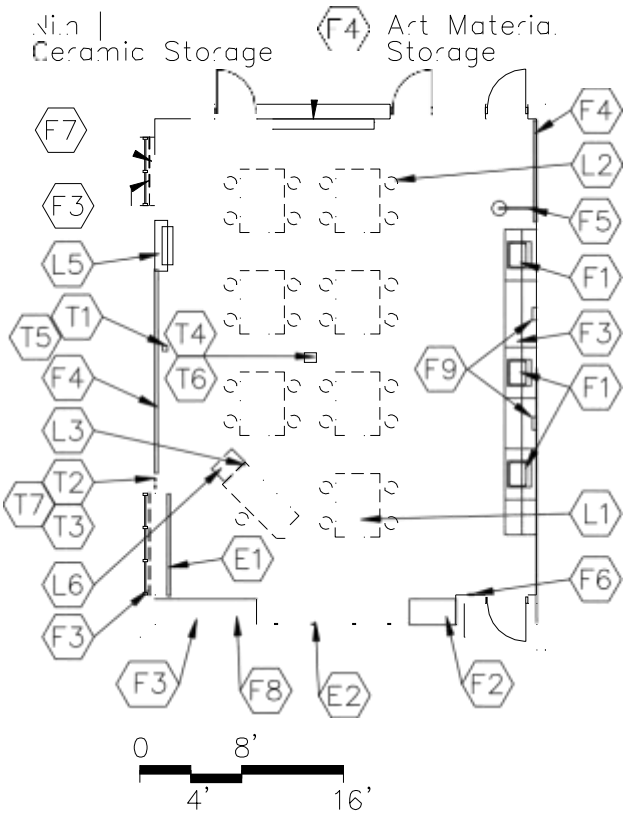


PROGRAM ACTIVITIES:

- Art students will work on a variety of two and three-dimensional art projects. Projects will include drawing and painting, computer graphics, sculpture and model making, collage, fiber arts, and ceramics.

SPATIAL RELATIONSHIPS:

- Near academic core classrooms
- Direct access to outdoors or access through corridor

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Stain-resistant floor covering

CAPACITY:	28 students
SIZE:	1,200 SF
ANCILLARY SPACES:	Kiln/Ceramic Storage M-VA-2
	Art Material Storage M-VA-3

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

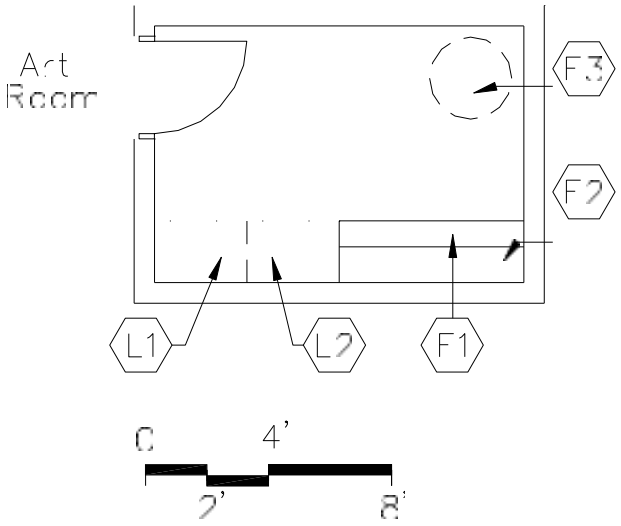
ART ROOM
M-VA-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, sheet vinyl, rubber,	096500
sealed concrete,	033000
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	
099100	
LOOSE FURNISHINGS:	
L1 Student work tables	
L2 Student chairs or stools	
L3 Teacher desk and chair/stool and teacher computer support	
L4 Reserved	
L5 Desk height file cabinet	
Wastebasket	
EQUIPMENT:	
E1 Drying rack	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
E2 Duplex receptacle with dedicated circuit for wireless devices	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 3'-5' sink base cabinets, or several wash fountains	123550
F2 Tall wardrobe with file drawers	123550
F3 26'-34' combination tall cabinets, base and wall cabinets	123550
F4 26'-34' combination marker board, tack board & tackable wall surface	101100
F5 Emergency eyewash (recommended)	224000
F6 Pencil sharpener support (optional)	062000
F7 Windows with integral blinds	085113
F8 Technology support casework	123550
F9 Towel dispenser (optional)	102813
F10 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sinks with solids interceptor	224000
Emergency eyewash connections	224500
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Manually controlled general exhaust	Div. 23
Electrical:	
Fluorescent lighting Illumination level: See Table 8600-5	265100
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Track lighting	265100
Means of egress lighting per code	265100
Emergency lighting per code	265100
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by design – refer to Note 2	272133
T7 Classroom technology center videoport	271543, 274116, 274119, 275127

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity/placement per 272133

requirements.



PROGRAM ACTIVITIES:
- Firing of art projects in ceramics and pottery by the teacher

SPATIAL RELATIONSHIPS:
- Adjacent to art room
- Near art material storage

ENVIRONMENTAL CONSIDERATIONS:
- Ventilation controlled by a thermostat

CAPACITY:	N/A
SIZE:	100 SF
ANCILLARY SPACES:	Art Room M-VA-1

NOTES:

KILN/CERAMIC STORAGE
M-VA-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete,	***033000***
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 3' of tall dry storage units (total)
L2 3' of tall damp storage units (total)

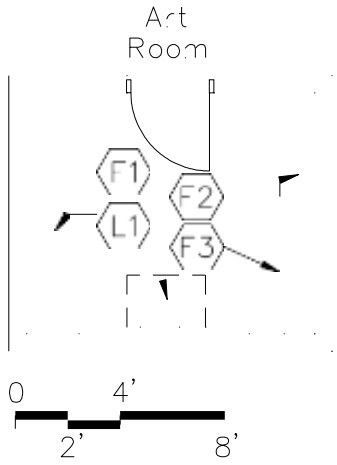
L1 and L2 could be fixed casework.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 3'-6' of base cabinets	123550
F2 3'-6' of wall cabinets	123550
F3 Kiln	119200
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Temperature controlled exhaust	Div. 23
Ventilation for kiln	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Electrical connection for kiln	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

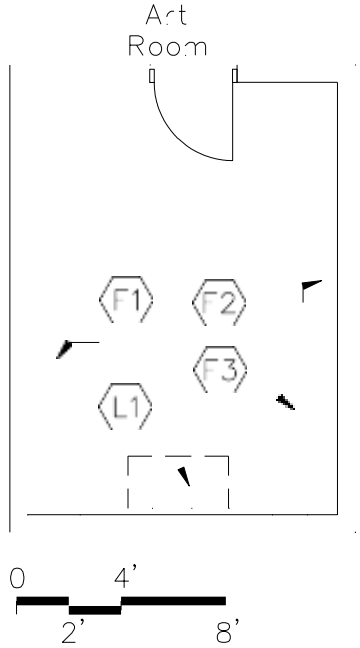
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

100 SF



200 SF



CAPACITY: N/A
SIZE: 100 - 200 SF
ANCILLARY SPACES: Art Room
M-VA-1

PROGRAM ACTIVITIES:
- Storage of art supplies and materials

SPATIAL RELATIONSHIPS:
- Adjacent to art room

ENVIRONMENTAL CONSIDERATIONS:
- Stain-resistant floor covering

NOTES:

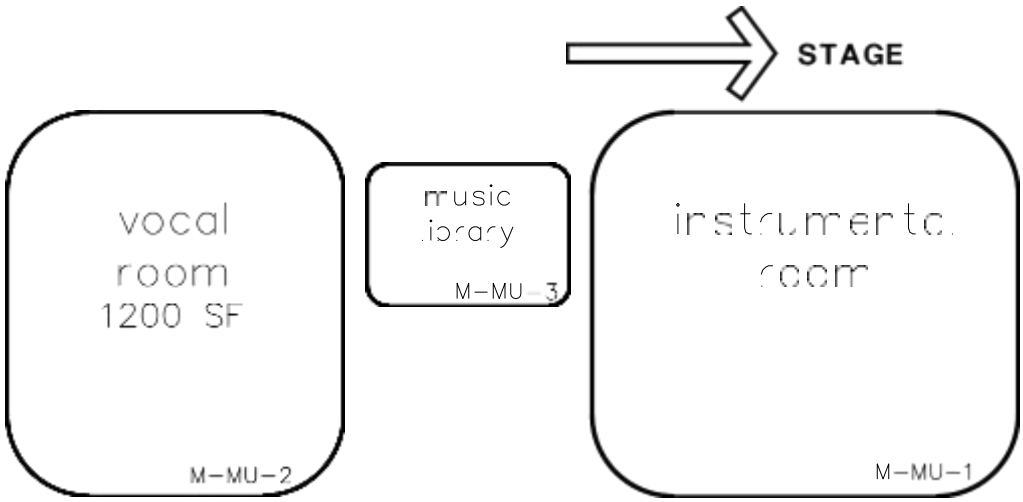
ART MATERIAL STORAGE
M-VA-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, sheet vinyl,	096500
sealed concrete,	***033000***
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Mobile materials cart

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 ***16'-28' combination base/wall or tall storage***	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-4	
Duplex receptacle above base cabinet	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



NOTES:

This is an example of how the music spaces in a middle school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Music space plates:

M-MU-1 Instrumental Room
M-MU-2 Vocal Room
M-MU-3 Music Library

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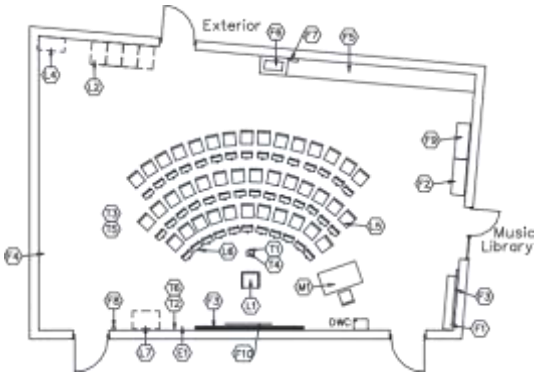
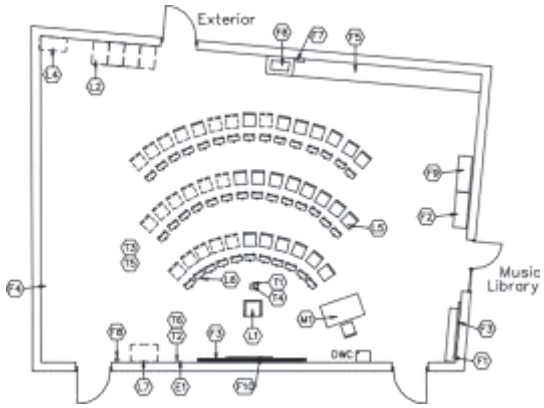
1400 SF



1600 SF



CAPACITY: District to dictate program
SIZE: 1,400 - 1,600 SF
ANCILLARY SPACES: Music Library M-MU-3

PROGRAM ACTIVITIES:

- House all of the instrumental music activities
- Practice area for individuals, small groups, class-size groups, and the entire school band
- Practice and performance type presentations
- Storage of band instruments

SPATIAL RELATIONSHIPS:

- Grouped with other noise producing activities
- Access to parking
- Direct access to outdoors
- Near vocal room
- Near the stage in the student dining area

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 60
  ceiling minimum CAC 35, NRC 0.70
- Large doors
- Ceiling heights: preferred 12'-16'
  (12' minimum)
- Acoustical requirements as determined by final configuration and other factors of the space.

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

INSTRUMENTAL ROOM
M-MU-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile	096816
Optional: linoleum, rubber, ET, sheet vinyl	096516 096500 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	
099100	
Acoustical wall treatment (varies with geometry of room)	098000
Absorptive 25%, reflective 25%, diffusive 50%	

LOOSE FURNISHINGS:
L1 Conducting podium
L2 Mobile percussion instrument storage cabinet
L3 Reserved
L4 Mobile sheet music cabinet
L5 Music chairs
L6 Music stands
L7 Teacher workstation
Wastebasket

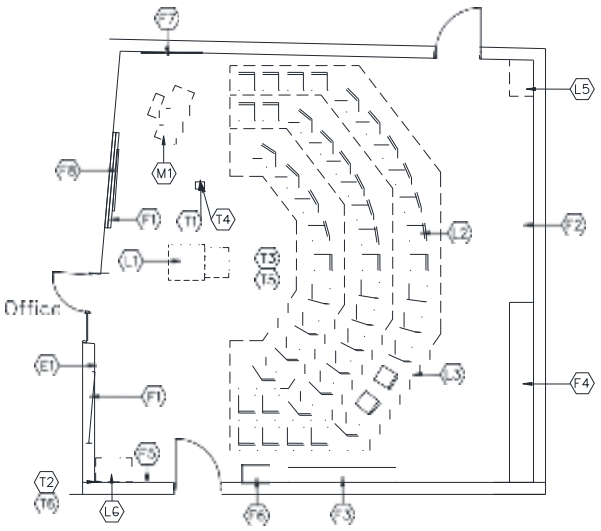
Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Doors are to have acoustic trim accessories.
Pencil sharpener (optional)
The following item is to be funded by the school district:
M1 Piano

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 4'-8' of bookshelves (or loose)	123550
F2 About 4' of tall cabinets	123550
F3 12'-28' combination marker board, tack board and tackable wall surface	101100
F4 Technology support casework	123550
F5 Instrument storage cabinets	123550
F6 3' sink base cabinet	
F7 Towel dispenser	102813
F8 Pencil sharpener support (optional)	062000
F9 Stereo cabinet (optional)	123550
F10 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Drinking water cooler	224000
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temp control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting	265100
Telecommunications Grounding	270526/260526
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123 T3
Wireless access point cable above ceiling	271513
Clock	275313
Middle School music sound system	275125
Central sound system	275123
T4 Ultra-short throw interactive projector	274119
T5 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T6 Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Sink and cabinet could be in instrument storage room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:

- Houses all of the vocal music activities
- Practice area for individuals and groups of students, as well as an instructional area
- Serves the general music activities

SPATIAL RELATIONSHIPS:

- Grouped with other noise producing type activities
- Near instrumental room
- Access to parking area
- Near the stage

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 60
  ceiling minimum CAC 35, NRC 0.70
- Large doors
- High ceilings
- Acoustical requirements as determined by final configuration and other factors of the space.

CAPACITY:	40 students
SIZE:	1,200 SF
ANCILLARY SPACES:	Music Library M-MU-3

NOTES:

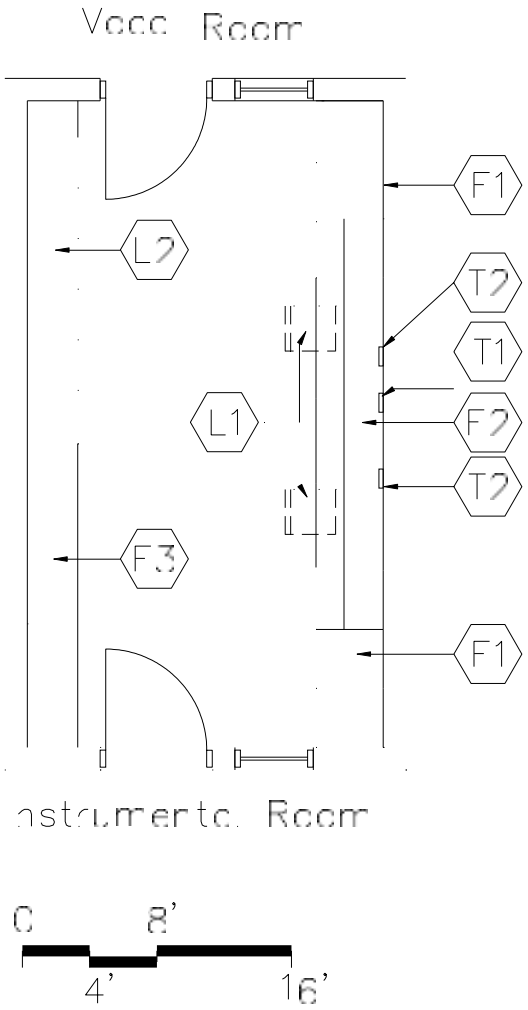
1. Loose furnishings shown represent one of many possible arrangements.

VOCAL ROOM
M-MU-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile,	096816
linoleum, ET, sheet vinyl,	096516
or rubber	096500
	096813
(Determined by district program needs)	
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	
099100	
Acoustical wall treatment	
(varies with geometry of room)	098000
LOOSE FURNISHINGS:	
L1 Conducting podium	
L2 Music chairs and caddies	
L3 Portable risers	
L4 Reserved	
L5 Mobile music storage cabinet	
L6 Teacher computer workstation	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Doors are to have acoustic trim accessories.	
Pencil sharpener (optional)	
The following item is to be funded by the school district:	
M1 Piano	
E1 Duplex receptacle with dedicated circuit for wireless devices	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 12'-28' combination marker board, tack board, tackable wall surface	101100
F2 Technology support casework	123550
F3 4'-9' of bookcases (or loose)	123550
F4 3'-10' of tall cabinets	123550
F5 Pencil sharpener support (optional)	062000
F6 Stereo cabinet (optional)	123550
F7 Mirrors on wall (optional)	102813
F8 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing: N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Means of egress lighting per code	265100
Emergency lighting per code	265100
Telecommunications Grounding	270526/260526
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123 T3
Wireless access point cable above ceiling	271513
Clock	275313
Middle School music sound system	275125
Central sound system	275123
T4 Ultra-short throw interactive projector	274119
T5 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T6 Classroom technology center video port	271543, 274116, 274119, 27512

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



CAPACITY: 2 teachers
SIZE: 200 SF
ANCILLARY SPACES: Instrumental Room M-MU-1
Vocal Room M-MU-2

PROGRAM ACTIVITIES:
- Office for both instrumental and vocal music teachers
- Library for printed music, tapes, etc.

SPATIAL RELATIONSHIPS:
- Adjacent to both the instrumental room and vocal room

ENVIRONMENTAL CONSIDERATIONS:
- Interior windows to vocal room and instrumental room
- Environmental sound control
  walls minimum STC ***45***
  ceiling minimum CAC 35, NRC ***0.70***

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

MUSIC LIBRARY
M-MU-3

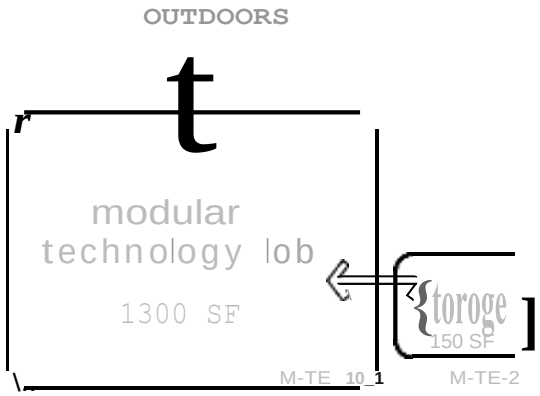
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, ***carpet tile,***	096816
linoleum, ET, sheet vinyl	***096813***
or rubber	***096500***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Chairs
L2 Files
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 (2), 2'-3' of tall wardrobes	123550
F2 24' of work surface with file drawers and wall cabinets	123550
F3 8'-16' of tall storage cabinets or shelving ***(or file cabinets)***	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Independent temperature control	230923
Supply/return air system	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
3 duplex receptacles	262726
Double duplex receptacle adjacent to data port	262726
Communications:	
T1 1 voice port and phone	271513/***273123***
T2 1 data port near each workstation	271513
Central sound system	275123
Electronic Safety and Security:	
Life safety device per code	283111
Miscellaneous:	
Interior windows (optional)	081113/088000

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



OR



NOTE:

This is an example of how the technology education spaces in a middle school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Technology Education space plates:

M-TE-1a	Modular Technology Lab
M-TE-1b	Production Lab
M-TE-2	Storage

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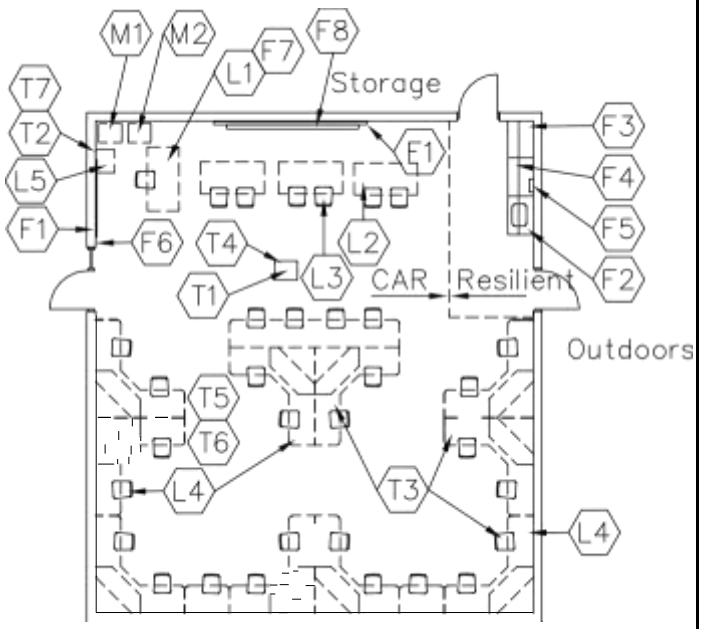
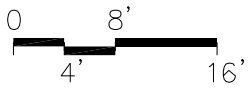




PROGRAM ACTIVITIES:

- Program accommodates groups of 2 or 3 students working with separate computerized modules in various technical areas that could include robotics, electronics, thermodynamics, research and design, and desktop publishing.
- This curriculum may be integrated with the science and math programs.
- Activity will introduce students to problem solving activities.
- A variety of hands-on activities/experiments which could include automation, wind tunnels, flight technology, digital imaging, and meteorology.

SPATIAL RELATIONSHIPS:

- Grouped with other noise producing type activities
- Access to driveway and parking
- Direct access to outdoors or access through corridor
- Adjacent to storage room

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blind

CAPACITY:	25 students
SIZE:	1,300 SF
ANCILLARY SPACES:	M-TE-2 Storage

NOTES:

1. Loose furnishings represent one of many possible arrangements.

MODULAR TECHNOLOGY LAB

M-TE-1a

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, ET,	096500
rubber, sheet vinyl,	096516
carpet, carpet tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:

L1 Teacher desk**/**computer support and chair
L2 Tables with heavy duty tops
L3 Student stools/chairs
L4 Computer technology workstation with chairs
L5 File cabinet
Wastebaskets

Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:

Pencil sharpener (optional)
The following items are to be provided by the school district:
M1 Classroom area network file server
M2 Printer

E1 Duplex receptacle with dedicated circuit for wireless devices

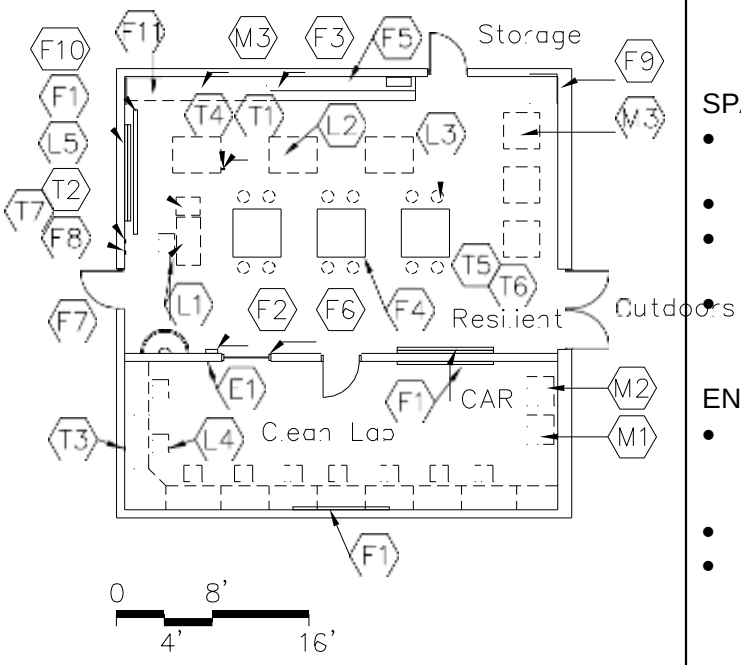
Communications (cont'd):

T6 Wireless access point (WAP) as determined by Design – refer to Note 3 272133
T7 Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 18'-26' combination marker board, tack board and tackable wall surface	101100
F2 3' sink base cabinet	123550
F3 About 9' of wall cabinets	123550
F4 About 9' of base cabinet with (heavy duty counter top)	123550
F5 Towel dispenser	102813
F6 Pencil sharpener support (optional)	062000
F7 Technology support casework	123550
F8 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temp control	230923
Electrical:	
Fluorescent lighting with ***computer aided*** lenses	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
8 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Means of egress lighting per code	265100
Emergency lighting per code	265100
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123 T3
Classroom area network (25 data ports minimum)	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T4 Ultra-short throw interactive projector	274119
T5 Wireless access point cable above ceiling	271513

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:

- Space for instruction in developing skills in use of tools, materials, and processes to apply knowledge of planning and design to actual fabrication of projects

SPATIAL RELATIONSHIPS:

- Grouped with other noise producing type activities
- Access to driveway and parking
- Direct access to outdoors or access through corridor
- Adjacent to storage room

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Resilient floor covering
- Optional – window with integral blind

CAPACITY:	25 students
SIZE:	1,300 SF
ANCILLARY SPACES:	M-TE-2 Storage

NOTES:

1. Loose furnishings represent one of many possible arrangements.

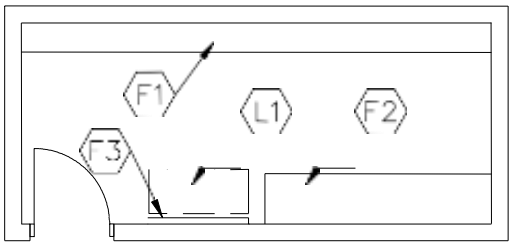
PRODUCTION LAB
M-TE-1b

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber, ET, sheet vinyl	096516
Carpet, carpet tile	096500
	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Painted, exposed structure	095113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
L1 Teacher desk and chair	
L2 Tables with heavy duty tops	
L3 Student stools	
L4 Computer technology workstation with chairs	
L5 File cabinet	
Wastebasket	
Waste receptacle	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
The following items are to be funded by the school district:	
M1 Classroom area network file server	
M2 Printer	
M3 Shop equipment with localized dust collection as necessary	
E1 Duplex receptacle with dedicated circuit for wireless devices	
Communications (cont'd):	
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	***272133***
T7 Classroom technology center video port	***271543, 274116, 274119, 275127***

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 12'-28' combination marker	101100
F2 board, tack board & tackable wall surface	
Towel dispenser	102813
F3 8'-12' of wall cabinets	123550
F4 Workbench and locker base	123550
F5 About 12' of heavy duty counter top at	
36" high with knee space	123550
F6 Interior window	081113/088000
Technology support casework	123550
F8 Pencil sharpener support (optional)	062000
F9 Tool cabinet (optional)	
F10 Projection screen (optional)	115213
F11 Tall wardrobe	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wash fountain	224000
Plumbing connections	
HVAC:	224000/221116/221119
Supply/return air system	Div. 23
Independent temperature control	230923
Localized dust collection system as necessary	233513
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching in computer area	262726
8 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Means of egress lighting per code	265100
Emergency lighting per code	265100
Electrical power for shop equipment	262726
Master shut-off for power equipment	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 Classroom area network (10 data ports minimum)	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T4 ***Ultra-short throw interactive*** projector	274119
T5 ***Wireless access point cable above ceiling***	271513

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***



Modular Technology Lab
Production Lab

0 4’
2’ 8’

PROGRAM ACTIVITIES:

- Houses equipment, instructional aids, and materials used in the technology education activities

SPATIAL RELATIONSHIPS:

- Adjacent to the modular technology lab or production lab
- Access to service drive

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY: N/A
SIZE: 150 SF
ANCILLARY SPACES: Modular Technology Lab M-TE-1a or Production Lab M-TE-1b

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

STORAGE
M-TE-2

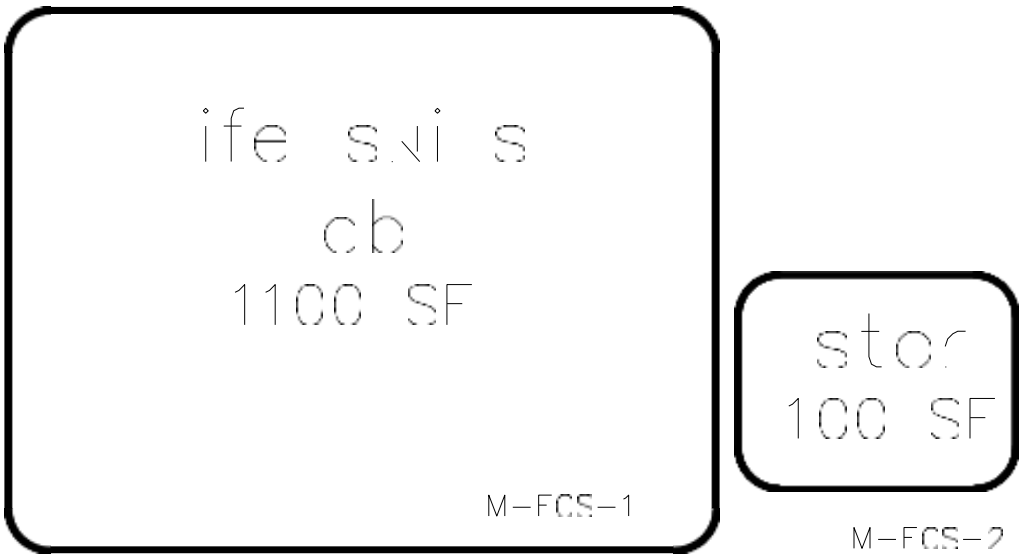
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Mobile tool cart

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 10'-20' of open shelving, depths may vary (fixed or loose)	123550
F2 About 9' of tall cabinets	123550
F3 4' of pegboard (optional)	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



NOTES:

This is an example of how the family and consumer science spaces in a middle school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Family and Consumer Science space plates:
M-FCS-1 Life Skills Lab
M-FCS-1 Life Skills Storage

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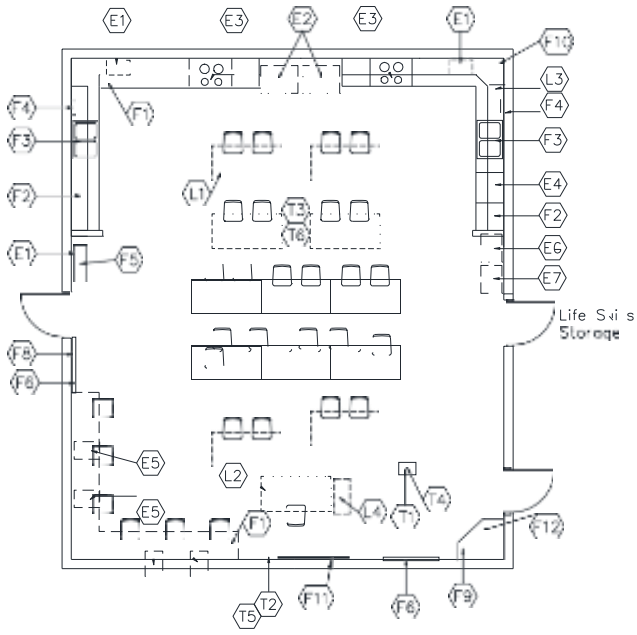


PROGRAM ACTIVITIES:

- Houses the facilities for the home economics programs, family living program, and consumer science programs
- Activities will include hands-on activities, demonstrations, and lectures.

SPATIAL RELATIONSHIPS:

- Grouped with support service programs
- Adjacent to storage

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	24 students
SIZE:	1,100 SF
ANCILLARY SPACES:	Life Skills Storage M-FCS-2

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

LIFE SKILLS LAB
M-FCS-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096515
ET, sheet vinyl, or rubber	096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:
L1 Tables and chairs
L2 Teacher desk**/**computer support and chair
L3 Reserved
L4 File cabinet
Wastebaskets

EQUIPMENT:
E1 Microwaves
E2 Refrigerators
E3 Ranges and ovens
E4 Dishwasher
E5 Sewing machines
E6 Washer
E7 Dryer

Miscellaneous:
Pencil sharpener (optional)
E1 Duplex receptacle with dedicated circuit for wireless devices

Electronic Safety and Security:

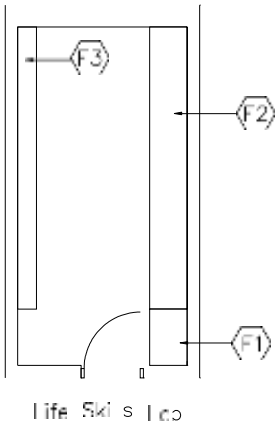
Life safety devices per code	283111

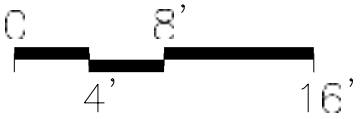
Communications (cont'd):
T4 Ultra-short throw interactive projector 274119
T5 Classroom technology center video port 271543, 274116, 274119, 275127
T6 Wireless access point (WAP) as determined by Design – refer to Note 3 272133

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Base cabinets	123550
F2 Wall cabinets	123550
F3 Double bowl sink base cabinet	123550
F4 Towel dispensers (optional)	102813
F5 3'-8' of bookcases	123550
F6 12'-20' combination marker board tack board, & tackable wall surface	101100
F7 Reserved	
F8 Pencil sharpener support (optional)	062000
F9 Tall wardrobe with file drawers	123550
F10 3' tall cabinet (optional)	123550
F11 Projection screen (optional)	115213
F12 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Double sinks	224000
Plumbing connections	224000/221116/221119
Garbage disposal (optional)	224000
Washer connections	224000
HVAC:	
Supply/return air system	Div. 23
Manually operated exhaust system	Div. 23
Independent temp control	230923
Dryer vent system	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Receptacles for refrigerators, microwaves, ranges, dishwashers, and sewing machines	262726
Means of egress lighting per code	265100
Emergency lighting per code	265100
Washer and dryer connections	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 Wireless access point cable near ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.





PROGRAM ACTIVITIES:

- Storage of materials, supplies, and equipment used in the delivery of the family and consumer science program

SPATIAL RELATIONSHIPS:

- Adjacent to life skills lab

ENVIRONMENTAL CONSIDERATIONS:

N/A

CAPACITY:	N/A
SIZE:	100 SF
ANCILLARY SPACES:	M-FCS-1 Life Skills Lab

NOTES:

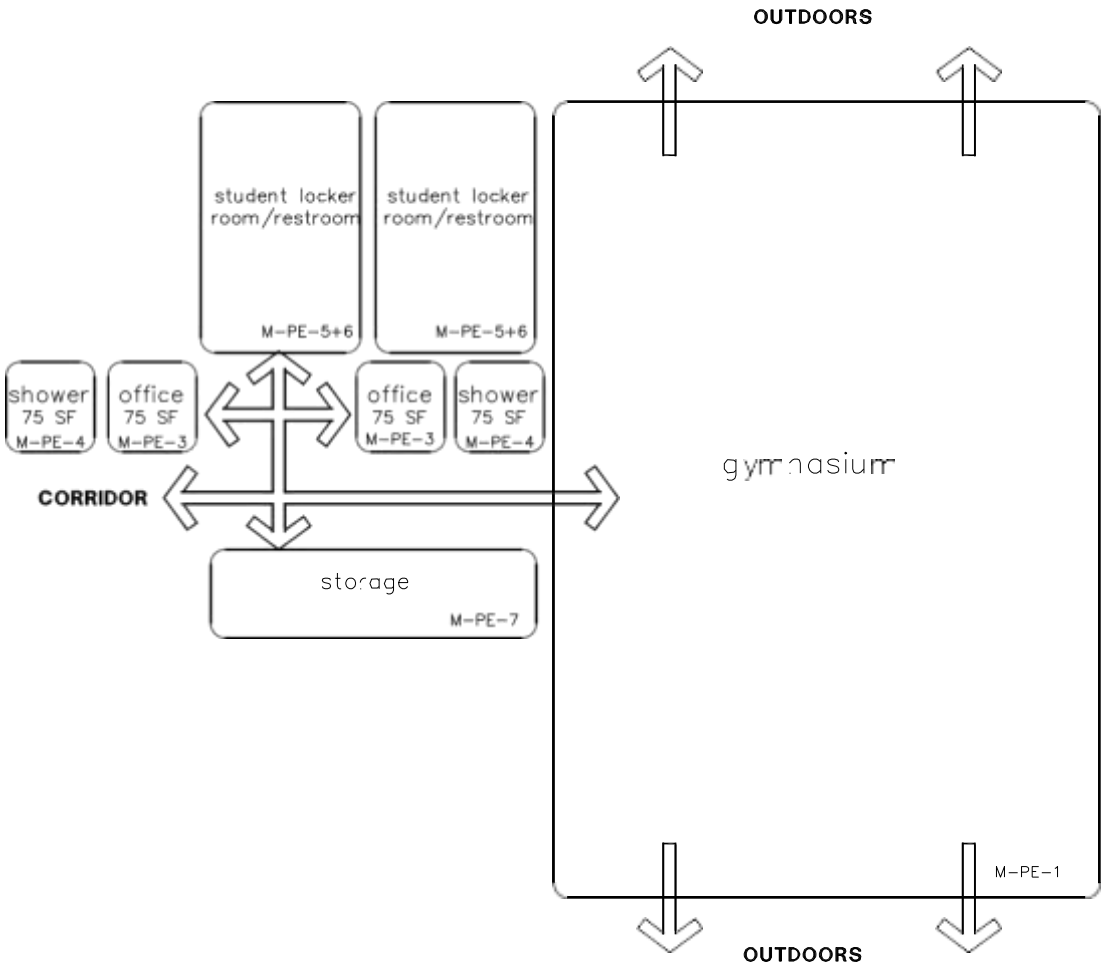
LIFE SKILLS STORAGE
M-FCS-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Rubber, linoleum, sheet vinyl, or ET	096500 ***096516***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe (optional)	123550
F2 10'-15' of tall cabinets, or base and wall cabinets	123550
F3 10'-15' of open tall cabinets	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed equipment and loose furniture can also be all fixed equipment or all loose equipment.



NOTES:

This is an example of how the physical education spaces in a middle school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Physical Education space plates:

M-PE-1	Gymnasium
M-PE-2	Auxiliary Gymnasium
M-PE-3	P.E./Athletic Office
M-PE-4	Staff Shower
M-PE-5	Student Locker Room
M-PE-6	Student Restroom/Shower
M-PE-7	Physical Education Storage

GYMNASIUM SIZE

When designing spaces for physical education activities, it is important to consider the type of activities, the number of participants, equipment needed, and space allocation for each space. Consideration should also be given as to the size of the activity area and safety borders (run-outs). Adequate co-funded space for these design considerations, and others, should be provided in the square footage allowed for the gymnasium.

The table included below, illustrates the maximum gymnasium size for each of the student enrollment examples found in the Program of Requirements (POR). For example, a school with 1,000 students would have approximately 95 staff members indicating a total number of persons in the facility of 1,095. The maximum size of the gymnasium would be 8,500 sf. That value, 8,500 sf., would be inserted into the POR for the gym size.

Additional student enrollment examples (1,250 and 1,750 students) have been added to assist in planning and design of various sized gymnasiums. These examples are bolded in the table below.

SEATING

Regarding seating/bleachers, in middle schools, space for seating in the gym is provided for the entire student enrollment and staff. The approximate number of seats to be included is shown in the table below.

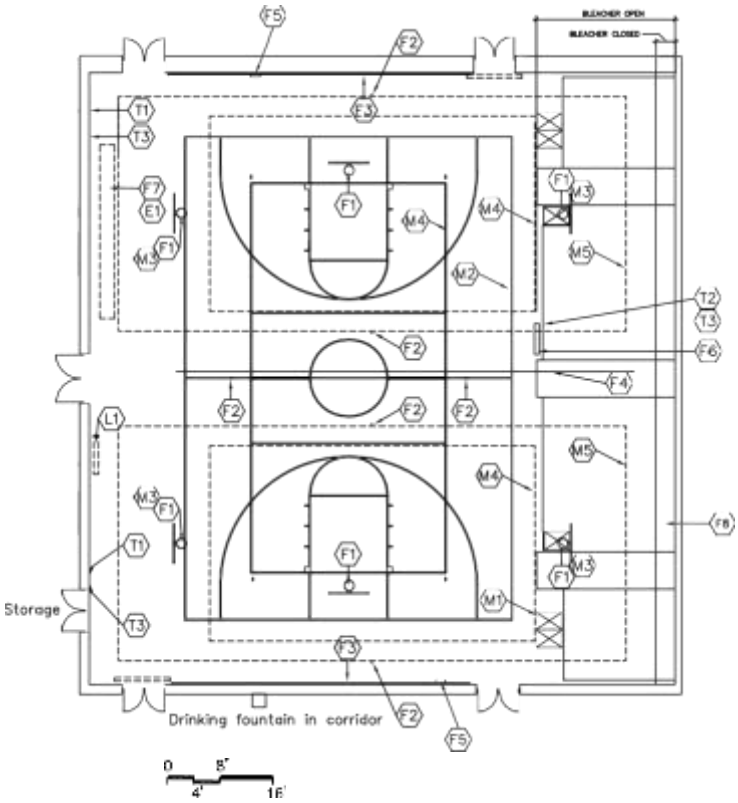
FINAL LAYOUT

The actual Gym layout and number of seats will be determined during the design process.

Middle School Gymnasium Design Guidelines

STN ENRL	Staff	Total Occup	Gym SF	Court Size	Approx. # Seats
450	44	494	7,000	50 x 74	1 08
600	58	658	***7,500***	50 x 74	236
750	72	822	***8,000***	50 x 74	3 64
1,000	95	1,095	8,500	50 x 74	492
1,250	***1 19***	***1,369***	***9,300***	***50 x 74***	***696***
1,500	1 42	1,642	10,000	50 x 74	876
1,750	***180***	***1,930***	***11,000***	***50 x 74***	***1,132***
2,000	217	2,217	12,000	50 x 74	1,388

Note: 2011



Please see page 5109-5 for an enlargement of this diagram.

CAPACITY: 25 - 60 students
SIZE: 7,000 – 12,000 SF
ANCILLARY SPACES:
Physical Education Storage
M-PE-7

PROGRAM ACTIVITIES:
- P. E. students will practice and participate in exercise, sports activities, intramural events, and physical fitness.
- Student assemblies
- Community use

SPATIAL RELATIONSHIPS:
- Direct access to outdoors
- Near student dining

ENVIRONMENTAL CONSIDERATIONS:
- Adequate sound control/acoustics
- Clear, ***fixed*** height of 23' from floor to nearest obstruction
- Environmental sound control - wall minimum STC 60

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

GYMNASIUM
M-PE-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Wood flooring or	096466
Fluid-applied athletic flooring	096766
Base:	
Ventilated resilient base	096466
Ceiling:	
Painted exposed structure	099100
Walls:	
Painted	099100
Sound absorbing concrete masonry units or abuse-resistant	042000
acoustical wall treatment	098000

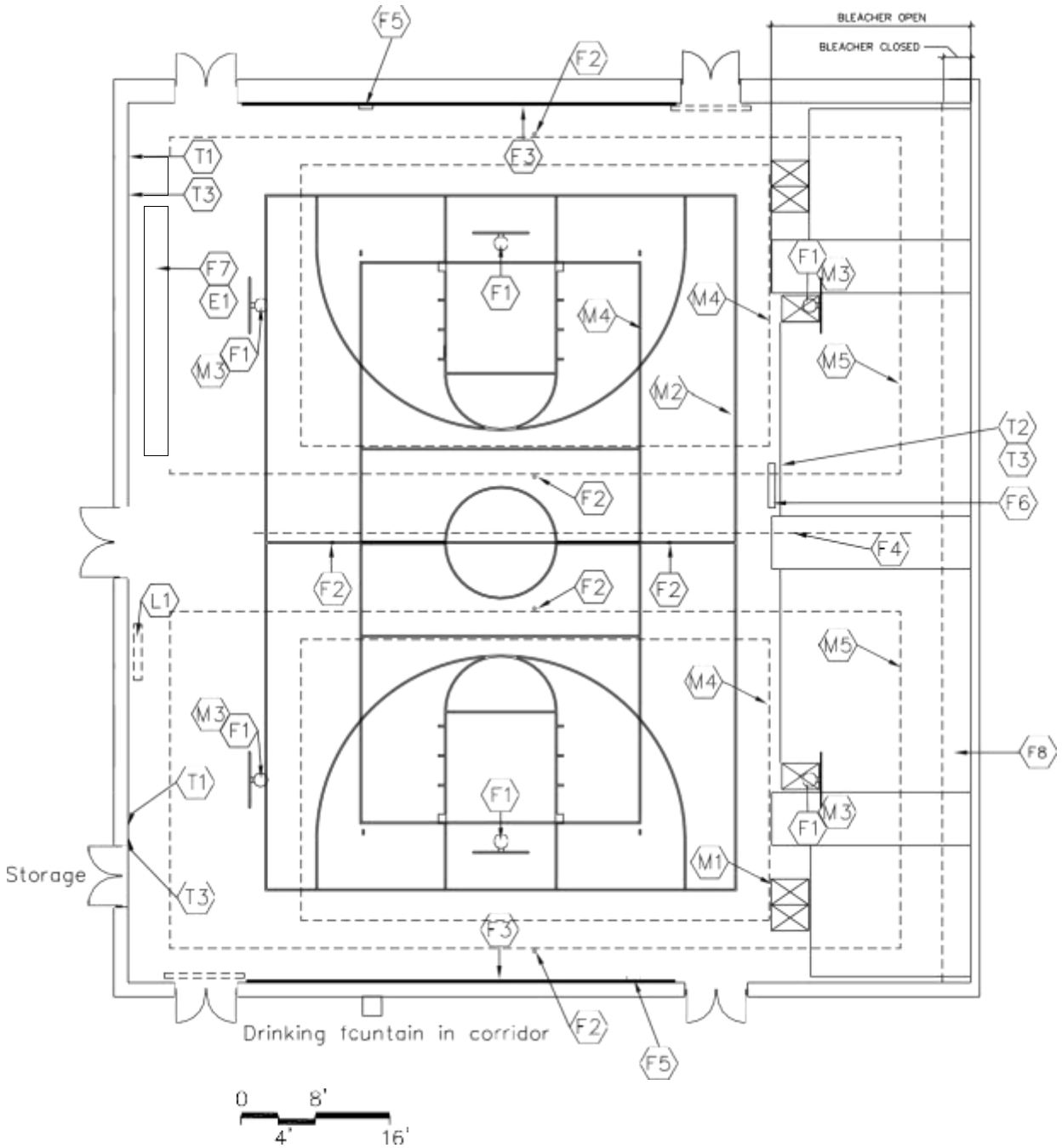
LOOSE FURNISHINGS:
L1 Portable ***markerboard***

Miscellaneous:
M1 Bleacher seating (ADA accessible)
Court markings (***optional***)
M2 74' x ***42'*** main basketball court
M3 2 cross courts to fit
M4 30'x 60' volleyball courts
M5 36' x 78' tennis courts
Provide wire guards on light fixtures and wall-mounted electrical devices.

EQUIPMENT:
E1 Wrestling mat

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 (6) basketball backstops, glass	116623
F2 Volleyball sleeves and standards on a cart	116623
F3 Safety wall wainscot (see note 2)	116623
F4 Divider gym curtain	116623
F5 Chin-up bar (optional)	116623
F6 Scorer table	126600
F7 Wrestling mat hoist (optional)	116623
F8 Telescoping bleachers	126600
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Drinking fountain directly outside the entrance	224000
HVAC:	
Supply/return air system	Div. 23
Independent temp control	230923
Electrical:	
Multi-level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
8 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Electrical connections to P.E. equipment where necessary	262726
Scoreboard (control outlets in the face of bleachers)	116643
Telecommunications Grounding	270526/260526
Communications::	
T1 2 ***projector*** video ports, 1 monitor with cart	271543/274119
T2 1 voice port	271513/273113
T3 3 data port	271513
Clocks with wire guards	275313
Central sound system	275123
Gymnasium sound system	275124
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Extend safety wall wainscot 5 feet beyond side game lines at both ends of main basketball court.


BLEACHER OPEN
BLEACHER CLOSED
F5
F2
F3
T1
T3
F7
E1
F1
M3
M4
M5
M2
T2
F6
F4
L1
M1
F8
Storage
Drinking fcuntain in corridor
0
8'
4'
16'

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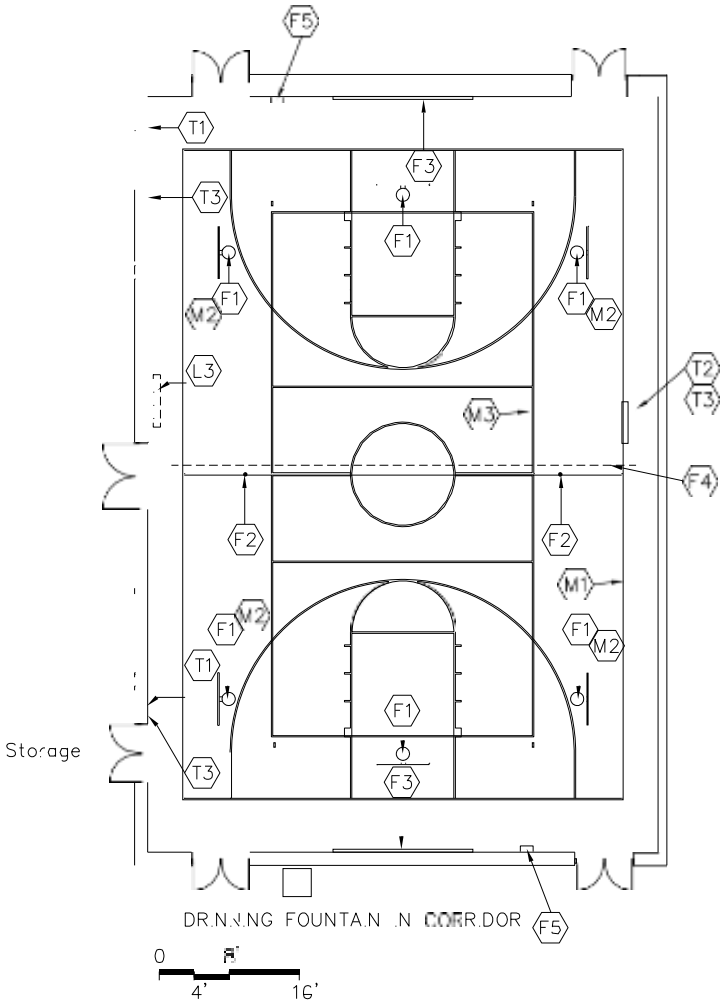


Please see page 5109-9 for an enlargement of this diagram.

CAPACITY: 25 - 60 students
SIZE: 5,000 – 6,500 SF
ANCILLARY SPACES:

PROGRAM ACTIVITIES:

- ***P.E. students will practice and participate in exercise, sports activities, intramural events, and physical fitness.***
- ***Student assemblies***
- Community use

SPATIAL RELATIONSHIPS:

- ***Direct*** access to outside
- ***Near student dining***

ENVIRONMENTAL CONSIDERATIONS:

- Adequate sound control/acoustics
- Clear height of 23' from floor to nearest obstruction
- Environmental sound control - wall minimum STC 60

NOTES:

1. Loose furnishings shown represent ***one*** of many possible arrangements.

AUXILIARY GYMNASIUM
M-PE-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Wood flooring or fluid applied athletic flooring	096466 096766
Base:	
Ventilated resilient base	096466
Ceiling:	
Painted exposed structure	099100
Walls:	
Painted	099100
Sound absorbing concrete masonry units on 2 walls or abuse-resistant acoustical wall treatment	042000

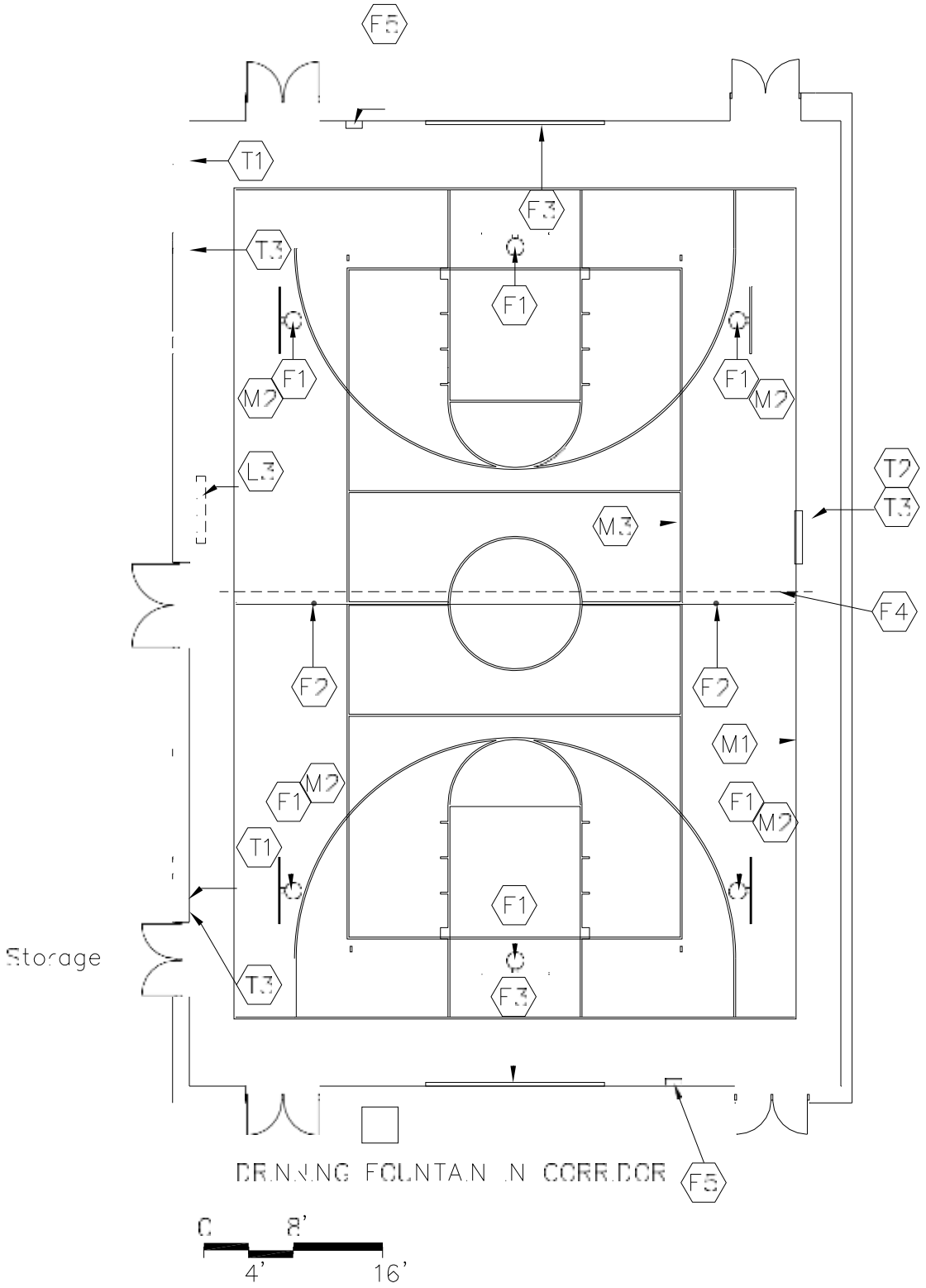
LOOSE FURNISHINGS:
L1 Portable ***markerboard***

Miscellaneous:
Court markings (minimum)
M1 74' x 50' main basketball court
M2 2 cross courts to fit
M3 30'x60' volleyball court
Provide wire guards on light fixtures and wall-mounted electrical devices.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 6 basketball backstops, glass	116623
F2 Volleyball sleeves and standards on a cart	116623
F3 Safety wall wainscot	116623
F4 Divider gym curtain	116623
F5 Chin-up bar (optional)	116623
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Drinking fountain directly outside the entrance	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Multi-level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
8 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Electrical connections to P.E. equipment where necessary	262726
Telecommunications Grounding	270526/260526
Communications:	
T1 2 video ports, 1 monitor with cart	271543/274119
T2 1 voice port	271513/273113
T3 2 data port	271513
Clocks with wire guards	275313
Central sound system	275123
Gymnasium sound system	275124
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. The OFCC does not co-fund telescoping bleachers in auxiliary gyms. District may provide telescoping bleachers in accordance with section 126600 at district's expense.


F5
T1
F3
T3
F1
M2
L3
T2
M3
F4
F2
M1
Storage
DRINKING FOUNTAIN IN CORRIDOR
0
8'
4'
16'

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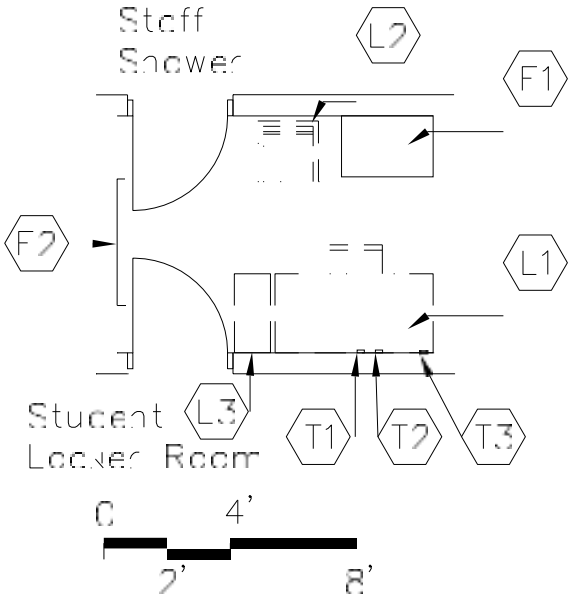


PROGRAM ACTIVITIES:
- Teacher office for planning, grading, conferences, and scheduling

SPATIAL RELATIONSHIPS:
- Near gymnasium
- Adjacent to student locker rooms
- Adjacent to staff shower

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	1 teacher
SIZE:	75 SF
ANCILLARY SPACES:	Student Locker Room M-PE-***5***
	Staff Shower M-PE-***4***

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

P.E./ATHLETIC OFFICE
M-PE-*3*

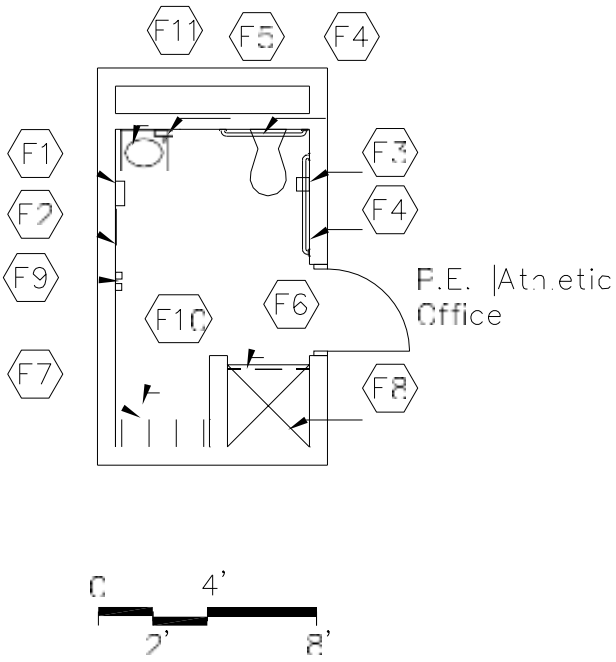
FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096516
ET, sheet vinyl, or rubber	096500
Base:	
Resilient base	096500
Ceiling:	
Acoustical, suspended	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Teacher desk and chair
L2 Visitor chair
L3 File cabinet
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe	123550
F2 4' of tack or marker board	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temp control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near teacher workstation	271513 T3
1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window (optional)	081113/088000

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Personal and health care needs for physical education teacher

SPATIAL RELATIONSHIPS:
- Adjacent to P.E./athletic office

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  walls minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

CAPACITY:	1 person
SIZE:	75 SF
ANCILLARY SPACES:	P.E./Athletic Office M-PE-***3***

NOTES:

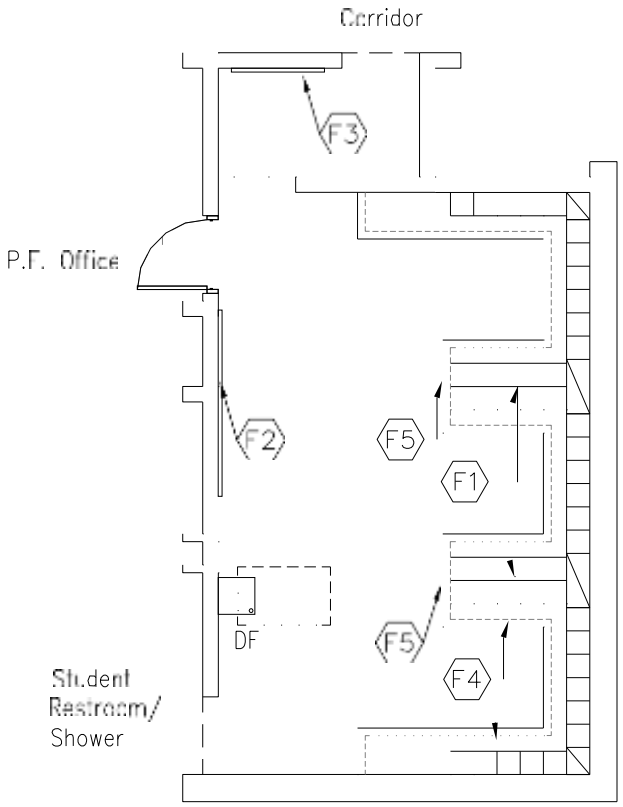
STAFF SHOWER
M-PE-*4*

FINISHES[1]:	Spec. Ref.#
Flooring:	
Restroom: Ceramic mosaic tile	***093000***
sheet vinyl, resinous flooring	096500
	096723
Shower: Ceramic mosaic tile,	093000
porcelain tile, or resinous flooring	
Base:	
Restroom: Resilient base,	096500
resinous flooring, or	096723
integral vinyl cove base	093000
Shower: Ceramic mosaic tile base, porcelain tile base, resinous flooring, or integral vinyl cove base	
Ceiling:	
Restroom: Suspended, acoustical	095113
Shower: Painted portland cement plaster	092400/099100
or interior finish system	092513
Walls:	
Epoxy painted concrete masonry units	042000/099100
or ceramic wall tile in shower and	093000
latex paint in restroom	099100
LOOSE FURNISHINGS:	
Wastebasket	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 24" x 60" mirror	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Shower curtain and rod	102813
F7 3 athletic lockers	105113
F8 ADA Shower accessories	102813
F9 Towel hooks	102813
F10 Built-in bench (optional)	102813
F11 Mirror over sink with shelf (optional)	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
ADA shower controls and head	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:

- Students change from their regular clothes into clothes appropriate for physical education
- Storage for personal items while students are attending physical education class

SPATIAL RELATIONSHIPS:

- Adjacent to student restroom/shower
- Near both gymnasium and outdoor area
- Located on gymnasium level
- Adjacent to P.E./athletic office

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: 25 - 30 students
SIZE: 600 - ***900 SF***
ANCILLARY SPACES:
Student Restroom/Shower
M-PE-***6***
P.E./Athletic Office
M-PE-***3***

NOTES:

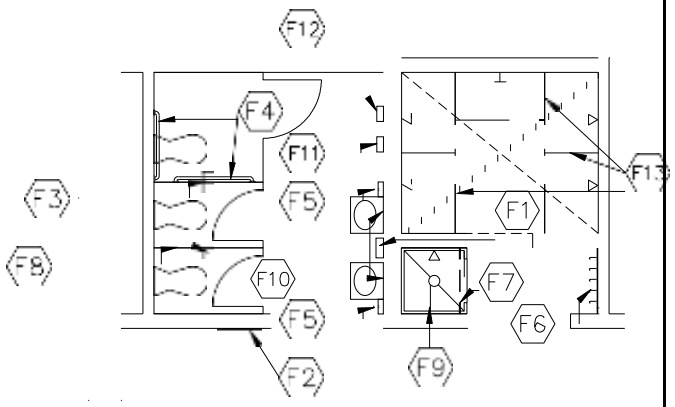
STUDENT LOCKER ROOM
M-PE-*5*

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete, sheet vinyl,	093000
rubber, rubber tile,	096500
or resinous flooring	096723
Base:	
Resilient base or	096500
resinous flooring	096723
Ceiling:	
Suspended, acoustical with high-impact hold-down clips	095113
Option: Exposed painted pre-cast units	099100
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Wastebaskets	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Athletic lockers	105113
F2 8'-16' combination marker board and tackable wall surface	101100
F3 Reserved	
F4 Locker benches (fixed or loose)	062000
F5 Mirrors (optional)	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Drinking fountain	224000
HVAC:	
Supply air system	Div. 23
Exhaust air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
2 duplex receptacles	262726
Emergency lighting	265100
Means of egress per code	265100
Communications:	
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

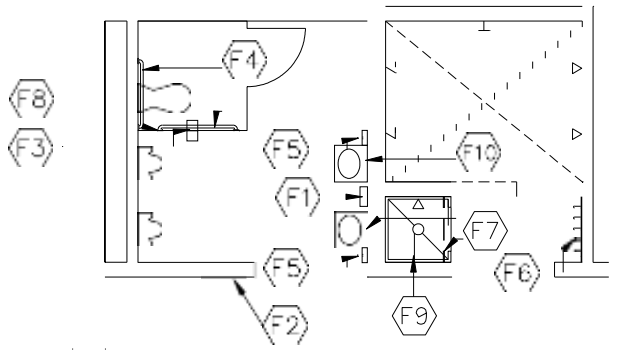
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



Female Student Locker Room

0 4'
2' 8



Male Student Locker Room

0 4'
2' 8

CAPACITY: 5 students
SIZE: 250 SF
ANCILLARY SPACES: Student Locker Room M-PE-***5***

PROGRAM ACTIVITIES:
- Serves as separate shower and restroom areas for males and females in the physical education and athletic programs
- Community adults and children may also use this facility after hours

SPATIAL RELATIONSHIPS:
- Adjacent to student locker room
- Direct access to both gymnasium and outdoor area

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

NOTES:

STUDENT RESTROOM/SHOWER
M-PE-*6*

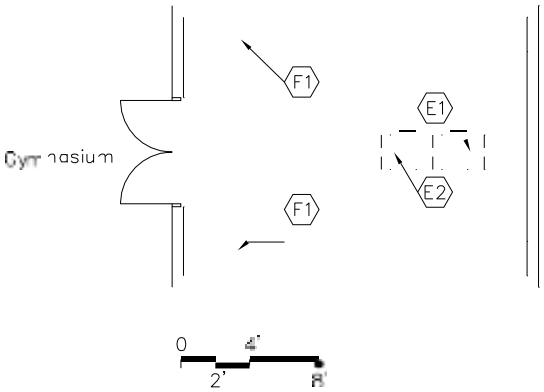
FINISHES[1]:	Spec. Ref.#
Flooring:	
Restroom: ***Ceramic mosaic, porcelain tile,*** sheet vinyl, or resinous flooring	***093000*** 096500 096723
Shower: Ceramic mosaic tile, porcelain tile, or resinous flooring	
Base:	
Restroom: Resilient base, resinous flooring, or integral vinyl cove base	096500 096723 093000
Shower: Ceramic mosaic tile base, porcelain tile base, resinous flooring, or integral vinyl cove base	
Ceiling:	
Restroom: Suspended, acoustical with high-impact, hold-down clips	095113
Shower: Painted portland cement plaster or interior finish system	092400/099100 092513
Walls: Epoxy-painted concrete masonry units or	042000/099100
ceramic wall tile in showers and latex paint in restroom	093000 099100
LOOSE FURNISHINGS:	
Wastebaskets	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispensers	102813
F2 24" by 60" mirror	102813
F3 Toilet tissue holders	102813
F4 36” and 42” grab bars	102813
F5 Soap dispensers	102813
F6 Towel hooks	102813
F7 Shower curtain and rod	102813
F8 Toilet partitions	102813
F9 ADA shower accessories	102813
F10 16" x 24" mirrors with shelves	102813 F11
Sanitary product dispenser[2]	102813 F12
Sanitary product receptacles[2]	102813 F13
Modesty shower partitions[2]	102113
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closets	224000
Wall-mounted lavatories or wash fountains	224000
Wall-mounted urinals	224000
ADA shower controls and head	224000
Shower fixtures	224000
Plumbing connections	24000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Exhaust air system	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Single level switching	262726
1 duplex receptacle	262726
Emergency lighting	265100
Means of egress lighting per code	265100
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

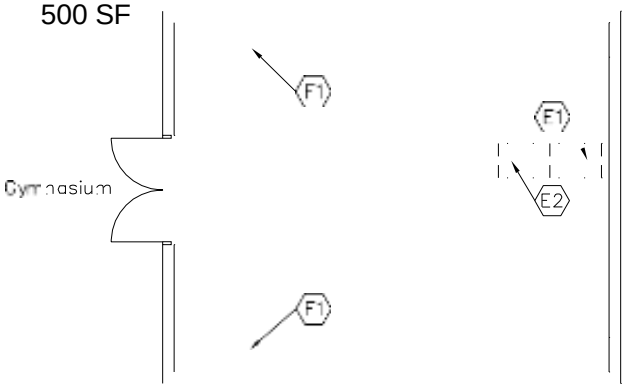
NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Toilet accessories and shower partitions for female locker rooms.

3. Optional: electric hand dryers

300 SF



500 SF



PROGRAM ACTIVITIES:
- Storage for physical education equipment

SPATIAL RELATIONSHIPS:
- Adjacent to gymnasium
- Near P.E./athletic office

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	300 - 500 SF
ANCILLARY SPACES:	Gymnasium M-PE-1

NOTES:

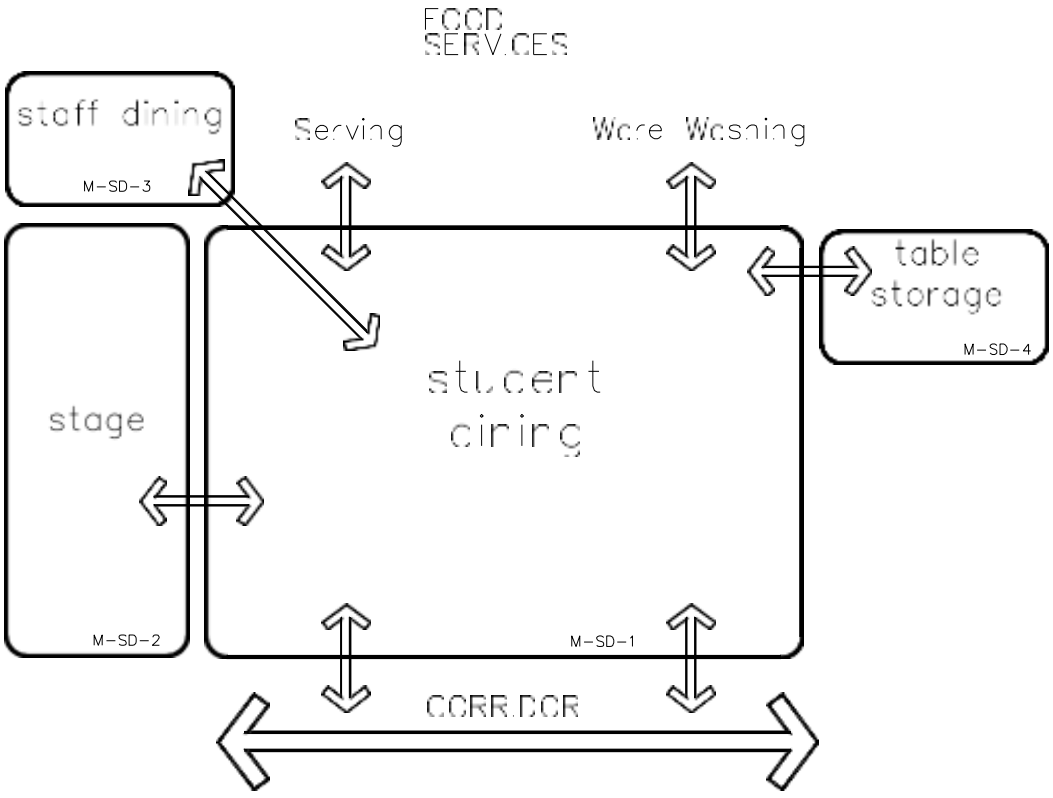
PHYSICAL EDUCATION STORAGE
M-PE-*7*

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	
Option: Rated gypsum wallboard	092116
Walls:	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS:	
N/A	
EQUIPMENT:	
E1 Tumbling mats on carts	
E2 Ball carts	

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 20’ – 48' of open shelving, depths may vary (fixed or loose)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the largest and smallest possible room size.



NOTES:

This is an example of how the student dining spaces in a middle school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Student Dining space plates:

M-SD-1	Student Dining
M-SD-2	Stage
M-SD-3	Staff Dining
M-SD-4	Table Storage
M-SD-5	***Family Restroom***

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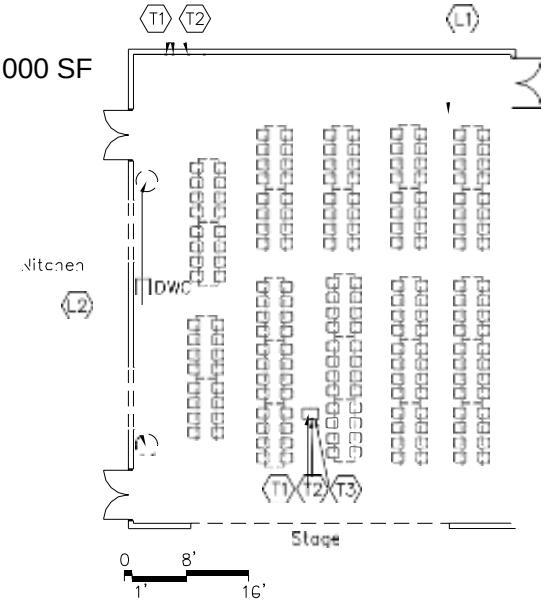
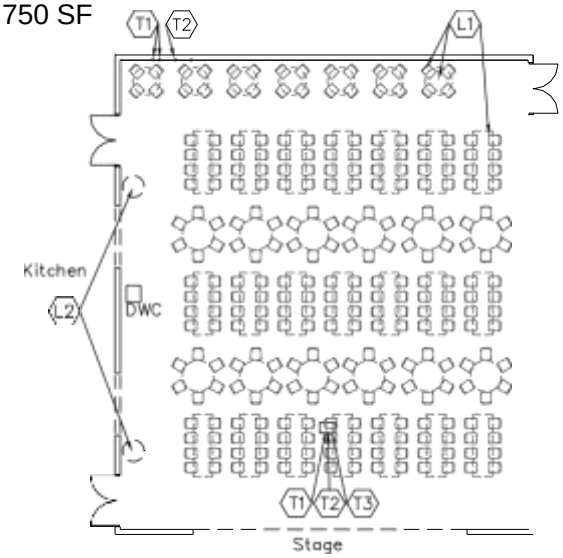
3,000 SF



3,750 SF



CAPACITY: 1/3 of the student capacity

SIZE: Student capacity divided by 3, multiplied by 15 SF per student
3,000 SF minimum

ANCILLARY SPACES: Stage, M-SD-2
Kitchen, M-FS-1

PROGRAM ACTIVITIES:
- Space for student dining and assembly-type programs

SPATIAL RELATIONSHIPS:
- Adjacent to kitchen
- Near staff dining
- Adjacent to stage

ENVIRONMENTAL CONSIDERATIONS:
- Stain-resistant floor covering
- Environmental sound control wall minimum STC 60

MISCELLANEOUS:
- Based on 3 serving periods, the size of the dining area is computed by dividing the student capacity by 3, then multiplying by 15 SF per student. The minimum size of a dining space is 3,000 SF.
- Natural lighting

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

STUDENT DINING
M-SD-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber, ET, sheet	096500
vinyl, porcelain tile, terrazzo	096516
tile, carpet tile, VCTT,	093000
polished concrete finishing, or	096813
colored concrete finishing	033510
	033519
Base:	
Resilient base	096500
Optional: porcelain tile base	093000
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
Acoustical wall treatment and diffusers	098000

LOOSE FURNISHINGS:

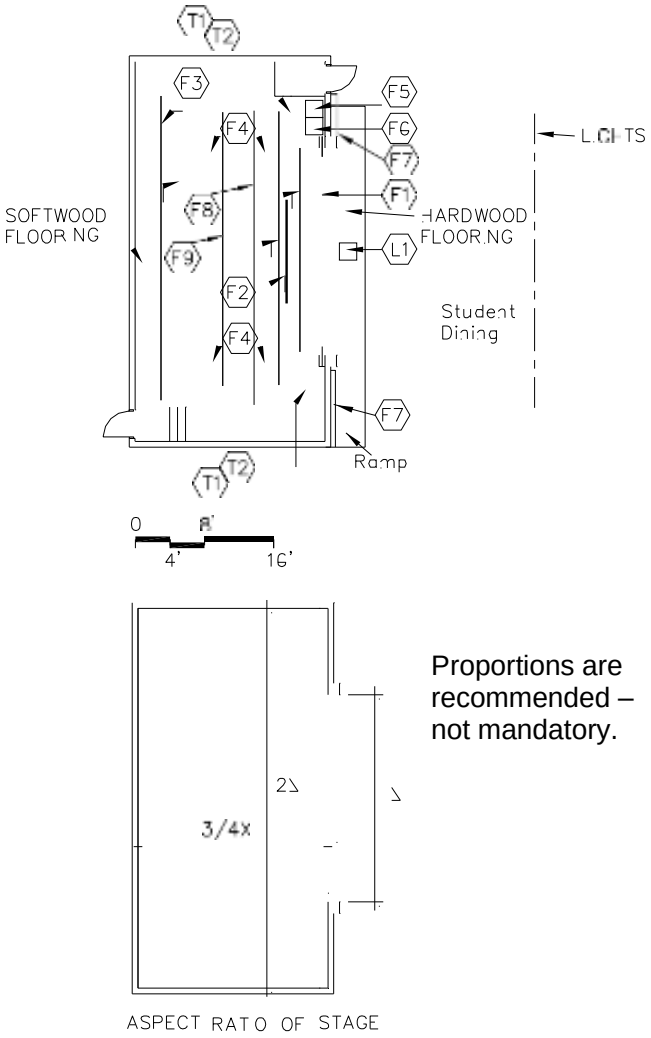
L1 Tables and chairs or long tables with attached stools
L2 Large waste receptacles
Folding or high density stack chairs for large assembly use
Carts for chairs
Recycling bins

Note: Cafeteria tables with attached stools shall be securely anchored to walls when not in use or be kept in secure storage area when not in use.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Drinking water cooler	224000
HVAC:	
Supply/return air system	Div. 23
Independent temp ctrl	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
Multilevel switching	262726
8 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Means of egress lighting per code	265100
Emergency lighting	265100
Telecommunications Grounding	270526/260526
Communications:	
T1 2 ***projector*** video ports	271543
T2 2 data ports	271513
Clock	275313
Student dining/cafeteria sound system[2]	275122
Central sound system	275123
T3 ***Ultra-short throw interactive*** projector	274119
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Windows with integral blinds or windows with shading devices (optional)	081113 /088000

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Student dining sound system is to be used in conjunction with the stage.



ASPECT RATIO OF STAGE

Proportions are recommended – not mandatory.

CAPACITY: NA

SIZE: x = proscenium opening
see diagram for dimensions

ANCILLARY SPACES: Student Dining
M-SD-1

PROGRAM ACTIVITIES:

- Serves as the assembly type programs, performances, and presentations for students and adults

SPATIAL RELATIONSHIPS:

- Open to student dining area

ENVIRONMENTAL CONSIDERATIONS:

- Area should be raised slightly above student dining area floor
- Provide handicapped accessibility

NOTES:

STAGE
M-SD-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Wood flooring, dark finish	096400
Stairs: carpet, rubber, or wood	
Base:	
Ventilated resilient base	096400
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/099100

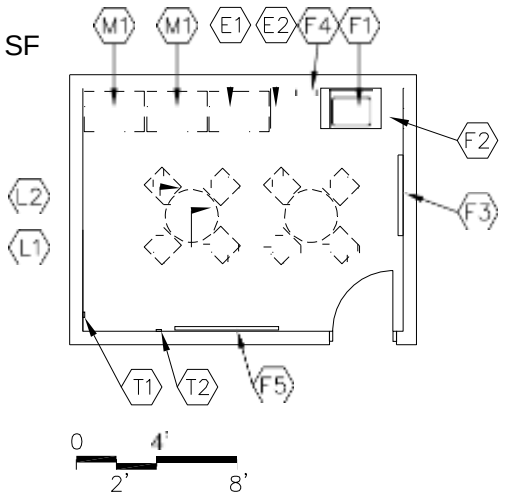
LOOSE FURNISHINGS:
L1 Podium

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Front curtain, track, and valance or grand border	116143
F2 Projection screen	116143
F3 Rear curtain	116143
F4 Leg curtains, tracks, and/or pivots	116143
F5 Sound control console receptacle	275122
F6 Lighting control console receptacle	265100
F7 Pipe handrail	055000
F8 Light pipe	116143
F9 Border curtains	116143
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Temperature control with student dining space	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
Single level switching	262726
2 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting	265100
Telecommunications Grounding	270526/260526
Communications:	
T1 2 ***projector*** video ports (1 on each side of the proscenium opening)	271543/274119
T2 2 data ports (1 on each side of the proscenium opening)	271513
Student dining/cafeteria sound system[2]	275122
Electronic Safety and Security:	
Life safety devices per code	283111

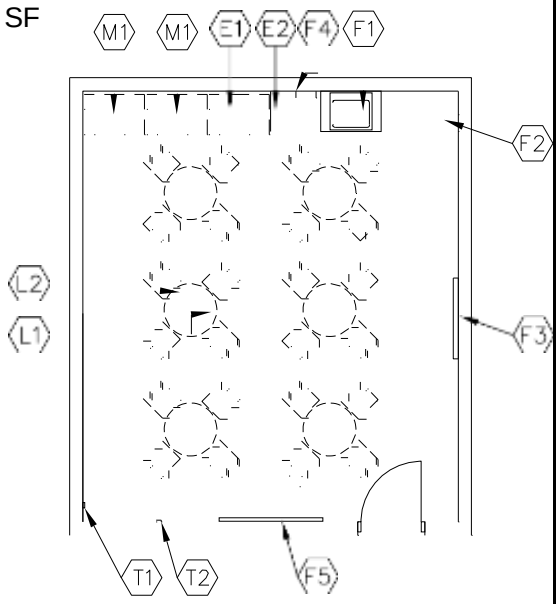
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Student dining sound system is to be used in conjunction with student dining area.
3. Provide a reflective strip on floor at edge of stage.

200 SF



300 SF



CAPACITY: 8 – 24 staff
SIZE: 200 – ***400 SF***
ANCILLARY SPACES: Student Dining
M-SD-1

PROGRAM ACTIVITIES:
- Space for staff dining

SPATIAL RELATIONSHIPS:
- Near student dining
- Near food services

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  walls ***only*** minimum STC ***45***
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

STAFF DINING
M-SD-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, ET, sheet vinyl,	096500
rubber, porcelain tile,	096516
carpet tile, VCTT,	093000
terrazzo tile	096813
Base:	
Resilient base	096500
Optional: porcelain tile	093000
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted, concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Tables
L2 Chairs
Waste receptacle

EQUIPMENT:
E1 Refrigerator (could be fixed equipment)
E2 Microwave
Waste receptacle

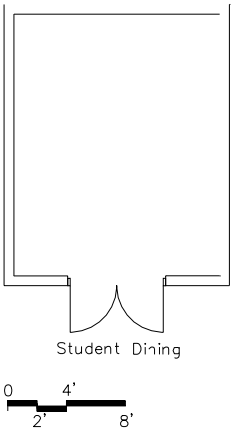
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 3' sink base cabinet with wall cabinet above	123550
F2 About 8' of base and wall cabinets	123550
F3 4' of tack board	101100
F4 Towel dispenser	102813
F5 4'-6' marker board (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each video port	262726
Receptacles for vending machines, refrigerator, and microwave	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273113
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
The following items are to be funded by the school district:
M1 Vending machines

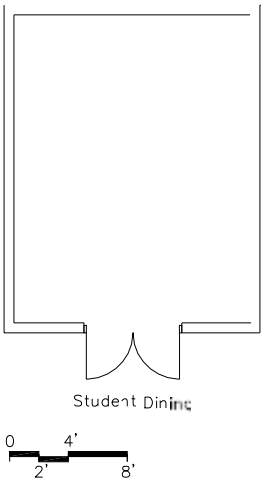
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

250 SF



400 SF



PROGRAM ACTIVITIES:
- Storage for tables and chairs

SPATIAL RELATIONSHIPS:
- Adjacent to student dining
- Near food services

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	250 - ***400*** SF
ANCILLARY SPACES:	Student Dining M-SD-1

NOTES:

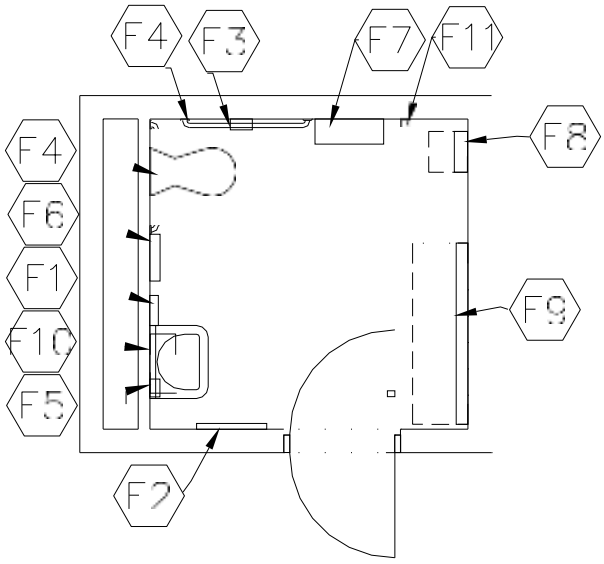
TABLE STORAGE
M-SD-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	
Option: Rated gypsum wallboard	092116
Walls:	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Communications::	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



CAPACITY: 2 people
SIZE: 80 SF

PROGRAM ACTIVITIES:

- Personal, health, and handicap needs for all building occupants

SPATIAL RELATIONSHIPS:

- Located where best accessible to all building occupants and the public

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

NOTES:

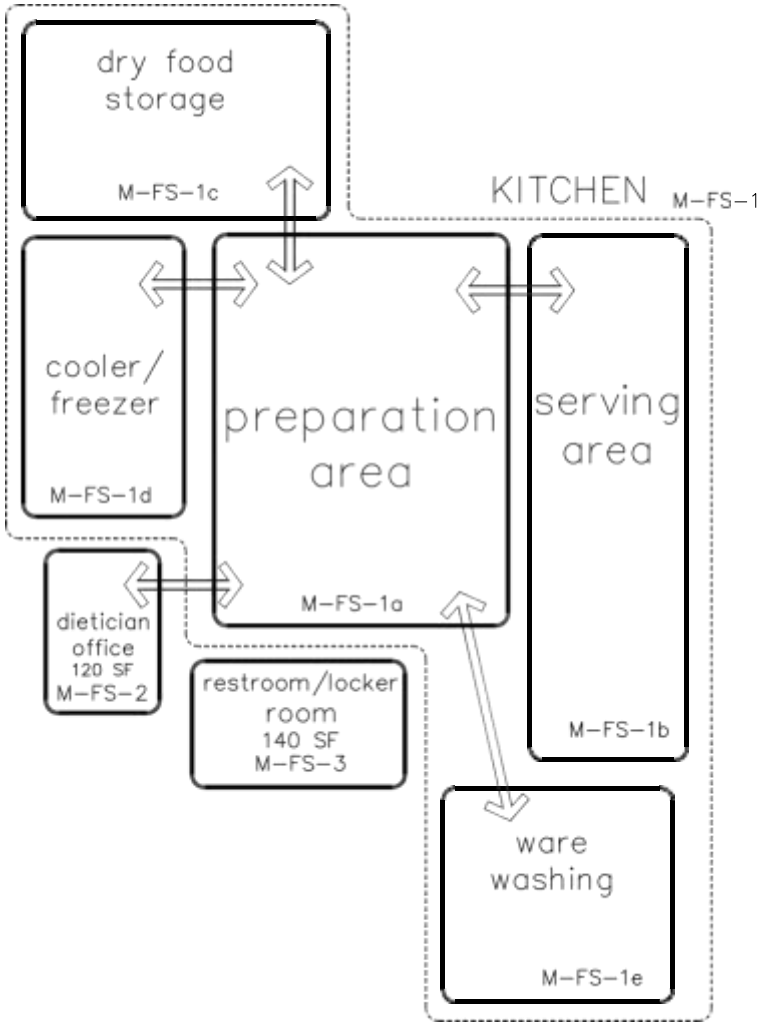
FAMILY RESTROOM
M-SD-5

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, ***porcelain tile,*** sheet vinyl, ceramic mosaic tile	096500
Optional: Ceramic mosaic tile,	093000
porcelain tile, or	096723
resinous flooring	
Base:	
Resilient base	096500
Optional: Ceramic mosaic tile,	093000
porcelain tile, resinous flooring	096723
flooring, or integral vinyl cove base	
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Wastebasket	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 24" x 60" mirror	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Sanitary napkin dispenser/disposal	102813
F7 Folding utility shelf	102813
F8 Mounted child seat	102813
F9 Adult/child changing station	102813
F10 16” x 24” mirror with shelf	102813
F11 Coat hooks	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



NOTES:

This is an example of how the food service spaces in a middle school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

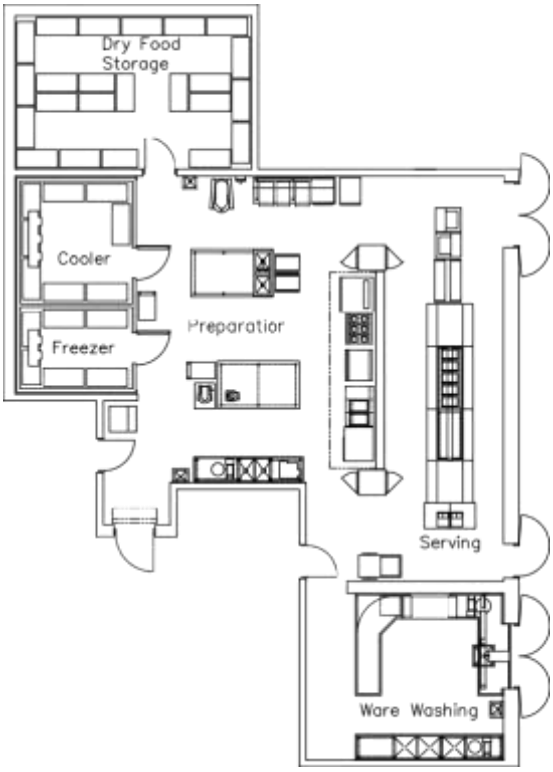
Following are the Food Service space plates:

M-FS-0	Warming Kitchen
M-FS-1	Kitchen
M-FS-1a	Preparation Area
M-FS-1b	Serving Area
M-FS-1c	Dry Food Storage
M-FS-1d	Cooler/Freezer
M-FS-1e	Ware Washing
M-FS-2	Dietician Office
M-FS-3	***Restroom/Locker Room***

KITCHEN
M-FS-1

This space consists of various areas:
- Preparation Area
- Serving Area
- Dry Food Storage
- Cooler/Freezer
- Ware Washing

A space plate follows for each of these areas.



CAPACITY: 3 – 10 persons
SIZE: Student capacity multiplied by 3.5 SF per student
ANCILLARY SPACES: Student Dining M-SD-1
Loading/Receiving Area M-BS-9

PROGRAM ACTIVITIES:
- Space for the planning, ordering, preparation, and serving of the meals, and for providing meals for the students and staff

SPATIAL RELATIONSHIPS:
- Adjacent to student dining
- Near staff dining
- Near table storage
- Adjacent to loading/receiving area

ENVIRONMENTAL CONSIDERATIONS:
- Compliance with State Board of Health requirements

MISCELLANEOUS:
- The sizing of the kitchen area assumes: Type “A” meal service only at 80% of the student capacity and 3, 30-minute serving periods.

NOTES:

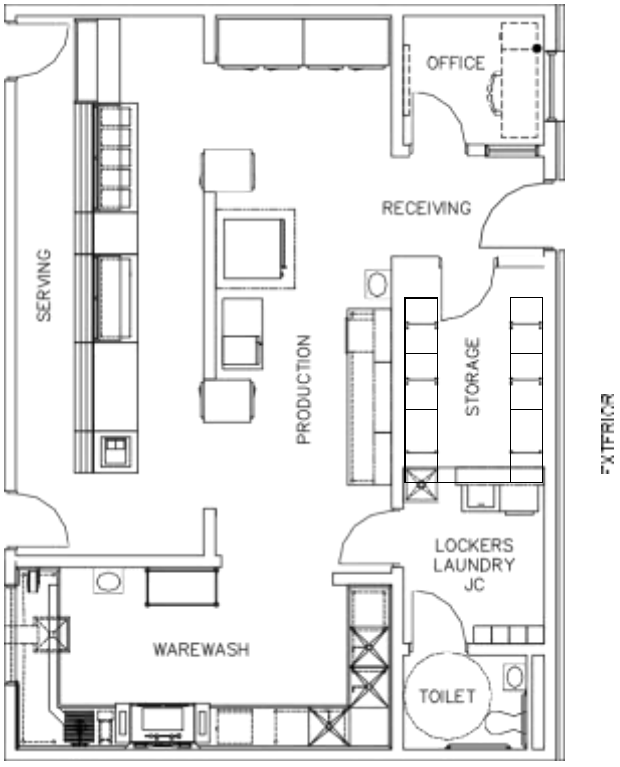
This kitchen layout is to be used only for a central kitchen operation.

This space consists of various areas:

Production Area	25%
Serving Area	35%
Warewash	25%
Storage	10%
Receiving	5%

Additional areas to be added:

Office	75 SF
Toilet	50 SF
Lockers/Laundry/Janitorial Closet	125 SF



CAPACITY: 3 - 7 persons
SIZE: Student capacity multiplied by 2.0 SF per student
ANCILLARY SPACES: Student Dining M-SD-1
Loading/Receiving Area M-BS-1

PROGRAM ACTIVITIES:

- Space for receiving, organizing, and serving of the meals prepared in the central kitchen.

SPATIAL RELATIONSHIPS:

- Adjacent to student dining
- Near staff dining
- Near table storage
- Adjacent to loading/receiving area

ENVIRONMENTAL CONSIDERATIONS:

- Compliance with State Board of Health requirements

MISCELLANEOUS:

- Kitchen area must be located adjacent to exterior loading dock area to receive transported food from central kitchen.

NOTES:

WARMING KITCHEN
M-FS-0

FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile or ***resinous flooring***	093000 ***096723***
Base:	
Quarry tile base or ***resinous integral base***	093000 ***096723***
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/0991000
Option: Ceramic wall tile or latex paint	093000 099100

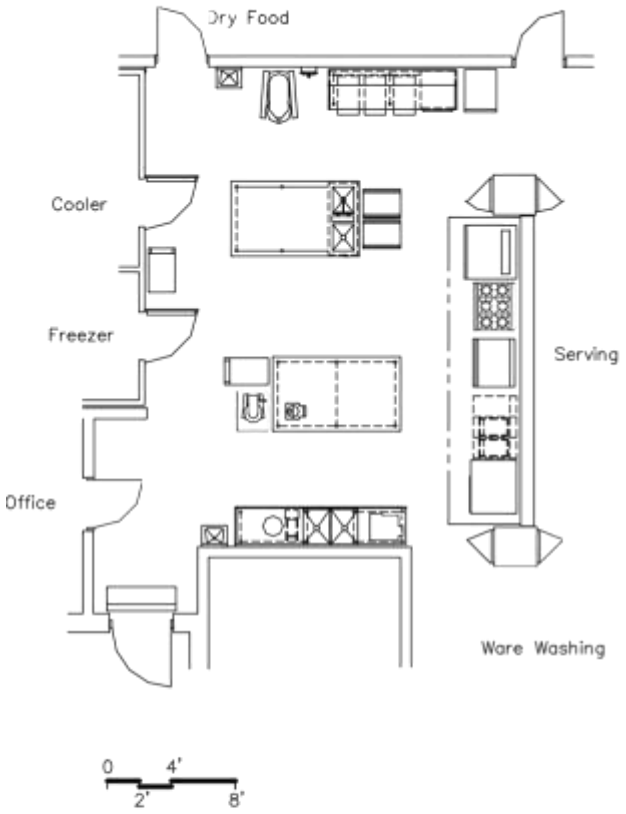
LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Connections to food service eqpt.	224000
Plumbing connections	224000/221116/221119
Hand washing lavatory	224000
Gas connection	226313
HVAC:	
Supply/return air system	Div. 23
Independent temp control	230923
Kitchen canopy exhaust system	233800
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
10 duplex receptacles	262726
Duplex receptacle at each cash register	262726
Emergency lighting	265100
Connections to food service eqpt.	262726
Means of egress lighting per code	265100
Communications:	
1 voice port and phone	271513/***273123*** 1
data port at cash register(s)	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.

KITCHEN - Preparation Area
M-FS-1a



PROGRAM ACTIVITIES:
- Space and equipment for the preparation of food for students and staff

SPATIAL RELATIONSHIPS:
- Adjacent to the serving area
- Near the cooler/freezer
- Near the dry food storage

ENVIRONMENTAL CONSIDERATIONS:
- Proper ventilation of space to remove cooking odors
- Cleanable building surfaces

CAPACITY: 3 – 10 persons
SIZE: Based on 36% of the kitchen area
ANCILLARY SPACES: Part of the kitchen

NOTES:

1. This is an example of a preparation area. Food service equipment will vary from school district to school district.

KITCHEN - Preparation Area
M-FS-1a

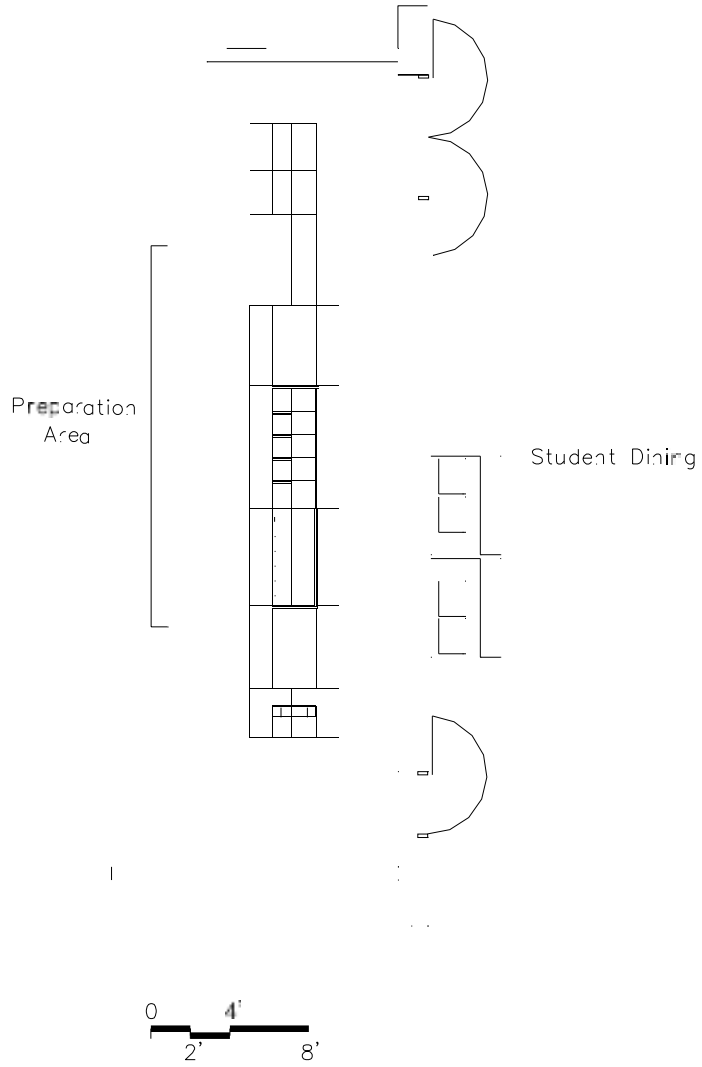
FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile or ***resinous flooring***	093000 ***096723***
Base:	
Quarry tile base or ***resinous integral base***	093000 ***096723***
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Option: Ceramic wall tile	093000
or latex paint	099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Connections to food service equipment	224000
Plumbing connections	224000/221116/221119
Hand washing lavatory	224000
Gas connections	226313
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Kitchen canopy exhaust system	233800
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
4 duplex receptacles	262726
Emergency lighting	265100
Connections to food service equipment	262726
Means of egress lighting per code	265100
Communications:	
1 voice port and phone	271513/***273123***
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	238111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.



CAPACITY: N/A
SIZE: Based on 34% of the kitchen area
ANCILLARY SPACES: Part of the kitchen

PROGRAM ACTIVITIES:
- Space for serving of food

SPATIAL RELATIONSHIPS:
- Adjacent to student dining
- Adjacent to preparation area

ENVIRONMENTAL CONSIDERATIONS:
- Cleanable building services

NOTES:

1. This is an example of a serving area. Food service equipment will vary from school district to school district.

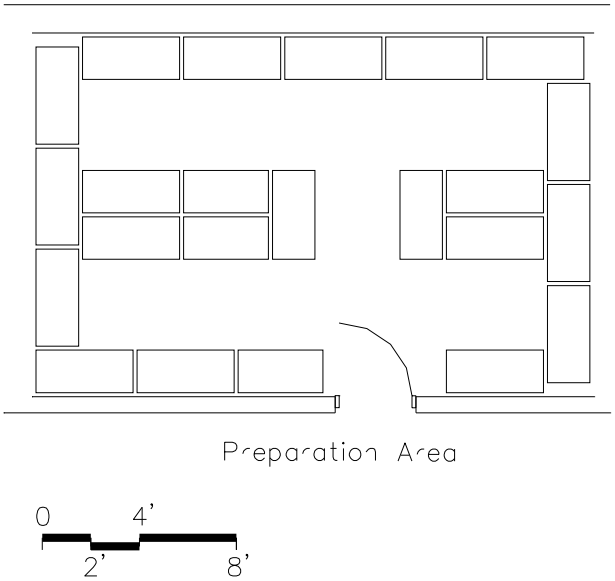
KITCHEN - Serving Area
M-FS-1b

FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile or ***resinous flooring***	093000
Optional: porcelain tile	***096723***
Base:	
Quarry tile base, ***resinous integral base***	093000 ***096723***
Optional: porcelain tile base	
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Option: Ceramic wall tile or latex paint	093000 099100
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Connections to food service equipment	224000
HVAC:	
Supply/return air system	Div. 23
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
4 duplex receptacles	262726
Connections to food service equipment	262726
Emergency lighting	265100
Means of egress lighting per code	265100
Duplex receptacle at each cash register	262726
Communications:	
Data port(s) at cash register(s)	271513
Clock	275313
Central sound system	275123
1 Voice port and phone	271513/***273123***
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.



PROGRAM ACTIVITIES:
- Lockable space to store dry food products and government commodities for 15 to 30 days

SPATIAL RELATIONSHIPS:
- Near the food preparation area
- Access to the loading/receiving area

ENVIRONMENTAL CONSIDERATIONS:
- Continuous conditioning of air
- Cleanable building surfaces

CAPACITY: N/A
SIZE: Based on 11% of the kitchen area
ANCILLARY SPACES: Part of the kitchen

NOTES:

1. This is an example of a dry food storage area. Food service equipment will vary from school district to school district.

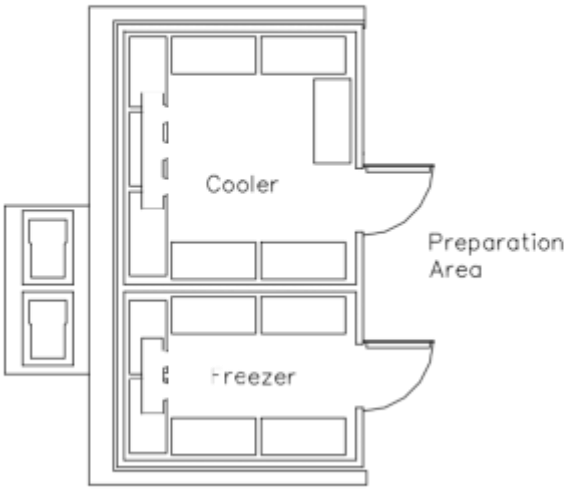
KITCHEN - Dry Food Storage
M-FS-1c

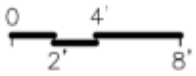
FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, ET, or sheet vinyl	096500
Option: Quarry tile or ***resinous flooring***	093000 ***096723*** 096516
Base:	
Resilient base	096500
Option: Quarry tile or ***resinous integral base***	***096723*** 093000
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Option: Ceramic wall tile or latex paint	093000 099100
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supply/return air system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.





CAPACITY: N/A
SIZE: Based on 10% of the kitchen area
ANCILLARY SPACES: Part of the Kitchen

PROGRAM ACTIVITIES:
- Space for refrigerated storage of perishable products

SPATIAL RELATIONSHIPS:
- Adjacent to food preparation area
- Access to the loading/receiving area

ENVIRONMENTAL CONSIDERATIONS:
- Ventilation for refrigeration machinery
- Cleanable building surfaces
- Floor to be flush with adjacent kitchen floor

NOTES:

1. This is an example of a cooler/freezer. Food service equipment will vary from school district to school district.

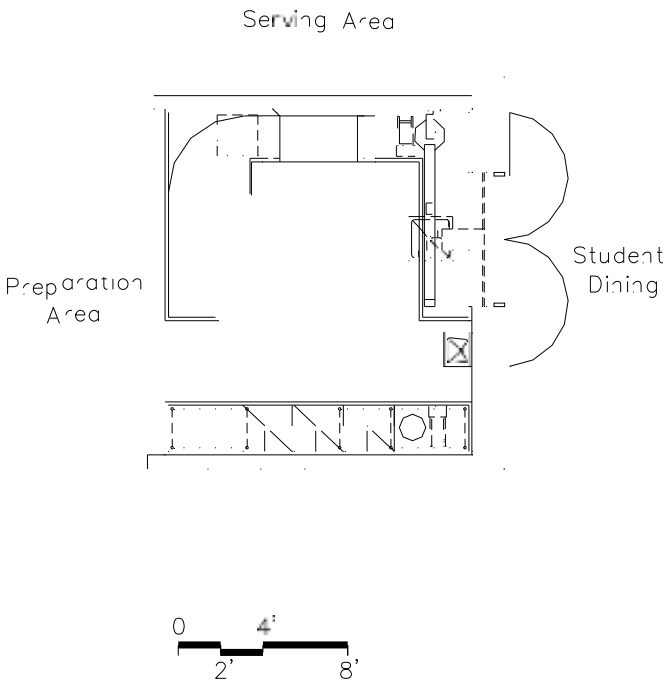
KITCHEN - Cooler/Freezer
M-FS-1d

FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile or resinous flooring	093000 096723
Base:	
Quarry tile base or resinous integral base	093000 096723
Ceiling:	
Manufactured insulated panel	114000
Walls:	
Manufactured insulated panel	114000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system for compressors	Div. 23
Electrical:	
Single level switching	262726
Fluorescent or LED lighting	265100
Illumination level: See Table 8600-6	
Electrical connections to freezer/cooler refrigeration equipment	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.



PROGRAM ACTIVITIES:
- Space and equipment to scrape, wash, air dry, and store serving trays and utensils

SPATIAL RELATIONSHIPS:
- Adjacent to student dining

ENVIRONMENTAL CONSIDERATIONS:
- Proper ventilation of space to remove steam and condensation
- Cleanable building surfaces

CAPACITY: N/A
SIZE: Based on 9% of the kitchen area
ANCILLARY SPACES: Part of the kitchen

NOTES:

1. This is an example of a ware washing area. Food service equipment will vary from school district to school district.

KITCHEN - Ware Washing
M-FS-1e

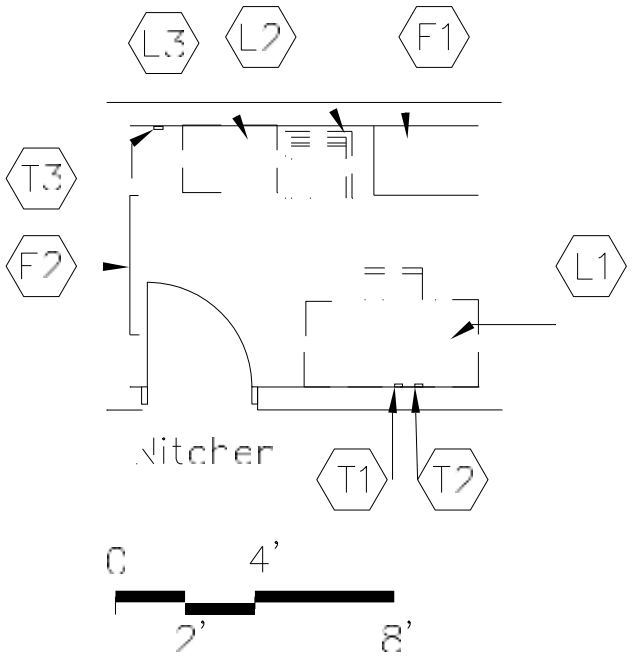
FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile or ***resinous flooring***	093000
Base:	
Quarry tile base or ***resinous integral base***	093000 ***096723***
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Option: Ceramic wall tile	093000
or latex paint	099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Lavatory	224000
Connections to food service equipment	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Exhaust hood system	Div. 23
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Connections to food service equipment	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.



PROGRAM ACTIVITIES:
- Space for the dietician to plan menus and meet with various vendors

SPATIAL RELATIONSHIPS:
- Adjacent to kitchen

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blind

CAPACITY:	1 - 2 persons
SIZE:	75 SF
ANCILLARY SPACES:	Kitchen M-FS-1

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

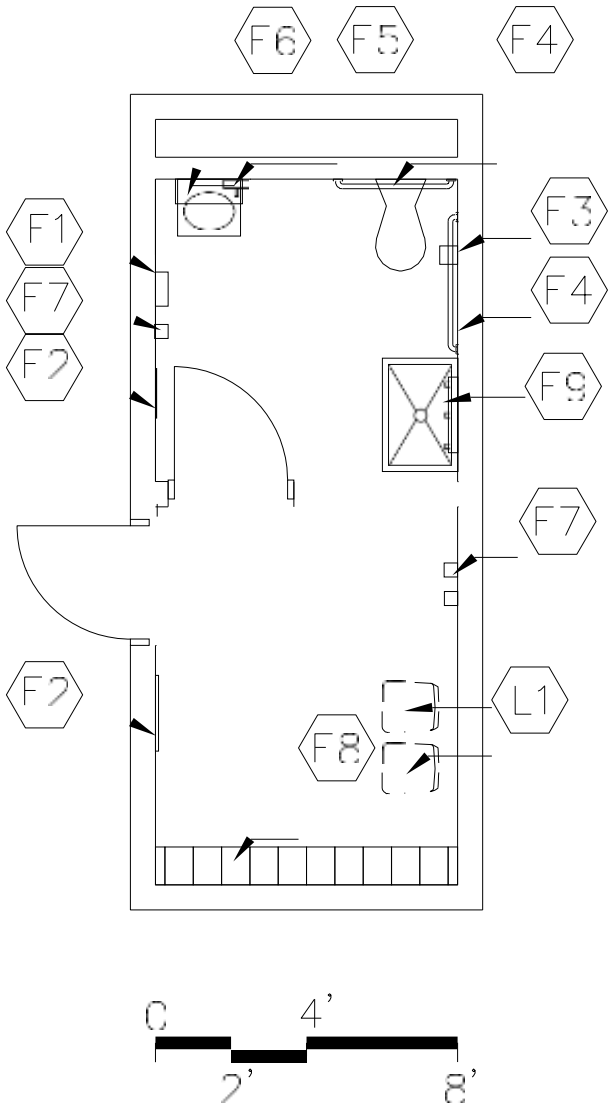
DIETICIAN'S OFFICE
M-FS-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, ET, or sheet vinyl	096500 096516
Option: Quarry tile or resinous flooring	093000 096723
Base:	
Resilient base	096500
Option: Quarry tile, resinous integral base	093000 096723
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/199100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chair
L3 File cabinet
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe (optional)	123550
F2 4' of tack board or marker board	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temp control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window (optional)	081113/088000

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed equipment or loose furnishings can also be all fixed or all loose.



CAPACITY: 2 persons
SIZE: 140 SF
ANCILLARY SPACES:

PROGRAM ACTIVITIES:
- Personal and health needs for food service staff

SPATIAL RELATIONSHIPS:
- Adjacent to kitchen

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

NOTES:

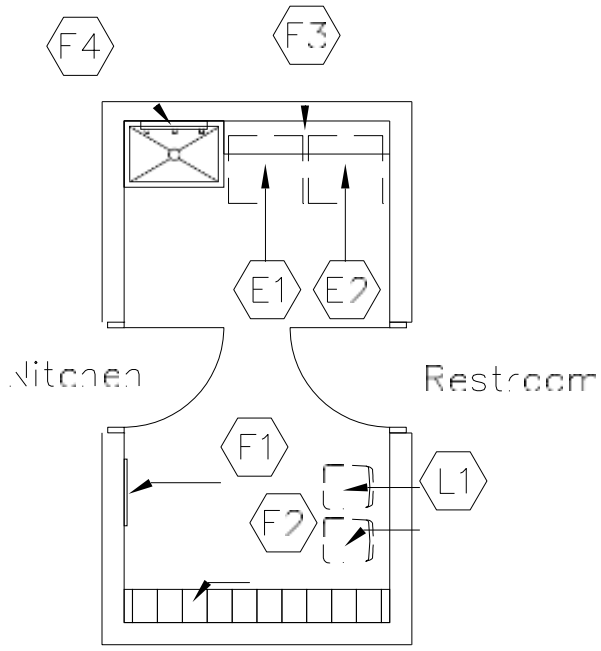
RESTROOM / LOCKER ROOM
M-FS-3

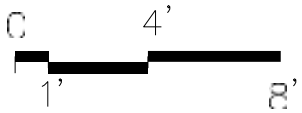
FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, sheet vinyl, rubber, rubber tile, or	096500
Optional: quarry tile or ***resinous flooring***	093000 ***096723***
Base:	
Resilient base	096500
Optional: quarry tile, integral vinyl cove base, ***or integral resinous base***	093000 ***096723***
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Chairs
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 ***2,*** 24" x 60" mirrors	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Mirror with shelf above sink(optional)	102813
F7 Coat hook***s***	102813
F8 Lockers 12” x 12” x 60”	105113
F9 Mop holder	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Floor service sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
2 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.





CAPACITY: 2 persons
SIZE: 125 SF
ANCILLARY SPACES: Kitchen, M-FS-1
Dietician Office, M-FS-***2***

PROGRAM ACTIVITIES:

- Space for the food service staff to store their personal belongings and to change their clothing
- Space for the washing, drying, and storage of towels, aprons, etc.
- ***This space could replace M-FS-3***

SPATIAL RELATIONSHIPS:

- Adjacent to kitchen
- Adjacent to restroom

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

LOCKER ROOM
M-FS-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sheet vinyl, resinous flooring, ***ET***	096500
Option: Quarry tile or resinous flooring	096723 ***093000***
Base:	
Resilient base, resinous flooring, or integral vinyl cove base	096500 096723
Option: Quarry tile or resinous integral base	
Ceiling:	
Suspended, acoustical with high-impact, hold-down clips	095113
Option: exposed, painted pre-cast units	099100
Walls:	
Painted concrete masonry units	042000/099100

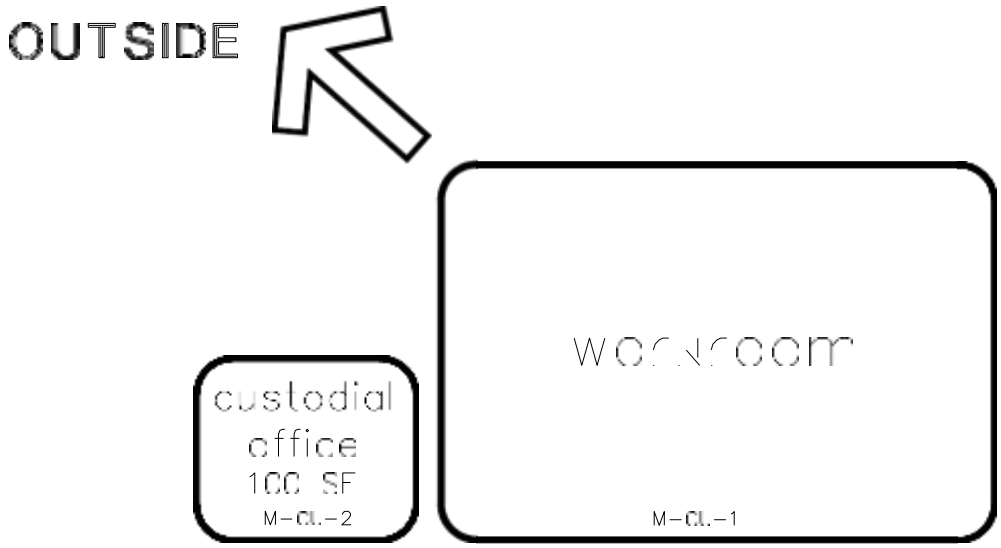
LOOSE FURNISHINGS:
L1 Chairs
Wastebasket

EQUIPMENT:
E1 Washer
E2 Dryer

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 24" x 60" mirror (optional)	102813
F2 Lockers 12" x 12" x 60"	105113
F3 6' of wall cabinets or shelf (optional)	123550
F4 Mop holder	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	224000/221116/221119
Floor service sink	224000
Washer connection	224000
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Dryer vent system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Connections for washer and dryer	262726
Communications:	
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Provide storage cabinet for supplies if required by governing agency.	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



NOTES:

This is an example of how the custodial spaces in a middle school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Custodial space plates:

M-CU-1 Workroom
M-CU-2 Custodial Office

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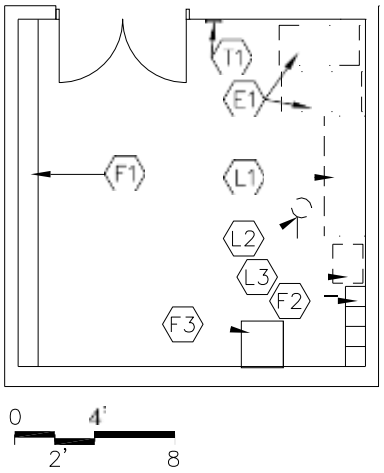
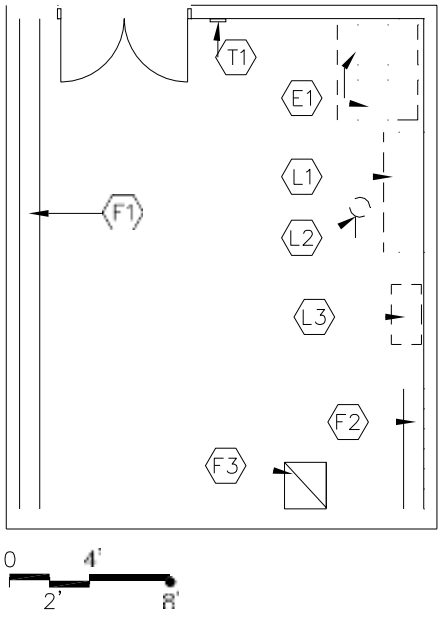
WORKROOM
M-CU-1

200 SF



400 SF



CAPACITY: N/A
SIZE: 200 - ***600*** SF

PROGRAM ACTIVITIES:
- Space for storage of custodial equipment needed to maintain the building
- Space for equipment repair

SPATIAL RELATIONSHIPS:
- Near central storage area
- Near custodial office

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

WORKROOM
M-CU-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete,	***033000***
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

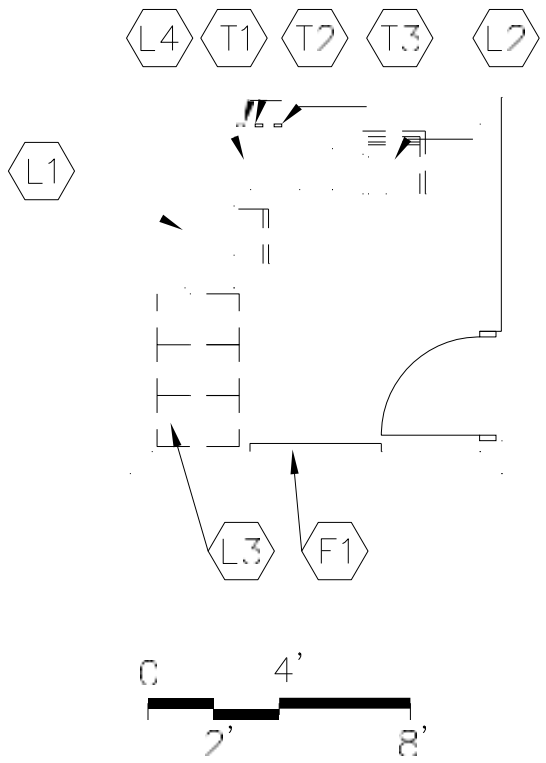
LOOSE FURNISHINGS:
L1 Workbench
L2 Stool
L3 Tool cabinet
Waste receptacles

EQUIPMENT:
E1 Recycling bins

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 10' - 24' of open shelving, depths may vary (fixed or loose)	123550
F2 4 - 6 lockers	105113
F3 Mop holder	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Floor service sink	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Single level switching	262726
4 duplex receptacles (minimum)	262726
Electrical receptacles for custodial equipment	262726
Communications:	
T1 1 voice port and phone	271513/***273123***
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



PROGRAM ACTIVITIES:
- Office for the custodian for scheduling, ordering, and inventory

SPATIAL RELATIONSHIPS:
- Near custodial workroom

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blind

CAPACITY:	N/A
SIZE:	100 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

CUSTODIAL OFFICE
M-CU-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, ET, sheet vinyl,	096500
sealed concrete,	096516
polished concrete finishing, or	***033000***
colored concrete finishing	033510
	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

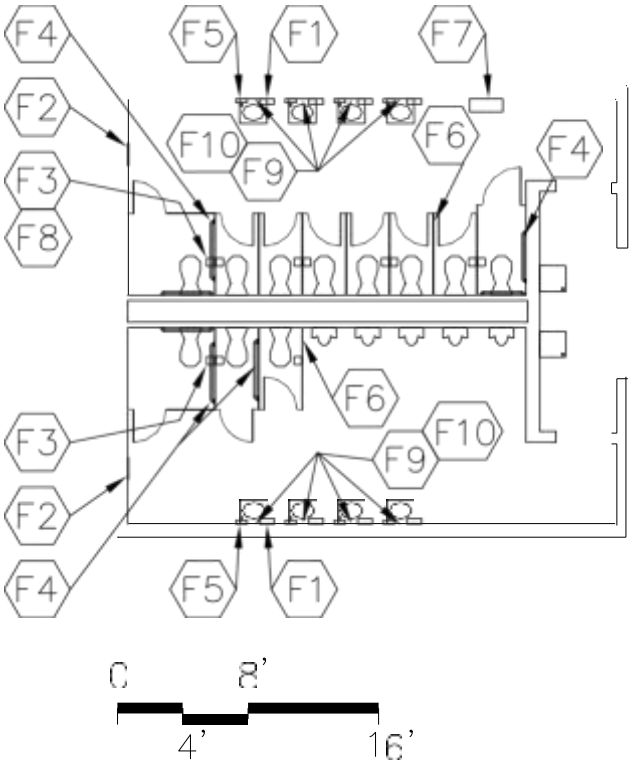
LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chair
L3 File cabinets
L4 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 4' of tack board ***or marker board*** (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and modem port	262726
Communications:	
T1 Modem port for temperature controls computer	271523
T2 1 voice port and phone	271513/***273123***
T3 1 data port near workstation	271513
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window (optional)	081113/088000

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.

Spaces to be determined by Design Professional based on the number of fixtures required.



CAPACITY: Based on size of program area

SIZE: Based on the sum of the program areas excluding building services, multiplied by 3.5%

PROGRAM ACTIVITIES

- Personal and health needs for the students

SPATIAL RELATIONSHIPS:

- Near student dining area
- Near public use areas, such as media center and gymnasium
- Near academic core area
- Restrooms located in several areas throughout building

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control –
  wall minimum STC 53
  ceiling minimum CAC 35, NRC 0.70

NOTES:

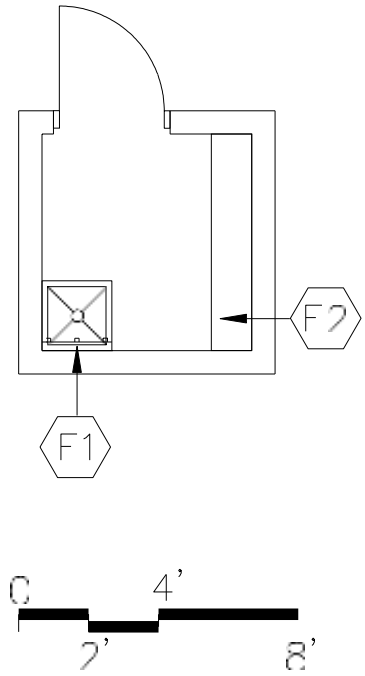
1. Where individual restrooms are provided in lieu of large group restrooms, refer to M-BS-10.

LARGE GROUP RESTROOMS
M-BS-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Ceramic mosaic tile	093000
Optional: porcelain tile,	096723
resinous flooring **or *unbacked sheet vinyl with welded seams***	***096500***
Base:	
Ceramic mosaic tile base	093000
Optional: structural glazed tile,	042000
porcelain tile base,	096723
resinous flooring, or ***integral vinyl base***	***096500***
Ceiling:	
Suspended, acoustical	095113
Optional: Abuse resistant gypsum wallboard	092116
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Waste Receptacles	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispensers	102813
F2 24" x 60" mirror	102813
F3 Toilet tissue holders	102813
F4 36" and 42" grab bar	102813
F5 Soap dispensers	102813
F6 Toilet partitions	102113
F7 Sanitary product dispenser	102813
F8 Sanitary product receptacles	102813
F9 16" x 24" mirrors with shelf (optional)	102813
F10 Shelves (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closets	224000
Wall-mounted urinals	224000
Wall-mounted lavatories or wash fountains	224000
Wall hydrants	224000
Plumbing connections	224000/221116/221119
Drinking water coolers	224000
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Emergency lighting	265100
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Optional: electric hand dryers



PROGRAM ACTIVITIES:
- Space for storage of custodial supplies throughout the building

SPATIAL RELATIONSHIPS:
- Near large group restrooms

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	50 SF

NOTES:

CUSTODIAL CLOSET
M-BS-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
Resilient base	096500
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Mop holder	102813
F2 Fixed or loose shelving (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Service sink or floor drain sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726

Communications:
N/A

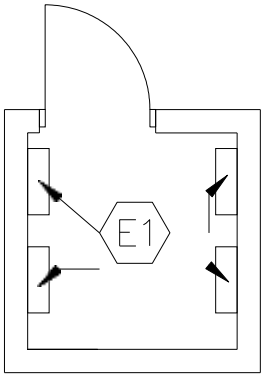
Electronic Safety and Security:
N/A

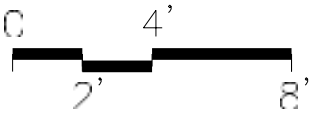
Miscellaneous:
N/A

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

Space to be determined by Design Professional.





PROGRAM ACTIVITIES:
- Space for electrical wiring and panels

SPATIAL RELATIONSHIPS:
N/A

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	50 SF

NOTES:

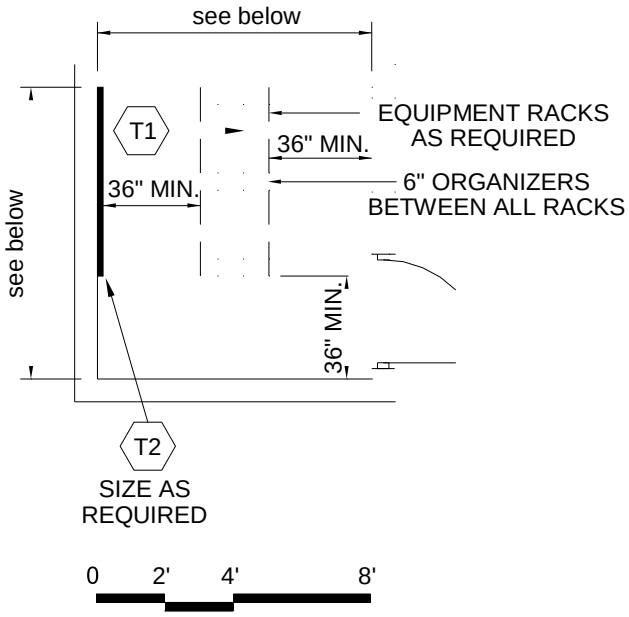
ELECTRICAL CLOSET
M-BS-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls:	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
E1 Electrical switchboard	262413/262416
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



CAPACITY: N/A

SIZE:

TR Serving Zone > 188 ports:
minimum 10 ft. x 12 ft.
TR Serving Zone of 96-188 ports:
minimum 8 ft. x 10 ft.
TR Serving Zone of < 96 ports:
minimum 8 ft. x 8 ft.

PROGRAM ACTIVITIES:

- Space for technology needs

SPATIAL RELATIONSHIPS:

N/A

ENVIRONMENTAL CONSIDERATIONS:

N/A

NOTES:

1. This is an example of a telecommunications room. The equipment and layout will vary from school district to school district.
2. ***Verify and coordinate TR quantity, size and location with technology designer during programming phase.***
3. ***Multiple TR's may be required.***

TELECOMMUNICATIONS ROOM
M-BS-4

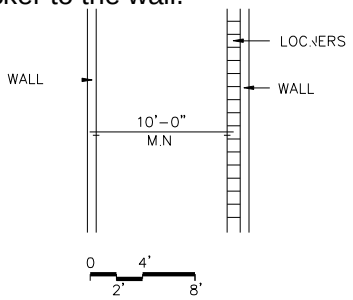
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete,	033000
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls:	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Cooling and Exhaust air system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
1 duplex receptacle	262726
Receptacles for data equipment	262726
Telecommunications Grounding	270526/260526
Standby power	263213/263600
Communications:	
T1 Technology equipment	
Central sound system	275123
Telephone Wiring	271313/271513
Integrated Telephone System	273123
Video Wiring	271543
Digital on Demand Delivery System	274125
Local Area Network Wiring	271513/271323
Local Area Network Electronics	272100/273123
Grounding & Infrastructure Equipment	270526/271100
T2 ***3/4***" plywood back board	271313
Electronic Safety and Security:	
Security System	281300/281600/282300
Miscellaneous:	
N/A	

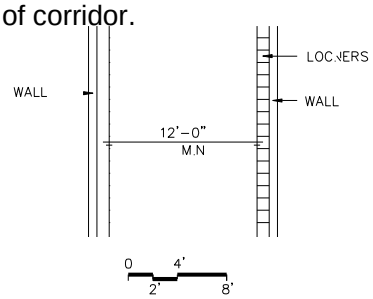
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

- Corridors shall be a minimum of 8 feet wide if no lockers are located in the corridor.
- Corridors shall be a minimum of 10 feet wide if lockers are located on one side of the corridor. The corridor width is from the face of the locker to the wall.



- Corridors shall be a minimum of 12 feet wide if lockers are located on each side of the corridor. The corridor width is from the face of the locker to the face of locker on opposite side of corridor.



- Instructional and activity areas shall be accessible by corridors without passing through another instructional or activity area.
- The corridors are to meet the existing requirements of applicable codes
- Stairs, ramps, and elevators are included under the corridor category.
- It is recommended that stairs in multi-story buildings not be enclosed unless required by code.

CAPACITY: Based on size of program area
SIZE: Based on the sum of the program areas excluding building services, multiplied by 20%

PROGRAM ACTIVITIES:
- Circulation space

SPATIAL RELATIONSHIPS:
N/A

ENVIRONMENTAL CONSIDERATIONS:
- Uniform lighting

VESTIBULES
- Area of vestibules to be included within area allotted for corridors.
- Width of vestibules can be no less than minimum width of adjacent corridor.
- Minimum corridor length to be 8'-0" between doors.
- Vestibules are to be provided at major entrances/exits and may be eliminated at minor entrances/exits as determined by the Design Professional.
- Provide automatic door operator on one leaf of main entrance/exit door and related vestibule door.
- Provide a five-step or fifteen foot walk off mat extending from main outside entry doors into the building and as wide as the entry doors.
- Option – entrance floor grilles. See Chapter 9, Section 124816.
- ***Lockers are not part of the construction factor, but are a part of the circulation/corridor factor.***

NOTES:

CORRIDORS
M-BS-5

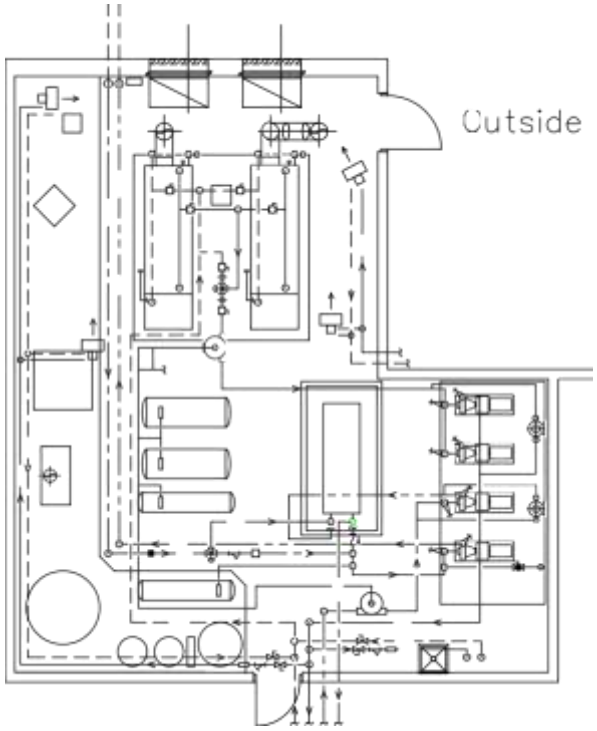
FINISHES[1]:	Spec. Ref.#
Flooring[2]:	
Linoleum, ET, sheet vinyl,	096516
rubber, carpet,	096500
carpet tile,	096816
polished concrete finishing,	096813
or colored concrete finishing	033510
	033519
Optional:Terrazzo tile, porcelain	093000
Base:	
Resilient base	096500
Optional: structural glazed tile	042000
Ceiling:	
Suspended, acoustical	095113
Option in vestibules: Abuse resistant gypsum wallboard	092116
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS	
Recycling bins and waste receptacles	
Fixed or loose benches	

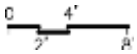
NOTE: At entries adjacent to dining/ commons area, match dining/commons flooring.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Corridor lockers	105113
Fire extinguishers and cabinets	104400
Recessed vinyl floor mats or surface mats	124813
Tack board or tackable wall surface	101100
Fire Suppression:	
N/A	
Plumbing:	
Drinking water coolers	224000
HVAC:	
Supply/return air system	Div. 23
Temp ctrl from adjacent instructional spaces	230923
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Duplex receptacles	262726
Double duplex receptacle adjacent to each video port	262726
Means of egress lighting per code	265100
Emergency lighting	265100
Communications:	
Video ports	271543
Data ports	271513
Pay phone terminals	271513/273113
Central sound system	275123
Clocks	275313
Wireless access points	271513/272100/272133
Electronic Safety and Security:	
Life safety devices per code	283111
Security System	281300/281600/282300
Miscellaneous:	
Display cases and Directory	101200

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Linoleum, VET, or sheet vinyl is to be used in vestibules, stairwells, and elsewhere as appropriate. Porcelain tile is optional in lobbies, with resilient or structural glazed tile base.

Space to be determined by Design Professional.





CAPACITY: Based on size of program area
SIZE: Based on the sum of the program areas excluding building services, multiplied by 6.9%

PROGRAM ACTIVITIES:
- Space for mechanical and electrical equipment

SPATIAL RELATIONSHIPS:
- Accessible for maintenance and repair
- Access to outside
- Isolate from main area of building
- Near loading/receiving area
- Near custodial area

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control – wall minimum STC 60 ceiling minimum CAC 35, NRC 0.70

NOTES:

1. This is an example of a mechanical room. The equipment and layout will vary depending upon the heating, ventilating, and air conditioning system used.
2. A penthouse is considered a mechanical room.

MECHANICAL/ELECTRICAL SPACE/DECKS

M-BS-6

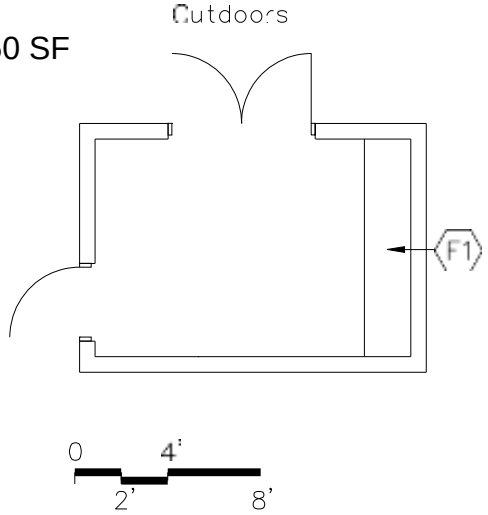
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls: (note 2)	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
To be determined by Design Professional	
Fire Suppression:	
N/A	
Plumbing:	
To be determined by Design Professional	
HVAC:	
To be determined by Design Professional	
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Others as determined by Design Professional	
Communications:	
Central sound system	275123
Voice port and phone	271413/***273123***
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

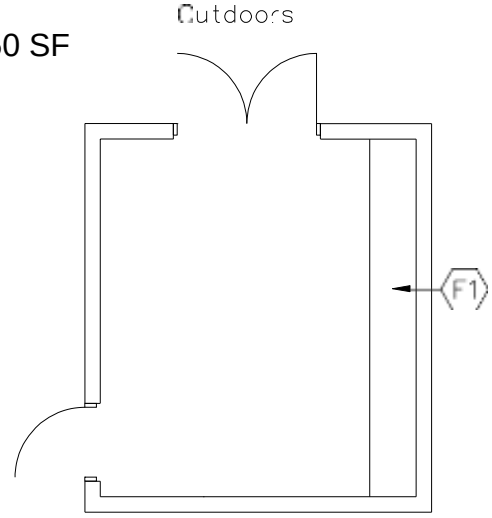
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Option for penthouse to use metal panel on concrete masonry or metal panel on metal framing wall systems.

150 SF



250 SF



CAPACITY: N/A
SIZE: 150 - 250 SF

PROGRAM ACTIVITIES:
- Space for storage of outdoor custodial equipment

SPATIAL RELATIONSHIPS:
- Near custodial office
- Near custodial workroom
- Direct access to outdoors

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

STORAGE AREA
M-BS-7

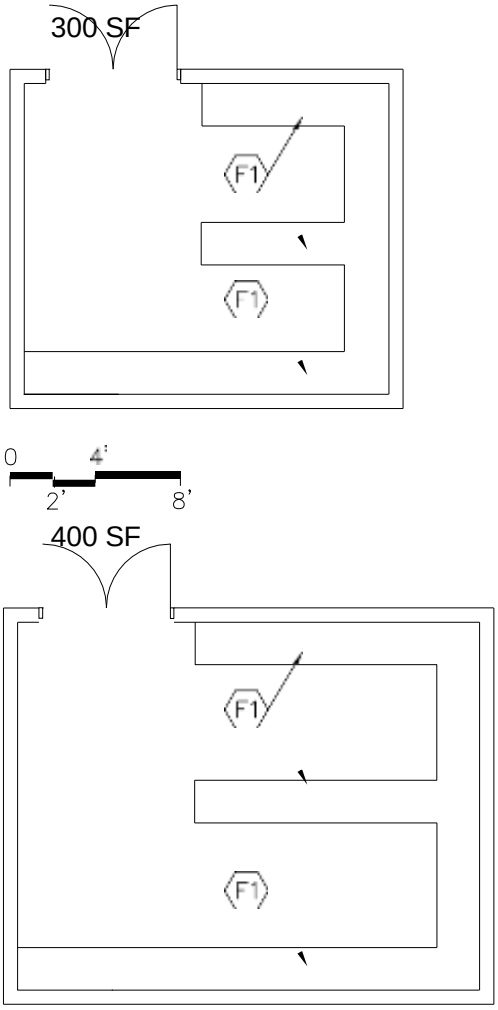
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls:	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 10‘ - 16’ of open tall shelving, depths may vary (fixed or loose)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.

Space to be determined by Design Professional.



CAPACITY: N/A
SIZE: 300 - ***700*** SF

PROGRAM ACTIVITIES:
- Storage for paper products, utensils, supplies, etc., to be used throughout the entire building

SPATIAL RELATIONSHIPS:
- Near loading/receiving area
- Direct access to building circulation

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

CENTRAL STORAGE AREA
M-BS-8

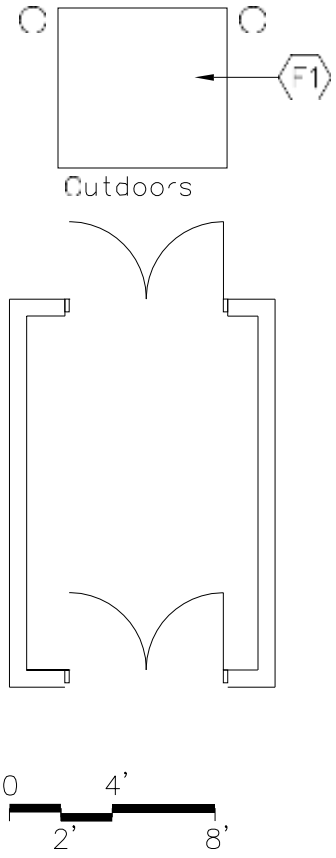
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls:	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 26' - 32' of open tall shelving, depths may vary (fixed or loose)	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.

LOADING/RECEIVING AREA
M-BS-9



CAPACITY: N/A
SIZE: 120 SF

PROGRAM ACTIVITIES:
- Delivery of materials and goods to be used throughout the building

SPATIAL RELATIONSHIPS:
- Near food service spaces
- Near central storage area
- Near mechanical room
- Adjacent to loading dock

ENVIRONMENTAL CONSIDERATIONS:
N/A

MISCELLANEOUS:
- Refer to Chapter 3, Section 3201, for site vehicular circulation requirements

NOTES:

LOADING/RECEIVING AREA

M-BS-9

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	
Walls:	
Epoxy-painted concrete masonry units	042000 / 099100

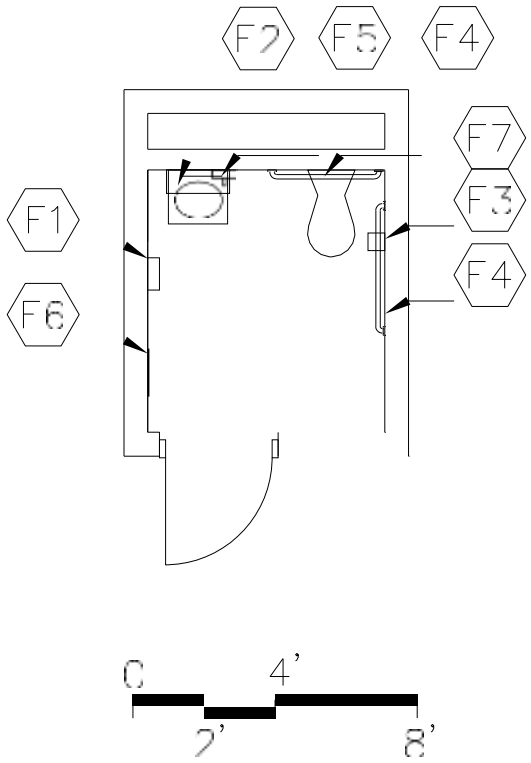
LOOSE FURNISHINGS

N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Loading dock leveler and dock bumpers	111300
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Personal and health needs for the building occupants

SPATIAL RELATIONSHIPS:
- Near academic area

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

CAPACITY: 1 person
SIZE: ***60*** SF
ANCILLARY SPACES:

NOTES:

1. Separate restrooms must be provided for male and female students

RESTROOM
M-BS-10

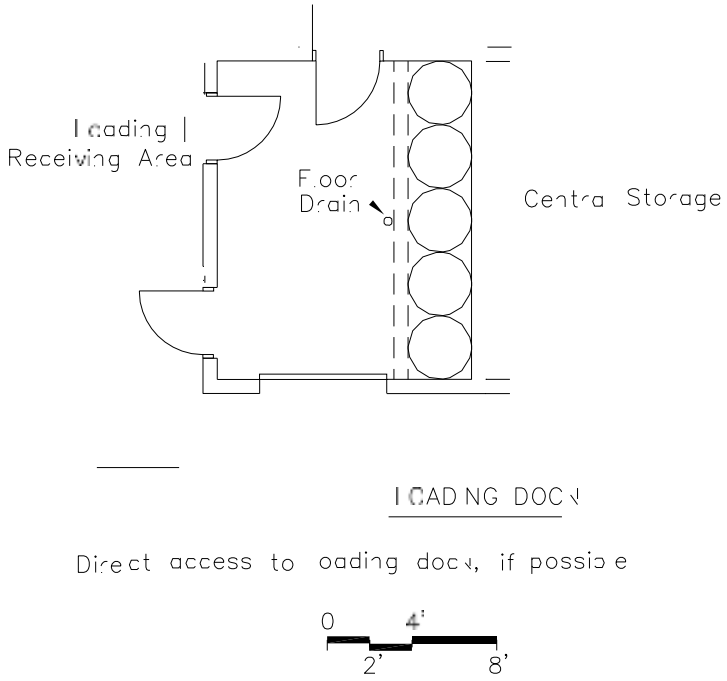
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sheet vinyl, or rubber	096500
Optional: quarry tile, or	093000
resinous flooring	096723
Base:	
Resilient base	096500
Optional: quarry tile, resinous	093000
flooring, or integral vinyl cove base	096723
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Wastebasket	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 Mirror with shelf above sink(optional)	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Sanitary product dispenser	102813
F7 Sanitary product receptacle	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. F6 and F7 required for female restroom only.

Recycling space to be determined by Design Professional.



CAPACITY: N/A
SIZE: 80 – 100 SF

PROGRAM ACTIVITIES:
- Provide recyclable collection for paper, cardboard, glass, plastics and metals

SPATIAL RELATIONSHIPS:
- Near food service spaces
- Near central storage area
- Near mechanical room
- Adjacent to loading dock

ENVIRONMENTAL CONSIDERATIONS:
N/A

MISCELLANEOUS:
- Refer to Chapter 3, Section 3201, for site vehicular circulation requirements

NOTES:

1. Contact local collection agency to see if co-mingling of materials is permitted. Design team should meet the LEED intent when designing the recycling area.

RECYCLING ROOM
M-BS-11

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	
Walls:	
Epoxy-painted concrete masonry units	042000 / 099100
LOOSE FURNISHINGS	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

PURPOSE The purpose of this Chapter is to provide the school district and the Design Professional with the guidelines and relationships for the High School spaces identified in Chapter 2: Bracketing.

INTRODUCTION This Chapter begins with an overall building diagram showing how the various areas of a school could be arranged. The diagram is meant only to demonstrate the relationships between various parts of the building.

Along with the overall building diagram, there are various program area diagrams throughout this chapter which demonstrate how specific spaces may relate to each other within a particular program area.

NO SMOKING SIGNS As required by the Ohio Revised Code, post "No Smoking" signs at every entrance door into the building. If a door is for exit only, there is no need for a sign. Post the signs on entrance glass or other appropriate surface. Signs shall contain a telephone number for reporting violations. (866/559-6446)

DIAGRAM Diagrams of the space have been developed to show how some of the features and loose furnishings may be organized. The space is not required to be designed in the configuration shown.

PROGRAM ACTIVITIES Program activities indicate the type of activities that may occur in the space. These activities will vary from school district to school district depending on the educational program.

SPATIAL RELATIONSHIPS Relationships of a particular room to other spaces and activities have been identified to assist the Design Professional in the design of the facility.

ENVIRONMENTAL CONSIDERATIONS Environmental considerations are items that may affect the educational program. They are the basis of some the requirements of Finishes, Features, Plumbing, HVAC, Electrical, and Technology. ***Storage rooms shall not be required to be exhausted if there is no objectionable transfer (odors or hazardous gas) to adjacent spaces.***

FINISHES The finishes stated for the spaces have been developed based on the function of the room. The spaces adjacent to the room or a building system may change the finishes stated.

OPERABLE WINDOWS Operable windows are optional in exterior window fenestration.

LIGHTING Interior lighting shall be controlled by occupancy sensors, automatic timed lighting controlled system or a combination of both to comply with ASHRAE 90.1. Exterior lighting shall be controlled by photosensor or astronomical time clock to comply with ASHRAE 90.1.to automatically turn lighting off when sufficient daylight is available.

AREA Square foot area given for the room is the necessary area. This area is given in net square feet – defined as the area within the walls of the room.

LOOSE FURNISHINGS

Loose furnishings are to be funded by the Ohio School Facilities Commission. The loose furnishings requirements are to be coordinated with the district's educational program. As an example, some spaces may require tables with student chairs and other spaces may require student desks with chairs.

* The intent of the loose furnishings shown on the space plates is not necessarily to be all-inclusive of furniture options or mandate items which may not be needed in a particular district, but rather to provide a general concept of how a particular space could be laid out. Some items listed as loose furnishings could be provided as fixed casework and items listed as fixed casework, if appropriate, could be provided as loose furnishings depending on the building design and types of technology used. Construction and loose furnishings budgets should be coordinated appropriately.

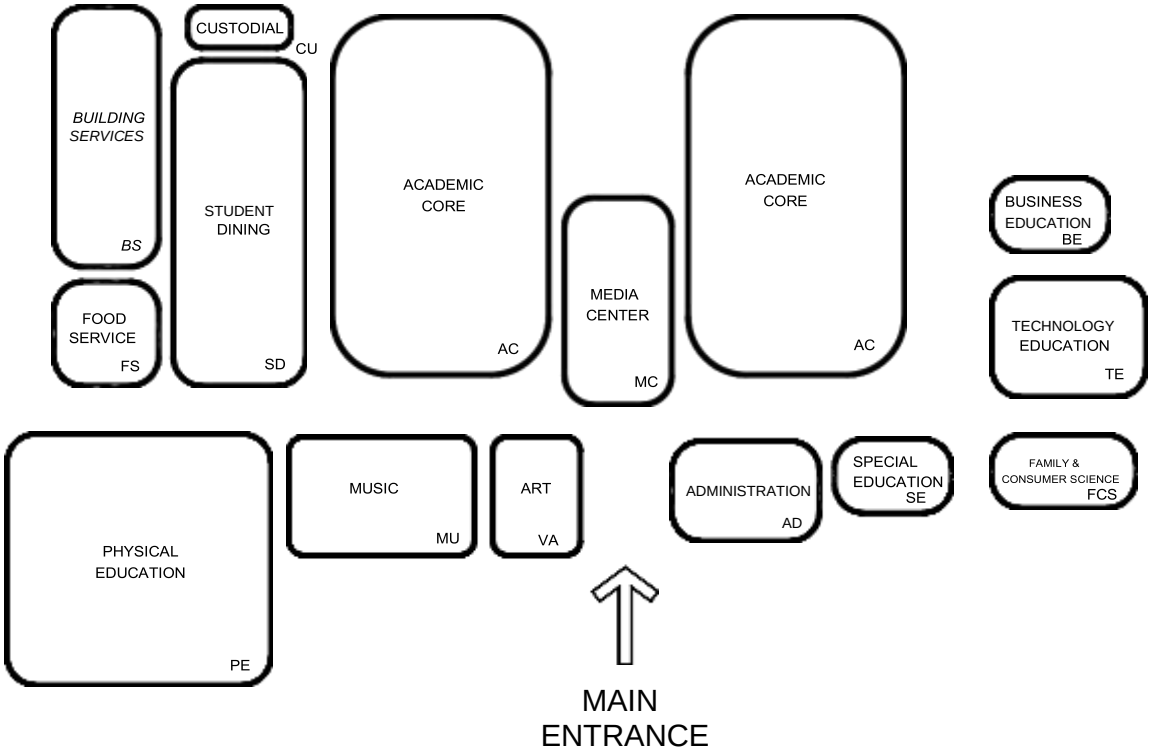
FEATURES

Features identified on the space plates are recommended for these rooms. These features include Fixed Items, Plumbing, Heating, Ventilating and Air Conditioning, Electrical, and Technology systems as well as Miscellaneous Items. Exact sizes of items may need to be modified slightly to interface with the exact size and proportions of the actual space.

Casework and Visual Display Boards should reflect the needs of the district's educational program. The intent of this list is not to mandate casework or visual display boards that may not be needed by a particular district, but rather to be used as a guideline for items that are generally used in this type of space. Some items listed as "fixed casework" could also be provided by mobile casework or loose furnishings if appropriate. Construction and loose furnishings budgets should then be adjusted appropriately.

TECHNOLOGY

The location of projectors, in spaces where required, shall be carefully coordinated between the Design Professionals in relation to the projection surface and ADA requirements. Note that classroom projectors are required to be ultra-short throw interactive projectors (refer to Section 274119). Classroom instructor AV interfaces and AV equipment are to be comprised of digital systems. Coordination is required between the Design Professionals to accommodate the digital solution that is selected by the District. Refer to Section 271543 and Figure 1, within that section, for a general overview of classroom equipment and interconnectivity requirements. The District's Digital Media Management System requires Design Professionals coordination for adequate dedicated rooftop space for current and potential future system antennas for incorporation of digital broadcast media sources as selected by the District (refer to Section 274125). Design Professionals should especially note that the classroom's dedicated 4 student data ports and associated work stations have been removed. A robust Wireless Local Area Network (WLAN), capable of supporting 1:1 and/or Bring Your Own Device (BYOD) throughout all educational areas is now required. Refer to Section 272133 for all of the new requirements for the District's WLAN.



NOTES:

This is an example of how the spaces in a high school could be arranged. This is meant only to demonstrate the relationships between various areas of the building.

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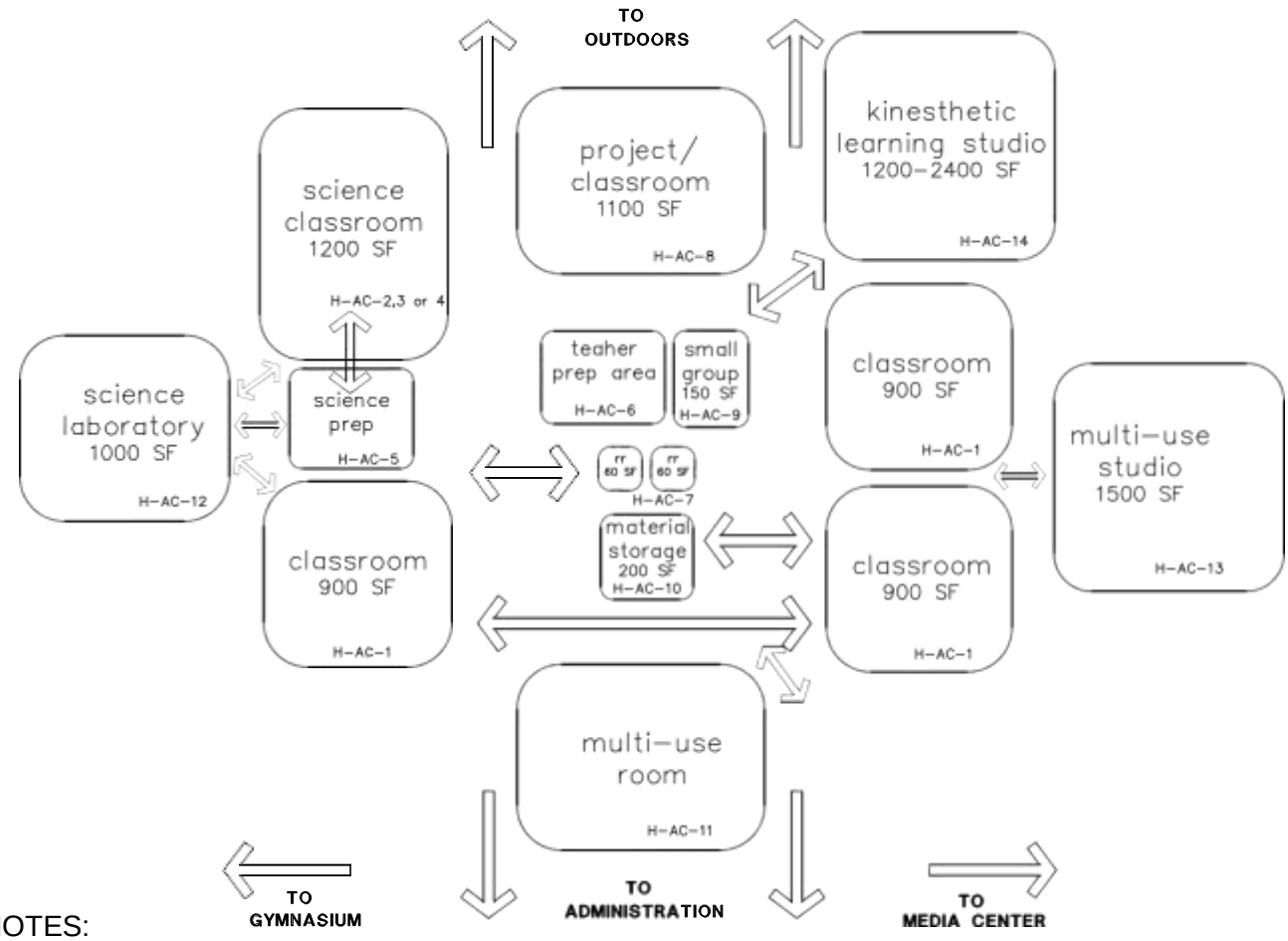

NOTES:

This is an example of how the academic core spaces in a high school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Academic Core space plates:

- H-AC-1 High School Classroom
- H-AC-2 Science Classroom - General/Physics
- H-AC-3 Science Classroom - Chemistry
- H-AC-4 Science Classroom - Biology
- H-AC-5 Science Prep
- H-AC-6 Teacher Prep Area/Workroom
- H-AC-7 Individual Restroom
- H-AC-8 Project/Classroom
- H-AC-9 Small Group Room
- H-AC-10 Instructional Material Storage
- H-AC-11 Multi-use Room
- ***H-AC-12 Science Laboratory***
- ***H-AC-13 Multi-Use Studio***
- ***H-AC-14 Kinesthetic Learning Studio***

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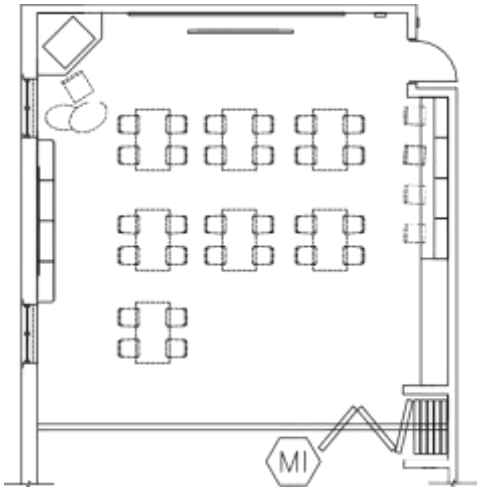
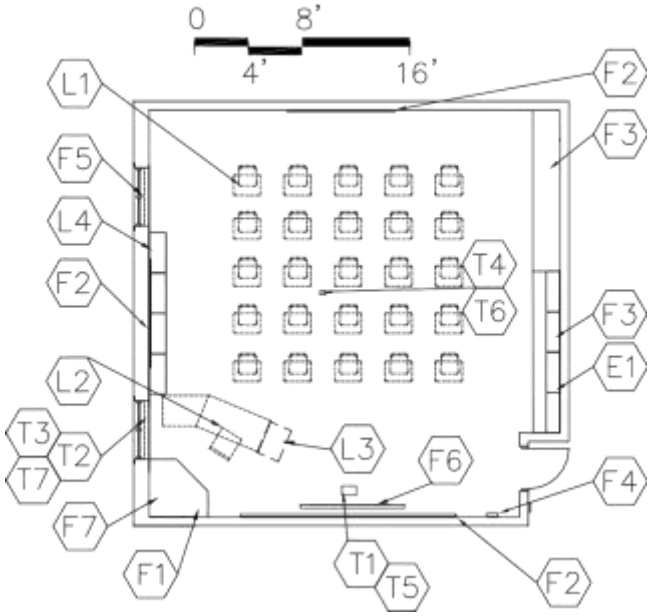


CLASSROOM WITH OPTIONAL FOLDING WALL



TYPICAL CLASSROOM

CAPACITY: 25 students
SIZE: 900 SF

PROGRAM ACTIVITIES:

- Large group, small group, and individual instruction
- Group and individual work
- Demonstrations
- Accommodates any of the core academic disciplines

SPATIAL RELATIONSHIPS:

- ☐ Near other academic core classrooms
- ☐ Proximity to large group restrooms
- ☐ Near teacher prep area/workroom
- ☐ Classrooms should be located in academic "zone" that is away from noisy or public activities
- ☐ Classrooms with access to media center and administrative services
- ☐ Flexibility of space

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be placed in this classroom or could be placed in a teacher prep area/workroom.

HIGH SCHOOL CLASSROOM
H-AC-1

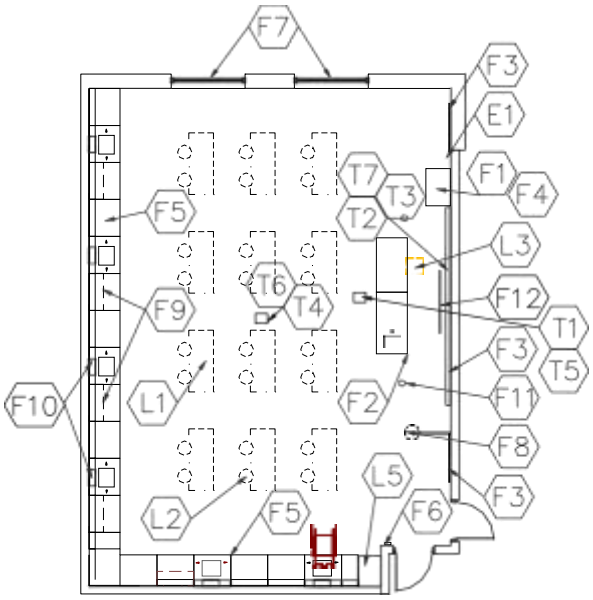
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile	096816
Optional: linoleum, ET,	096516
sheet vinyl, or rubber	096500
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
- L1 Student desks and chairs
- L2 Teacher desk or workstation/computer support and chair
- L3 File cabinet
- L4 9' of low bookcases (fixed or mobile)
- Wastebasket

Miscellaneous:
- Pencil sharpener ***(optional)***
- M1 Operable partitions between classrooms are optional 02226
- ***E1 Duplex receptacle with dedicated circuit for wireless devices***

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123550
F2 20'-32' combination marker board, tack board and tackable wall surface	101100
F3 18'-24' combination base and wall cabinets	123550
F4 Pencil sharpener support (optional)	062000
F5 Windows with integral blinds	085113
F6 Projection screen (optional)	115213
F7 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 ***Wireless access point cable above ceiling***	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 ***Ultra-short throw interactive*** projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	***272133***
T7 Classroom technology center video port	***271543, 274116, 274119, 275127***
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Where appropriate, some casework may be mobile to add flexibility and could become part of the loose furnishings.
4. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***



PROGRAM ACTIVITIES:

- Large group, small group, and individual instruction
- Group and individual work
- Laboratory experimentation
- Data collection and analysis
- Demonstrations
- Project work

SPATIAL RELATIONSHIPS:

☐ Near other science classrooms
☐ Adjacent to science prep room
- Classrooms located in academic "zone" that is away from noisy or public activities

☐ Classrooms with access to media center and administrative services
☐ Proximity to large group restrooms
☐ Flexibility of space

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Higher than normal ventilation requirements
- Moisture- and stain-resistant finishes
- Chemical-resistant counter tops

CAPACITY:	24 - 28 students
SIZE:	1,200 SF
ANCILLARY SPACES:	Science Prep H-AC-5

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Science casework layout to be determined by the school district.
3. Depending upon the educational program of the district, a tall wardrobe may be placed in this classroom or could be placed in a teacher prep area/workroom.
4. The layouts shown do not restrict or reflect the variety of arrangements available to the Design Professional.

SCIENCE CLASSROOM - GENERAL/PHYSICS

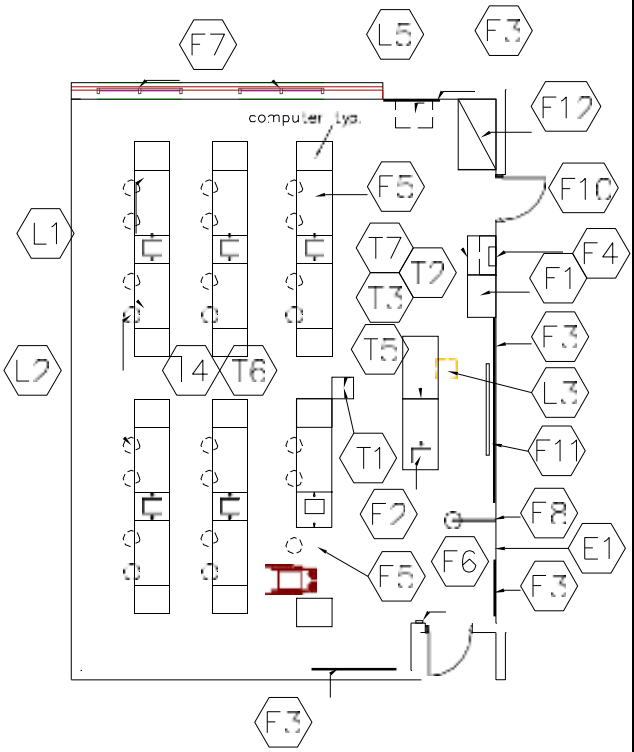
H-AC-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096500
rubber, ET, sheet vinyl,	096516
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	
099100	
LOOSE FURNISHINGS:	
L1 Student work tables	
L2 Student stools/chairs	
L3 Teacher chair or stool	
L4 Reserved	
L5 File cabinet	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
E1 Duplex receptacle with dedicated circuit for wireless devices	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123553
F2 Demonstration table/teacher desk	123553 F3
20'-32' combination marker board, tack board and tackable wall surface	101100
F4 Technology support casework	123553
F5 40'-60' of lab casework with sinks	123553 F6
Pencil sharpener support (optional)	062000 F7
Windows with integral blinds	085113
F8 Emergency shower/eyewash	224000
F9 18'-24' of wall cabinets	123553
F10 Towel dispensers (optional)	102813
F11 2 eye hooks for demonstrations(optional)	055000
F12 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	224000/221116/221119
Emergency shower/eyewash connections	224000
Gas connections (optional)	226313
Master shutoff for gas	226313
Compressed air connections(optional)	221500
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Manual exhaust	Div. 23
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
Duplex receptacles at perimeter workstations and teaching wall	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting	265100
Means of egress lighting per code	265100
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port at demonstration table	271513 T4
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119 T6
Wireless access point (WAP) as determined by design – refer to Note 4	272133
T7 Classroom technology center videoport	271543, 274116, 274119, 275127

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Master gas shutoff valve shall be clearly labeled, easily accessible, and immediately operable by staff.
4. Baseline includes WAP cable per classroom. WAP device quantity/placement per 272133 requirements.



PROGRAM ACTIVITIES:

- Large group, small group, and individual instruction
- Group and individual work
- Laboratory experimentation
- Data collection and analysis
- Demonstrations
- Project work

SPATIAL RELATIONSHIPS:

- ☐ Near other science classrooms
- ☐ Adjacent to science prep room
- Classrooms located in academic "zone" that is away from noisy or public activities
- ☐ Classrooms with access to media center and administrative services
- ☐ Proximity to large group restrooms
- ☐ Flexibility of space

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Higher than normal ventilation requirements
- Moisture- and stain-resistant finishes
- Chemical-resistant counter tops

CAPACITY:	24 - 28 students
SIZE:	1,200 SF
ANCILLARY SPACES:	Science Prep H-AC-5

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Science casework layout to be determined by the school district.
3. Depending upon the educational program of the district, a tall wardrobe may be placed in this classroom or could be placed in a teacher prep area/workroom.
4. The layouts shown do not restrict or reflect the variety of arrangements available to the Design Professional.

SCIENCE CLASSROOM - CHEMISTRY
H-AC-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Vinyl sheet flooring, linoleum,	096500
rubber, ET,	096516
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:

L1 Student work tables
L2 Student stools/chairs
L3 Teacher chair or stool
L4 Reserved

L5 File cabinet
Wastebasket

L4 Could be fixed casework

Electronic Safety and Security:

Life safety devices per code 283111

Miscellaneous:

Pencil sharpener (optional)

E1 Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):

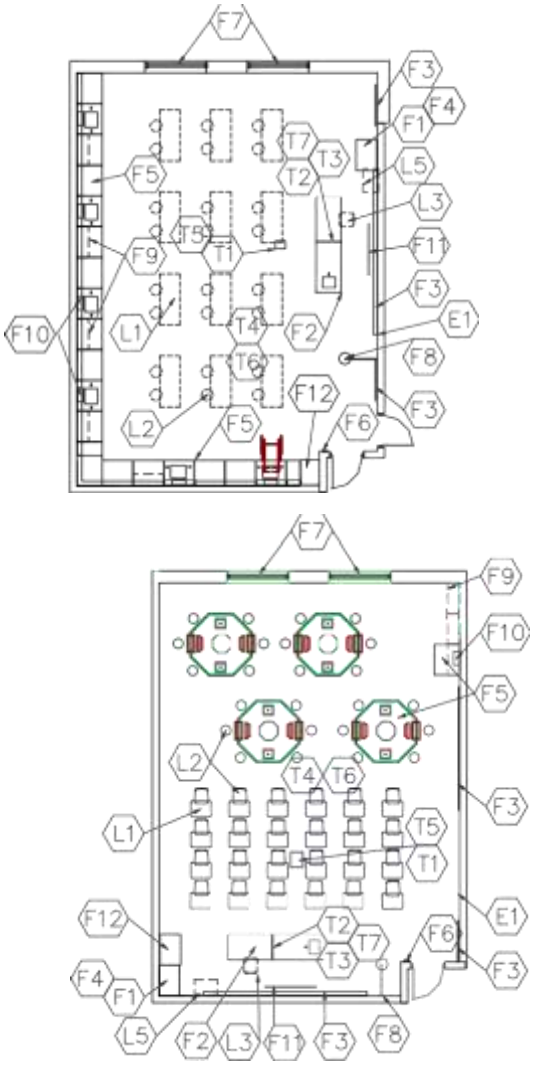
T6 Wireless access point (WAP) as determined by Design – refer to Note 4 272133

T7 Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123553
F2 Demonstration table/teacher desk	123553
F3 20'-32' combination marker	101100
board, tack board and tackable wall	surface
F4 Technology support casework	123550
F5 40'-60' lab casework with sinks	123553
F6 Pencil sharpener support (optional)	062000
F7 Windows with integral blinds	085113
F8 Emergency shower/eyewash	224000
F9 18'-24' of wall cabinets (optional)	123553
F10 Towel dispensers (optional)	102813
F11 Projection screen (optional)	115213
F12 Fume hood	115313
F13 Tall cabinet for microscopes(optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	224000/221116/221119
Emergency shower/eyewash connections	224000
Master shut-off for gas	226313
Gas connections	226313
Compressed air connections (optional)	221500
Acid waste piping	221316
Neutralization tank	221323
HVAC:	
Supply/return air system	Div. 23
Independent temp control	230923
Manual exhaust	Div. 23
Exhaust for fume hood	Div. 23
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
Duplex receptacles at perimeter workstations and teaching wall	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting	265100
Means of egress lighting per code	265100
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port at demonstration table	271513 T4
Wireless access point above ceiling	271513
Central sound system	275123
Clock	275313
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Master gas shutoff valve shall be clearly labeled, easily accessible, and immediately operable by staff.

4. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



CAPACITY: 24 - 28 students
SIZE: 1,200 SF
ANCILLARY SPACES: Science Prep H-AC-5

PROGRAM ACTIVITIES:

- Large group, small group, and individual instruction
- Group and individual work
- Laboratory experimentation
- Data collection and analysis
- Demonstrations
- Project work

SPATIAL RELATIONSHIPS:

- Near other science classrooms
- Adjacent to science prep room
- Classrooms located in academic "zone" that is away from noisy or public activities
- Classrooms with access to media center and administrative services
- Proximity to large group restrooms
- Flexibility of space
- Appropriate exterior exposure for "grow" window

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Higher than normal ventilation requirements
- Moisture- and stain-resistant finishes
- Chemical-resistant counter tops

NOTES:

1. Loose furnishings shown represent two of many possible arrangements.
2. Science casework layout to be determined by the school district.
3. Depending upon the educational program of the district, a tall wardrobe may be placed in this classroom or could be placed in a teacher prep area/workroom.
4. Option: small, bay window-type, pre-manufactured greenhouse. No additional square footage allowed.
5. The layouts shown do not restrict or reflect the variety of arrangements available to the Design Professional.

SCIENCE CLASSROOM - BIOLOGY
H-AC-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096500
rubber, ET, sheet vinyl,	096516
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	
099100	

LOOSE FURNISHINGS:

L1 Student work tables
L2 Student stools/chairs
L3 Teacher chair or stool
L4 Reserved
L5 File cabinet
Wastebasket

L4 could be fixed casework.

Electronic Safety and Security:

Life safety devices per code	283111

Miscellaneous:

Pencil sharpener (optional)

E1 Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):

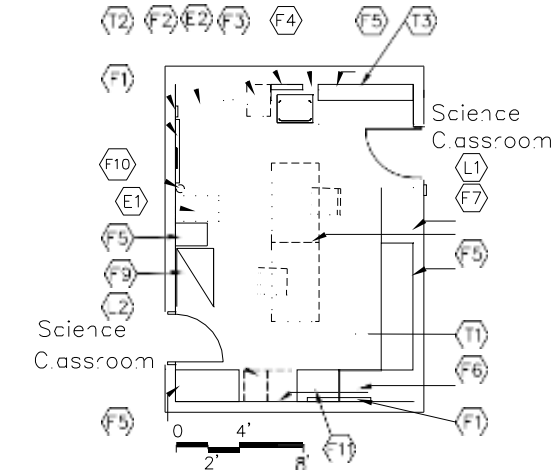
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123553
F2 Demonstration table/teacher desk	123553
F3 20'-32' combination marker board tack board and tackable wall surface	101100
F4 Technology support casework	123550
F5 40'-60' of lab casework with sinks	123553
F6 Pencil sharpener support (optional)	062000
F7 Windows with integral blinds	085113
F8 Emergency shower/eyewash	224000
F9 18'-24' of wall cabinets (total)	123553
F10 Towel dispensers (optional)	102813
F11 Projection screen (optional)	115213
F12 Tall cabinets (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	224000/221116/221119
Emergency shower/eyewash connections	224000
Master shut-off for gas	226313
Gas connections	226313
Compressed air connections (optional)	221500
Acid waste piping	221316
Neutralization tank (optional)	221323
HVAC:	
Supply/return air system	Div. 23
Independent temperature ctrl	230923
Manual exhaust	Div. 23
Electrical:	
Fluorescent lighting: Illumination level: See Table 8600-5	265100
Multilevel switching	262726
Duplex receptacles at perimeter workstations and teaching wall	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting	265100
Means of egress lighting per code	265100
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port at demonstration table	271513
T4 Wireless access point cable above ceiling	271513
Central sound system	275123
Clock	275313
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119

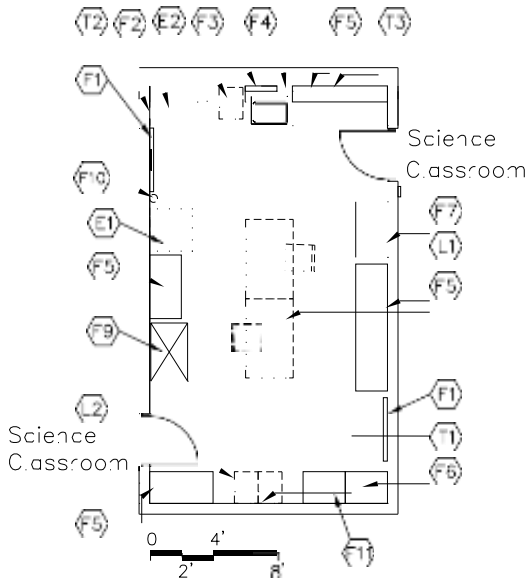
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Master gas shutoff valve shall be clearly labeled, easily accessible, and immediately operable by staff.
4. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

300 SF



400 SF



CAPACITY: 1-3 Staff
SIZE: 300-400 SF
ANCILLARY SPACES: Science Classrooms
H-AC-2, H-AC-3, H-AC-4

PROGRAM ACTIVITIES:
- Teacher preparation
- Materials storage
- Laboratory experimentation
- Data collection and analysis
- Small group work

SPATIAL RELATIONSHIPS:
- Adjacent to science classrooms
- Shared by more than one science classroom
- Grouped with and have access to other classrooms

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Ventilation requirements
- Moisture- and stain-resistant finishes
- Chemical-resistant counter tops

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Science casework layout to be determined by the school district.
3. Depending upon the educational program of the district, a tall wardrobe may be placed in this science prep room or could be placed in a teacher prep area/workroom.
4. A separate chemical storage room may be created from the science prep room square footage.

SCIENCE PREP
H-AC-5

FINISHES[1]:	Spec. Ref.#
Flooring:	
Vinyl sheet flooring, linoleum,	096516
rubber, ET,	096500
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Work tables with chemical-resistant top
L2 2 file cabinets
Wastebasket

EQUIPMENT
E1 Refrigerator/freezer (optional)
E2 Dishwasher (optional)

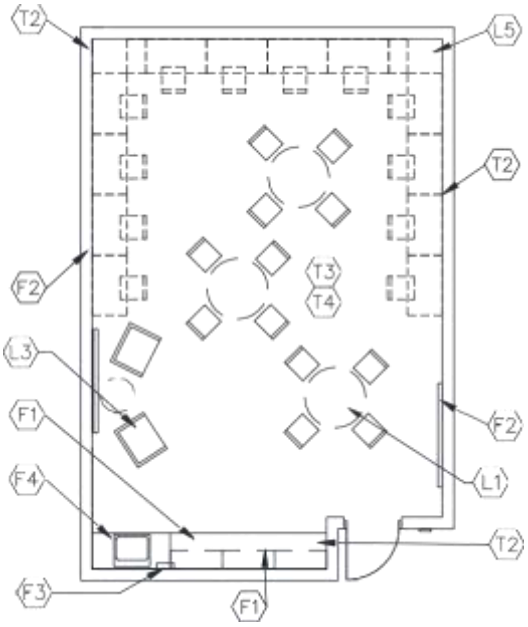
Note: Eliminate 24 hour exhaust if recommended by cabinet manufacturer. Make room 24 hour exhaust if no cabinet exhaust.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 4' of tack board	101100
F2 8'-15' of lab station with sink	123553
F3 Drying rack with pegs (optional)	123553
F4 Towel dispenser (optional)	102813
F5 16'-31' combination wall cabinets and tall cabinets	123553
F6 Storage cabinets for acids, Ventilated (optional)	123553
F7 Storage cabinets for flammables(optional)	123553
F8 Reserved	
F9 Fume hood (optional)	123553
F10 Emergency eyewash (if applicable)	224000
F11 Chemical storage cabinets with acid resistant lining	123553
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	224000/221116/221119
Acid waste system	Div. 23
Gas connections	226313
Compressed air connections(optional)	221500
Access to neutralization tank	221323
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Manual exhaust	Div. 23
24 hour exhaust for acid storage cabinet	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
1 duplex receptacle under work tables	262726
3 duplex receptacles	262726
Receptacle for refrigerator/freezer	262726
Double duplex receptacle at each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security;	
Life safety devices per code	283111
Miscellaneous:	
Fume hood through wall if adjacent to chemistry	

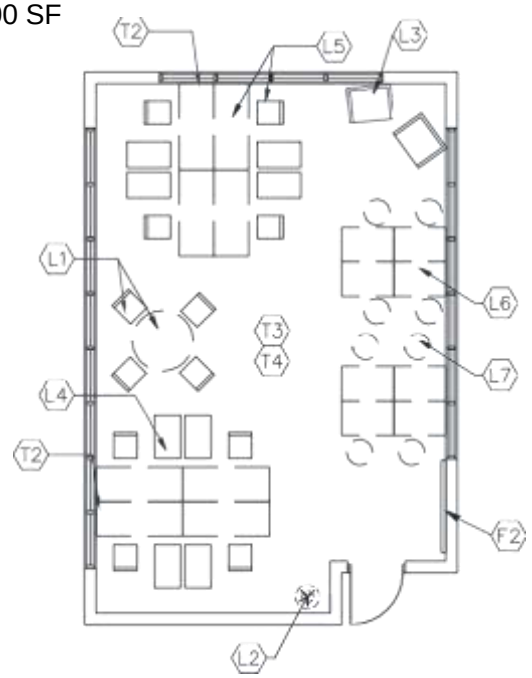
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

600 SF



600 SF



CAPACITY: 4-12 teachers
SIZE: 300 - 600 SF

PROGRAM ACTIVITIES:

- Teachers and other staff members hold team meetings and prepare for class
- Professional interaction should be encouraged to improve communication, professional development, and team building.
- ***Collaboration of grade level grouped or subject grouped instructors.***
- ***Collaboration spaces should support the exchange of ideas, remain instantly flexible, and provide an area for both individual study and group collaboration.***

SPATIAL RELATIONSHIPS:

- Near academic core classrooms
- Near individual restroom
- Near instructional material storage

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- ***Transparent walls or windows to adjacent rooms***

Collaboration Note:

- ***Collaboration is the vehicle by which individuals communicate their vision, desires, opinions, thoughts, and insight to their fellow colleagues. It is the means to address all aspects of the educational process, themes of focus, professional and personal relationships, and to build the camaraderie and teamwork to meet the ever changing educational needs of students of all ages.***

NOTES:

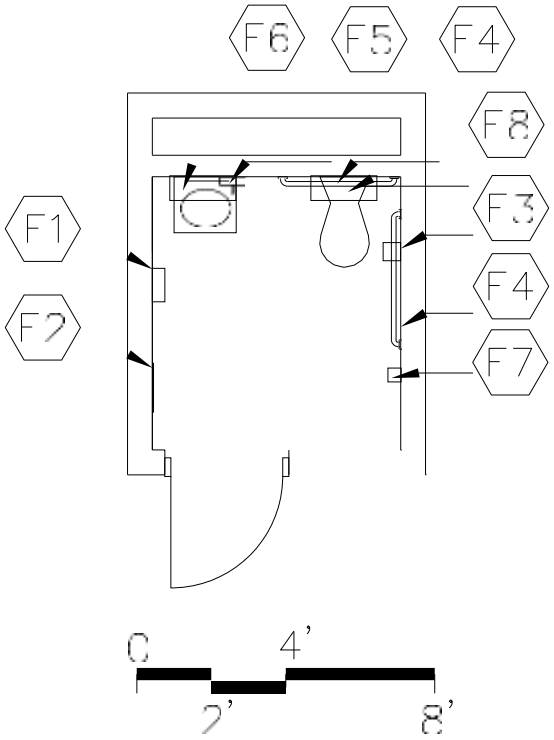
1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this teacher prep area/workroom or could be placed in a classroom

TEACHER PREP AREA/WORKROOM
H-AC-6

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, ET, linoleum, vinyl sheet, or rubber	096816 096500 096516 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	
099100	
LOOSE FURNISHINGS:	
L1 Tables and chairs	
L2 Coatrack	
L3 Soft Seating	
L4 Teacher computer trucks	
L5 Teacher workstation furniture and chair	
L6 42" high teacher cabinet with work surface top	
L7 Stools	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Copier by school district	
E1 Reserved	

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 12'-18' combination base & wall cabinets (some could be bookcases)	123550
F2 ***50-75 sf*** combination marker board, tack board & tackable wall surface	101100
F3 Towel dispenser (optional)	102813
F4 3' sink base cabinet	123550
Fire Suppression:	
Fire suppression systems	211000
TEX	
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single-level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
3 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Duplex receptacles for office equipment	262726
Receptacle for copier(if applicable)	262726
Communications:	
T1 Reserved	
T2 Voice ports and phones	271513/273123
T3 Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
T4 Wireless access point (WAP) as determined by Design – refer to Note 3	***272133***

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.
3. Baseline includes WAP cable. WAP device quantity / placement per 272133 requirements.
4. ***When collaboration area is selected, teacher computer trucks are provided in lieu of teacher desks in classrooms.***



PROGRAM ACTIVITIES:

- Personal and health needs for teachers, staff, and other individuals

SPATIAL RELATIONSHIPS:

- Near academic core classrooms
- Near teacher prep area/workroom

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35**,** NRC 0.70
- Moisture- and stain-resistant finishes

CAPACITY: 1 person
SIZE: ***60*** SF

NOTES:

INDIVIDUAL RESTROOM

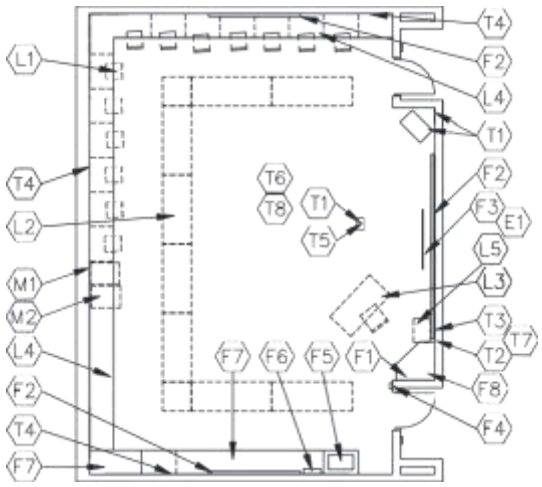
H-AC-7

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber, ET, or sheet vinyl	096516 096500
Optional: Ceramic mosaic tile, porcelain tile, or resinous flooring	093000 096723
Base:	
Resilient base	096500
Optional: Ceramic mosaic tile, Porcelain tile, resinous flooring, or integral vinyl cove base	093000 096723
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Wastebasket	

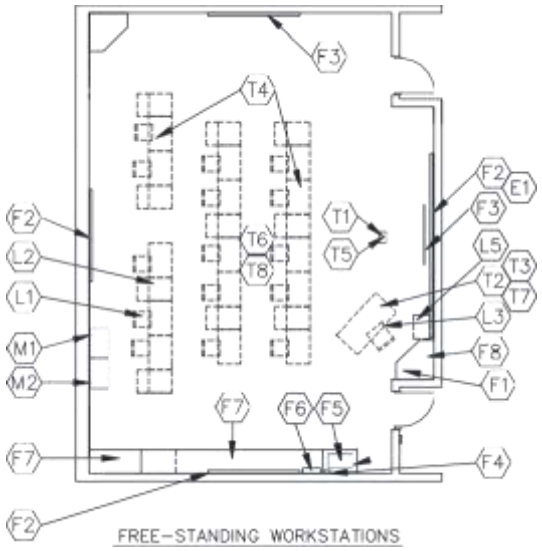
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 24" x 60" mirror	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Shelf above sink (optional)	102813
F7 Coat hook	102813
F8 Cabinet above toilet (optional)	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PERIMETER WORKSTATION LAYOUT



FREE–STANDING WORKSTATIONS

CAPACITY: 25 students
SIZE: 1,100 SF

PROGRAM ACTIVITIES:
- Individual computer instruction
- Group instruction
- Individual project work
- Media production
- Small group meetings

SPATIAL RELATIONSHIPS:
- ☐ Near academic core classrooms
- ☐ Near large group restrooms
- ☐ Near teacher prep area/workroom

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Flexibility of space

NOTES:

1. Loose furnishings shown represent two of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be placed in this classroom or could be placed in a teacher prep area/workroom.

PROJECT/CLASSROOM
H-AC-8

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile	096816
Optional: ET, sheet vinyl,	096500
linoleum, or rubber	096516
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:

L1 Student chairs
L2 Work tables
L3 Teacher desk or workstation/computer support and chair
L4 Computer workstation furniture
L5 File cabinet
Wastebasket

L4 could be fixed casework.

Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
Pencil sharpener (optional)

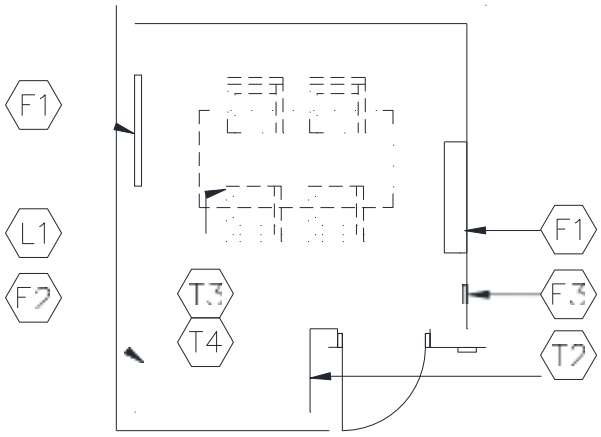
The following items are to be funded by the school district:

M1 Classroom area network file server
M2 Printer

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123550
F2 16'-32' combination marker board tack board & tackable wall surface	101100
F3 Projection screen (optional)	115213
F4 Pencil sharpener support (optional)	062000
F5 3' sink base cabinet (optional)	123550
F6 Towel dispenser (optional)	102813
F7 9'-20' combination base and tall cabinets	123550
F8 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting:	
computer aided lenses	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Classroom area network	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127
T8 Wireless access point cable above ceiling	271513

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:
- Student small group work
- Independent student work
- Small group meetings

SPATIAL RELATIONSHIPS:
- Near academic core classrooms

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	4 - 5 students
SIZE:	150 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

SMALL GROUP ROOM
H-AC-9

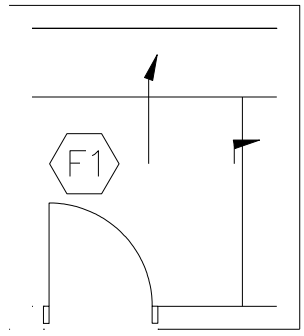
FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, sheet vinyl, linoleum, or rubber	096500 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

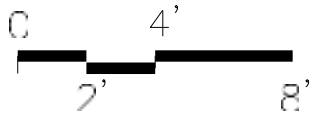
LOOSE FURNISHINGS:
L1 Work tables and chairs
L2 Reserved
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 8'-12' combination marker board, tack board & tackable wall surface	101100
F2 4'-6' of work surface (optional)	123550
F3 Pencil sharpener support (optional)	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Fluorescent lighting: Illumination level: See Table 8600-5	265100
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 Reserved	
T2 voice port with phone	271513/273123
T3 Wireless access point cable above ceiling	***271513***
T4 Wireless access point (WAP) as determined by design – refer to note 2	***271533***
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window(optional)	081113/088000
Pencil sharpener (optional)	

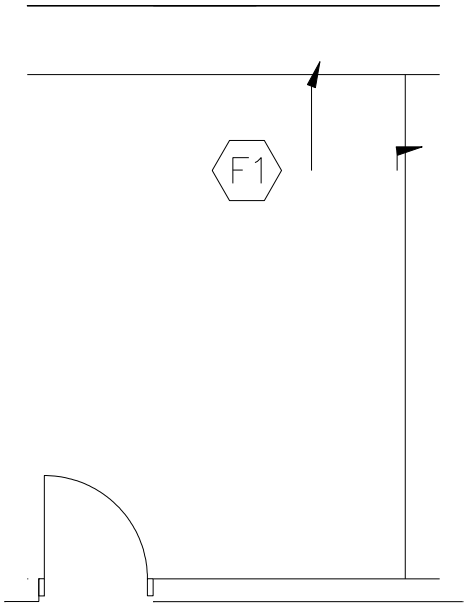
NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable. WAP device quantity / placement per 272133 requirements.

50 SF





250 SF



PROGRAM ACTIVITIES:
- Storage of supplies, textbooks, and equipment

SPATIAL RELATIONSHIPS:
- Near teacher prep area/workroom

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY: N/A
SIZE: 50 - 250 SF

NOTES:

INSTRUCTIONAL MATERIAL STORAGE
H-AC-10

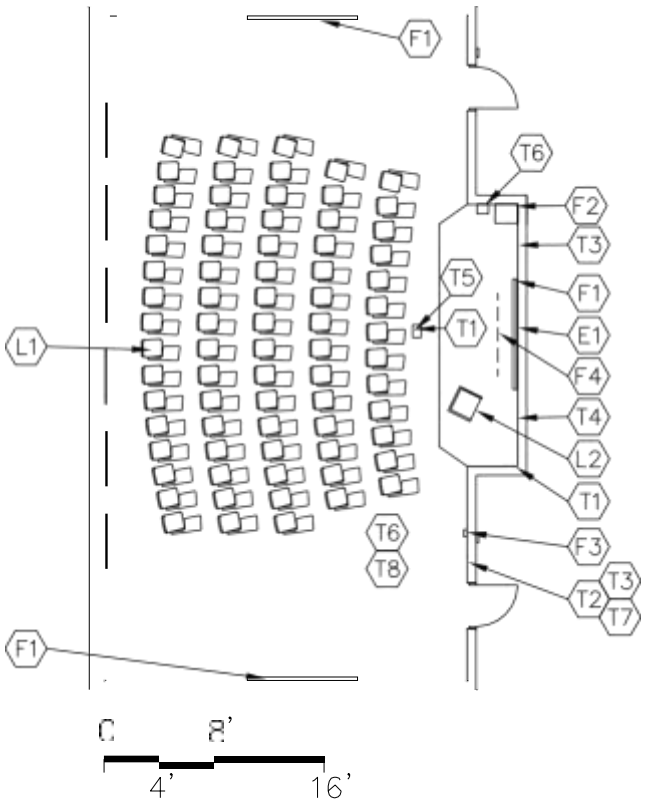
FINISHES[1]:	Spec. Ref.#
Flooring:	
Rubber, ***linoleum, ET, or sheet vinyl***	096500 ***096516***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry	042000/099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 30' of open shelving	
depths may vary (fixed or loose)	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



CAPACITY: 100 students
SIZE: 1,500 SF

PROGRAM ACTIVITIES:
- Group instruction
- Presentations
- Testing
- Community use

SPATIAL RELATIONSHIPS:
- ☐ Near academic core classrooms
- ☐ Near large group restrooms
- ☐ Close to stage to serve as "green" room
- ☐ Flexibility of space

ENVIRONMENTAL CONSIDERATIONS:
- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

MULTI-USE ROOM
H-AC-11

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, linoleum, rubber, ET, sheet vinyl	096816 096813 096516 096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
Acoustical wall treatment	098000

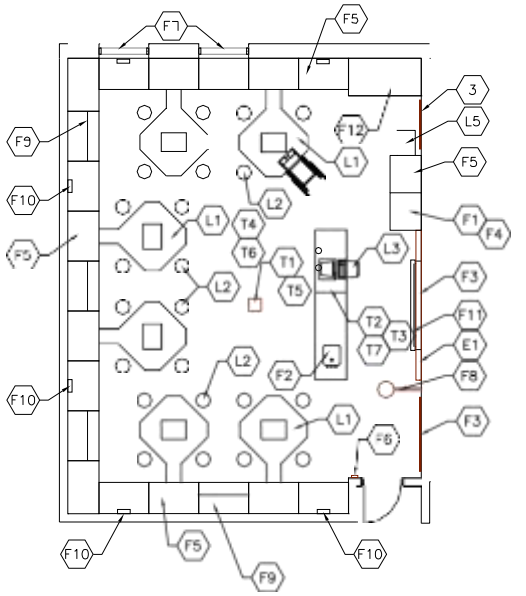
LOOSE FURNISHINGS:
L1 Student desks and chairs
L2 Podium **/** console (optional)
Portable risers
Wastebasket

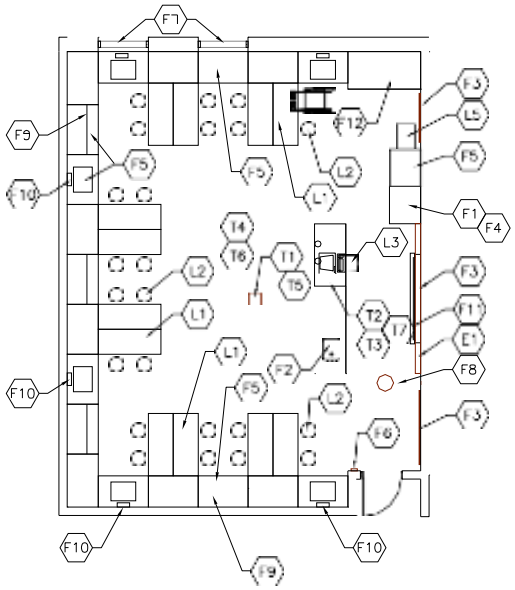
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 16'-28' combination marker board tack board & tackable wall surface	101100
F2 Technology support casework	123550
F3 Pencil sharpener support (optional)	062000
F4 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Telecommunications Grounding	270526/260526
Communications:	
T1 2 ***projector*** video ports	271543
T2 1 voice port and phone	271513/273123
T3 1 data port (minimum)	271513
T4 1 port to input local computer to monitor	271513
Clock	275313
Central sound system	275123
T5 ***Ultra-short throw interactive*** projector	274119
T6 Student Dining/Cafeteria sound reinforcement system	275122
T7 ***Wireless access point (WAP) as determined by Design – refer to Note 3***	***272133***
T7 Classroom technology center video port	***271543, 274116, 274119, 275127***
T8 Wireless access point cable above ceiling	***271513***

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.





CAPACITY: 24 students
SIZE: 1,000 SF
ANCILLARY SPACES: Science Classrooms

PROGRAM ACTIVITIES:
- Large group, small group, and individual instruction
- Group and individual work
- Laboratory experimentation
- Data collection and analysis
- Demonstrations
- Project work

SPATIAL RELATIONSHIPS:
- Adjacent to other science classrooms
- Near science prep room

ENVIRONMENTAL CONSIDERATIONS:
- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Higher than normal ventilation requirements
- Moisture- and stain-resistant finishes
- Chemical-resistant counter tops

NOTES:
1. Loose furnishings shown represent one of many possible arrangements.
2. Science casework layout to be determined by the school district.
3. Depending upon the educational program of the district, a tall wardrobe may be placed in this classroom or could be placed in a teacher prep area/workroom.
4. The layouts shown do not restrict or reflect the variety of arrangements available to the Design Professional.

SCIENCE LABORATORY
H-AC-12

FINISHES[1]:	Spec. Ref.#
Flooring:	
Vinyl sheet flooring, linoleum, rubber, ET	096500 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:
L1 Student work tables
L2 Student stools/chairs
L3 Teacher chair or stool
L4 Reserved
L5 File cabinet
Wastebasket

L4 Could be fixed casework

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

E1 Duplex receptacle with dedicated circuit for wireless devices

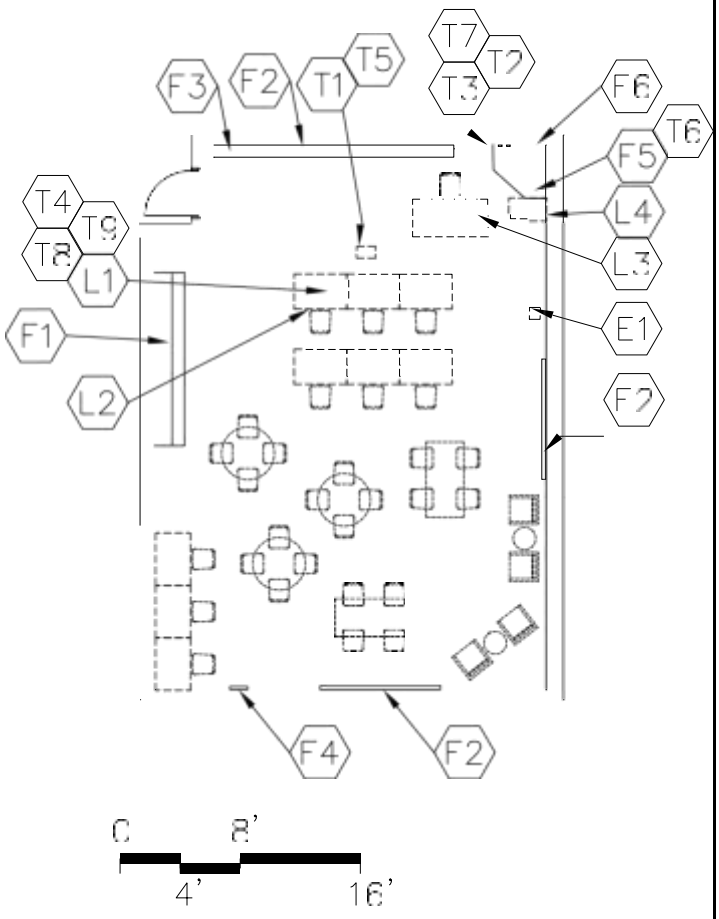
Communications (cont'd):
T5 Ultra-short throw interactive projector 274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4 272133
T7 Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123553
F2 Demonstration table/teacher desk	123553
F3 14'-22' combination chalk/marker board, tack board & tackable wall surface	101100
F4 Technology support casework	123550
F5 40'-60' lab casework with sinks	123553
F6 Pencil sharpener support (optional)	062000 F7
Windows with integral blinds	085113
F8 Emergency shower/eyewash	224000
F9 18'-24' of wall cabinets (optional)	123553 F10
Towel dispensers (optional)	102813
F11 Projection screen (optional)	115213
F12 Fume hood	115313
F13 Tall cabinet for microscopes(optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	224000/221116/22111
Emergency shower/eyewash connections	22400
Master shut-off for gas	226313
Gas connections	226313
Compressed air connections (optional)	221500
Acid waste piping	221316
Neutralization tank	221323
HVAC:	
Supply/return air system	Div. 23
Independent temp control	230923
Manual exhaust	Div. 23
Exhaust for fume hood	Div. 23
Electrical:	
Fluorescent lighting: Illumination level: See Table 8600-5	265100
Multilevel switching	262726
Duplex receptacles at perimeter workstations and teaching wall	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting	265100
Means of egress lighting per code	265100
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port at demonstration table	271513 T4
Wireless access point cable above ceiling	271513
Central sound system	275123
Clock	275313
Sound reinforcement system	275127

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Master gas shutoff valve shall be clearly labeled, easily accessible, and immediately operable by staff.
4. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.



PROGRAM ACTIVITIES:
- Group instruction and individual work
- Activities include instruction, production, and individual project work
- "Wet / Dry" activities

SPATIAL RELATIONSHIPS:
- Near kinesthetic studio
- Near academic core classrooms

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

MISCELLANEOUS:
- Due to the changing nature of the activities anticipated, a multi-use studio is to be designed for flexibility of use.

CAPACITY:	25 students
SIZE:	1,500 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

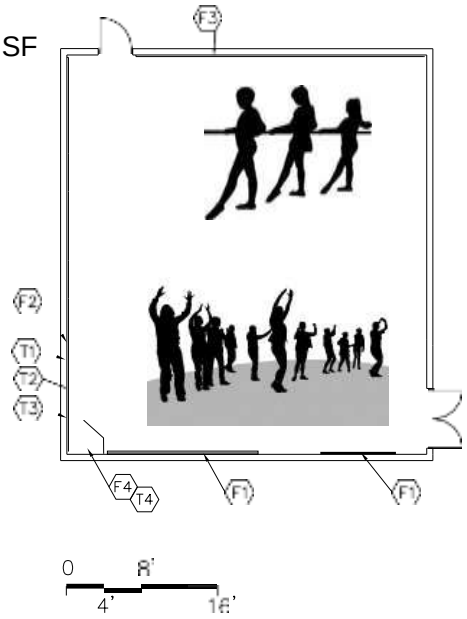
MULTI-USE STUDIO
H-AC-13

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, sheet vinyl, linoleum, rubber	096500 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100
LOOSE FURNISHINGS:	
L1 Flexible furniture	
L2 Student chairs	
L3 Teacher desk and chair	
L4 File cabinet	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
E1 Duplex receptacle with dedicated circuit for wireless devices	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 4’-16' of base & wall cabinets	123550
F2 18’-28' combination marker board, tack board, or tackable wall surface	101100
F3 Projection screen (optional)	115213
F4 Pencil sharpener support (optional)	062000
F5 Tall wardrobe with file drawers	123550
F6 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Classroom area network	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Combination i-Pod / CD Player unit and Mixer/Amp unit, located in the wardrobe, serving room overhead distributed speakers	
T7 Classroom technology center video port	271543, 274116, 274119, 275127
T8 Wireless access point cable above ceiling	271513
T9 Wireless access point (WAP) as determined by Design – refer to Note 3	272133

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

1,600 SF



2,400 SF



CAPACITY: 22-25 students
SIZE: 1,200 – 2,400 SF

PROGRAM ACTIVITIES:
- Gross motor activities
- Dance
- Yoga
- Pilates
- Aerobics
- Gymnastics
- "Movement" activities

SPATIAL RELATIONSHIPS:
- Near multi-use studio
- Near academic core spaces

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Flexibility of space

NOTES:

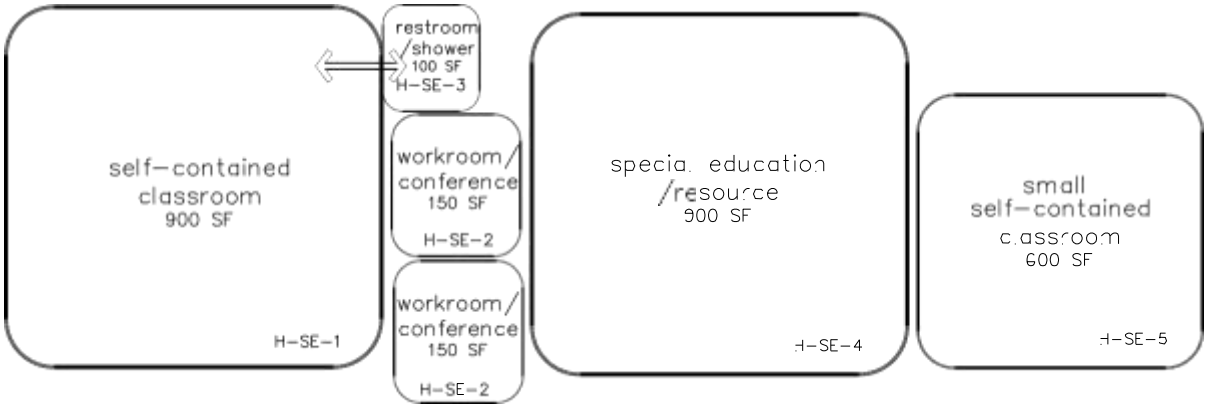
KINESTHETIC LEARNING STUDIO
H-AC-14

FINISHES[1]:	Spec. Ref.#
Flooring:	
Wood dance floor	096400
Base:	
Resilient base	096500
Ceiling:	
Painted exposed structure	099100
Walls:	
Paint	
099100	

FEATURES:	Spec. Ref.#
Fixed Items:	
F1 8’-24' combination marker board, tack board, or tackable wall surface	101100
F2 Mirrors	102813
F3 Dance bars	116615
F4 Tall wardrobe with file drawers	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
Dimmable lighting	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Means of egress lighting	265100
Emergency lighting per code	265100
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123 T3
1 data port	271513
Clock	275313
Central sound system horns	275123
T4 Combination i-Pod / CD Player unit and Mixer/Amp unit, located in the wardrobe, serving room overhead distributed speakers	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



NOTES:

This is an example of how the special education spaces in a high school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Special Education space plates:

H-SE-1	Self-contained Classroom
H-SE-2	Workroom/Conference
H-SE-3	Restroom/Shower
H-SE-4	Special Education/Resource
H-SE-5	Small Self-contained Classroom

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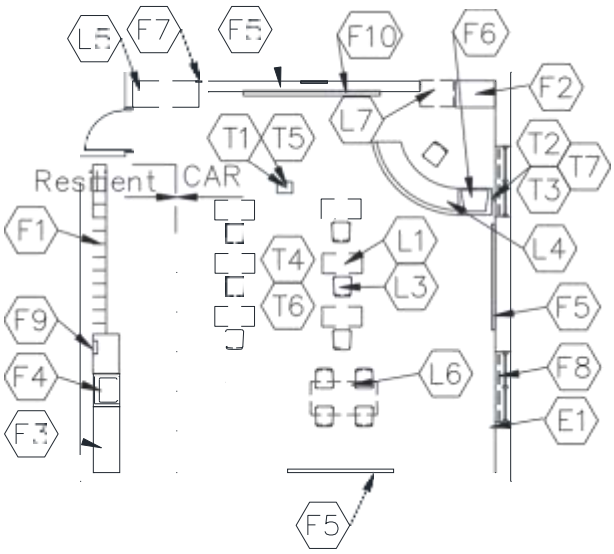


PROGRAM ACTIVITIES:

- Accommodates students who have special needs and are unable to be included in regular instructional program areas a majority of the school day.
- Activities include, but are not limited to: group and individual work to improve auditory, tactile, visual, kinesthetic and academic skills.

SPATIAL RELATIONSHIPS:

- Near academic core classrooms
- Adjacent to special education restroom/ shower

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
  Environmental sound control - wall only minimum STC 45
  ceiling minimum CAC 35**,** NRC 0.70
- Resilient and stain-resistant floor covering
- Special consideration for wheelchair access and physical accessibility needs (ADA)

CAPACITY: Based on disability. See Chapter 1, Section 1110.

SIZE: 900 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this classroom or could be placed in a workroom/conference area.
3. See Chapter 1, page 1110-16 for specific areas needed for each disability.

SELF-CONTAINED CLASSROOM
H-SE-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Combination carpet, carpet tile, with resilient options	096816 096500
Optional: All ET, sheet vinyl, linoleum, or rubber	096516 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:
L1 Student desks/tables
L2 Reserved
L3 Student chairs
L4 Teacher workstations/computer support and chair
L5 8'-10' of low bookcases (fixed or mobile)
L6 Reading table
L7 File cabinet
Wastebasket

EQUIPMENT(optional)
Washer and dryer
Small refrigerator
Range
Oven
Microwave

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

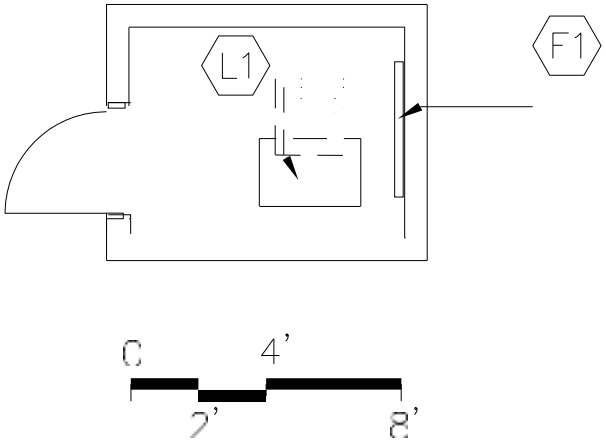
E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Open casework – student coats and personal items with wall cabinets above	123550
F2 Tall wardrobe w/file drawers	123550
F3 8'-10' of base & wall cabinets	123550
F4 3' sink base cabinet	123550
F5 24'-32' combination marker board	101100
F6 tack board and tackable wall surface	123550
Technology support casework	
F7 Pencil sharpener support (optional)	062000
F8 Windows with integral blinds	085113
F9 Towel dispenser (optional)	102813
F10 Projection screen (optional)	115213
F11 Tall storage cabinet(optional)	123550
F12 Mirror (optional)	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink with drinking fountain	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting Illumination level: See Table 8600-5	265100
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Wireless access point cable above ceiling	271513
Clock	275313
Sound reinforcement system	275127
Central sound system	275123
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133

T7 Classroom technology center video port 271543, 274116, 274119, 275127

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:

- Could be used for emotionally disturbed or other students requiring a quiet individual area.
- Preparation and storage of instructional materials and equipment.

SPATIAL RELATIONSHIPS:

- Close proximity to academic classrooms
- Integral part of self-contained classroom or special education/resource room

ENVIRONMENTAL CONSIDERATIONS:

- Dimmed lighting
- Environmental sound control
  wall minimum STC ***45***
  ceiling minimum CAC 35, NRC ***0.70***

CAPACITY:	1 - 2 persons
SIZE:	150 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Walls floor to ceiling and an open area for ½ of the fourth wall.
3. See Chapter 1, page 1110-16 for specific areas needed for each disability.

WORKROOM/CONFERENCE

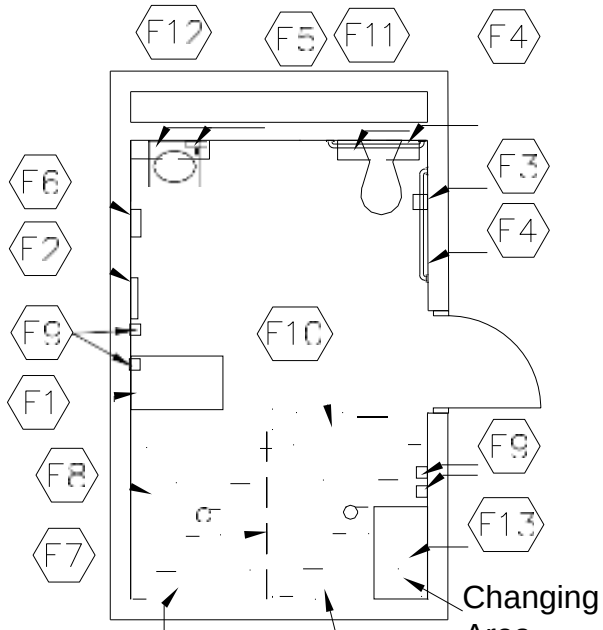
H-SE-2 (Quiet Area)

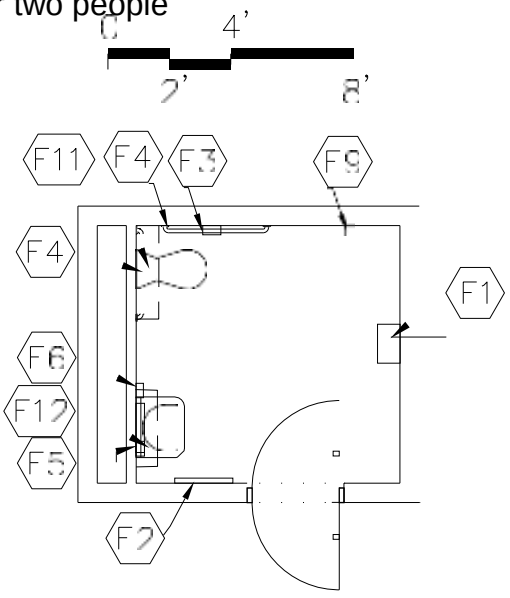
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, ***carpet tile,*** ET, linoleum, or sheet vinyl	096816 096500 096516 ***096813***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
L1 Student desk and chair	
Wastebasket	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 4' of tack board (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Dimmable lighting	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Clock (optional)	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window with blinds (optional)	081113/088000

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.





PROGRAM ACTIVITIES:
- Changing area
- Toilet / shower needs

SPATIAL RELATIONSHIPS:
- Next to self-contained classroom

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- ☐ Moisture- and stain-resistant finishes
- ☐ Special consideration for wheelchair access and physical accessibility needs (ADA)

CAPACITY: 1 - 2 persons
SIZE: 100 SF

NOTES:

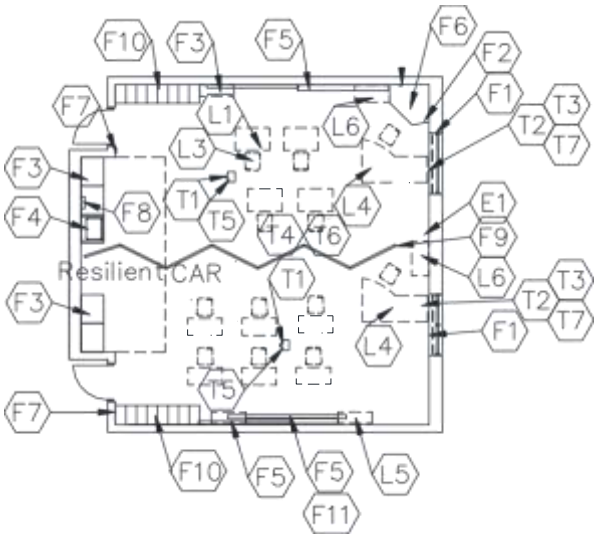
1. See Chapter 1, page 1110-16 for specific areas needed for each disability.

RESTROOM/SHOWER
H-SE-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Restroom: ET, vinyl sheet flooring, porcelain tile, or ceramic mosaic	096500 093000
Shower: Ceramic mosaic tile, or porcelain tile	
Base:	
Restroom: Resilient base, or ***ceramic mosaic, or porcelain*** integral vinyl cove base	096500 093000
Shower: Ceramic mosaic tile base, porcelain tile	
Ceiling:	
Restroom: Suspended, acoustical	095113
Shower: Painted portland cement plaster or interior finish system	092400/099100 092513
Walls:	
Epoxy painted concrete masonry units or ceramic wall tile in shower and latex paint in restroom	042000/099100 093000 099100
LOOSE FURNISHINGS:	
Wastebasket	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Base cabinets	123550
F2 24" x 60" mirror	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Towel dispenser	102813
F7 Shower curtain and rod	102813
F8 ADA shower accessories	102813
F9 (2) towel hooks	102813
F10 Cubicle curtain (optional)	102813
F11 8" deep wall cabinet above toilet	102813
F12 Shelf (optional)	102813
F13 Changing station or fold-down adult changing station	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
ADA shower controls and head	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Refer to ADAAG 4.21 for grab bar and control locations.



PROGRAM ACTIVITIES:

- Accommodates students who have special needs with cognitive disability, hearing impairment, visual impairment, emotional disturbance, orthopedic impairment, autism, brain injury, learning-deaf-blindness disabilities.
- Variety of special services such as one-on-one instruction and small group instruction.
- Activities include, but are not limited to: group discussions, demonstrations, music activities, life skills, coping skills, speech, and visual and hearing support services.

SPATIAL RELATIONSHIPS:

- Near academic core classrooms
- The space will be used to accommodate the specific IEP requirements of each student

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control –
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: Based on disability.
See Chapter 1, Section 1110.

SIZE: 900 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this room or could be placed in a workroom/conference area.
3. See Chapter 1, page 1110-16 for specific areas needed for each disability.

SPECIAL EDUCATION/RESOURCE

H-SE-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Combination carpet, carpet tile,	096816
with resilient options	096500
Option: All ET, sheet vinyl,	096516
linoleum, or rubber	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:

L1 Student desks/tables
L2 Reserved
L3 Student chairs
L4 Teacher desk **/** computer support and chair
L5 Mobile bookcases or storage unit
L6 File cabinet
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

E1 Duplex receptacle with dedicated circuit for wireless devices

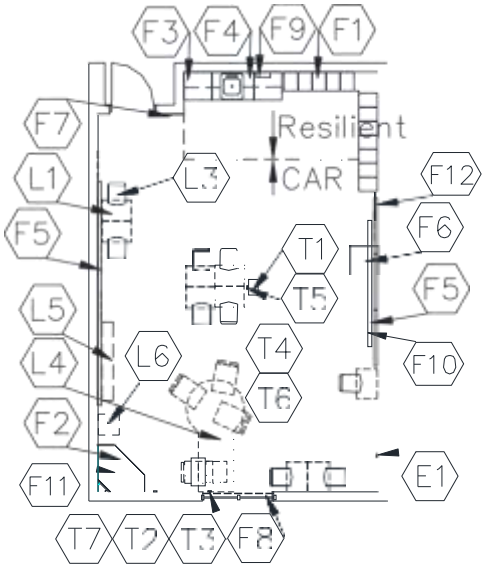
Communications (cont'd):
T6 Wireless access point (WAP) as determined by Design – refer to Note 3 272133
T7 Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Windows with integral blinds	085113
F2 Tall wardrobe with file drawers	123550
F3 8'-12' of base cabinets	123550
F4 3' sink base cabinet	123550
F5 20'-32' combination chalk/marker board, tack board, tackable wall surface	101100 F6
Technology support casework	123550
F7 Pencil sharpener support (optional)	062000 F8
Towel dispenser (optional)	102813
F9 Operable partition (optional)	102226
F10 Open casework coats and personal storage w/wall cabinets above	123550
F11 Projection screen (optional)	115213
F12 Mobile storage cabinet (optional)	123550 F13
Mirror (optional)	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/237123
T3 1 data port near each teacher workstation	271513 T4
Wireless access point cable above ceiling	271513
Clock	275313
Sound reinforcement system	275127
Central sound system	275123
T5 Ultra-short throw interactive projector	274119

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:

- Can accommodate students with cognitive, hearing, speech, language, emotional, orthopedic, autistic, brain injury, learning, deaf, and blindness. Services to include occupational, physical, and speech therapy.
- Accommodates students who have special needs and are unable to be included in regular instructional program areas.
- Activities include, but are not limited to: group discussions, demonstrations, music activities, listening skills, presentations, art and science projects, and small group activities.

SPATIAL RELATIONSHIPS:

- Distributed throughout academic core areas.

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Resilient and stain-resistant floor covering
- Special consideration for wheelchair access and physical accessibility needs (ADA)

CAPACITY:	Based on disability. See Chapter 1, Section 1110.
SIZE:	600 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this classroom or could be placed in a workroom/conference area.
3. See Chapter 1, page 1110-16, for specific areas needed for each disability.

SMALL SELF-CONTAINED CLASSROOM

H-SE-5 (Special Education) CHAPTER 6: HIGH SCHOOL

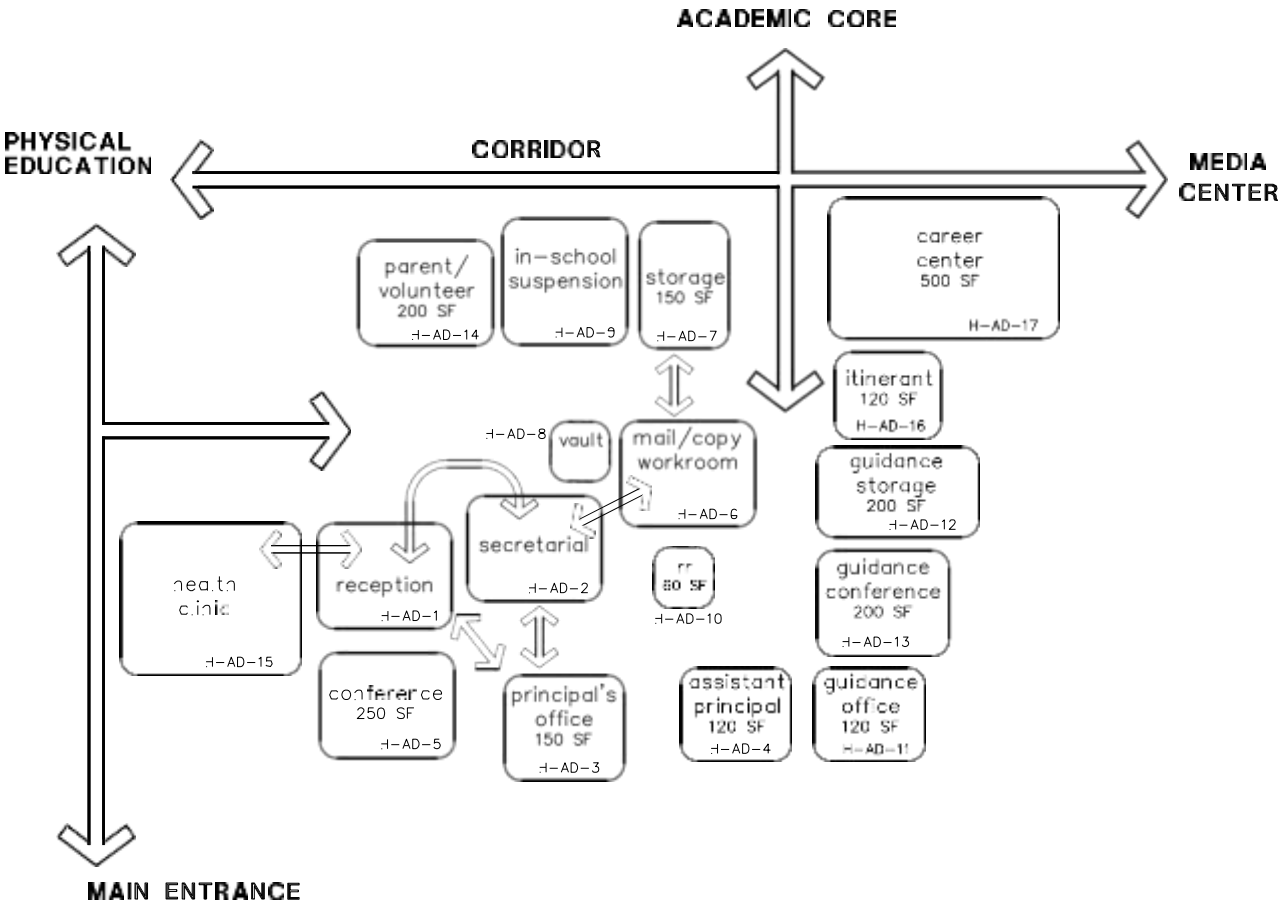
FINISHES[1]:	Spec. Ref.#
Flooring:	
Combination carpet, carpet tile,	096816
with resilient options	096516
Option: All ET, sheet vinyl, linoleum, or rubber	096500 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100
LOOSE FURNISHINGS:	
L1 Student desks/tables	
L2 Reserved	
L3 Student chairs	
L4 Teacher workstations/computer support and chair	
L5 6' of low bookcases (fixed or mobile)	
L6 File cabinet	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
E1 Duplex receptacle with dedicated circuit for wireless devices	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Open casework – coats and personal items with wall cabinets above	123550
F2 Tall wardrobe w/file drawers	123550
F3 About 6' of base & wall cabinets (total)	123550
F4 3' sink base cabinet	123550
F5 20'-32' combination marker board, tack board, tackable wall surface	101100
F6 Mobile storage cabinet (optional)	123550 F7
Pencil sharpener support (optional)	062000 F8
Windows with integral blinds	085113
F9 Towel dispenser (optional)	102813
F10 Projection screen(optional)	115213
F11 Technology support casework	123550
F12 Mirror (optional)	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink with drinking fountain	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123 T3
1 data port near teacher workstation	271513
T4 Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector (optional)	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.



NOTE:

This is an example of how the administrative spaces in a high school could be arranged. This is only meant to demonstrate the relationships between various areas of the building.

Following are the Administrative space plates for the following rooms:

H-AD-1	Reception Area	H-AD-10	Restroom
H-AD-2	Secretarial Area	H-AD-11	Guidance Counselor's office
H-AD-3	Principal's Office	H-AD-12	Guidance Records/Storage
H-AD-4	Assistant Principal's Office	H-AD-13	Guidance Conference Room
H-AD-5	Conference Room	H-AD-14	Parent/Volunteer Room
H-AD-6	Mail/Work/Copy room	H-AD-15	Health Clinic (includes restroom)
H-AD-7	Administrative Storage	H-AD-16	Itinerant Personnel Office
H-AD-8	Vault/Records Storage	H-AD-17	Career Center
H-AD-9	In-school Suspension		

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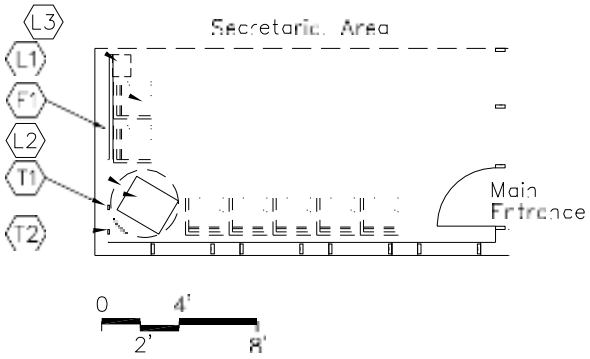
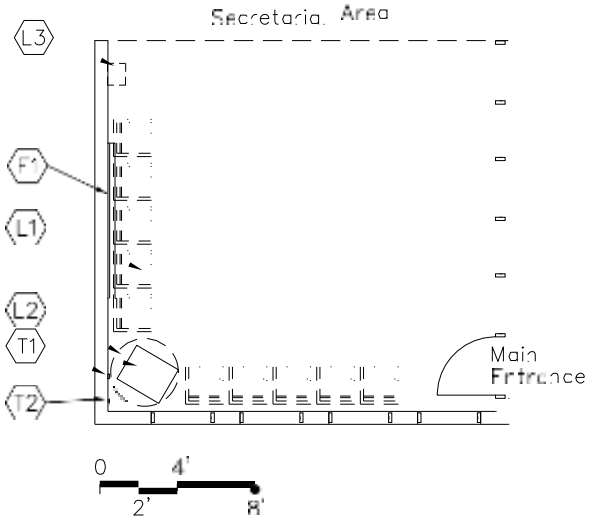
200 SF



600 SF



CAPACITY: 6 - 8 or 8 - 10 visitors
SIZE: 200 – 1,000 SF
ANCILLARY SPACES: Secretarial Area
H-AD-2

PROGRAM ACTIVITIES:

- Serves as the main entry to the building
- Visitors may wait or are directed to other areas of the building.

SPATIAL RELATIONSHIPS:

- Access to all areas of the building
- Open to secretarial area
- Near principal's office
- Near main entrance to the building
- Visual access to main entrance of the building

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 40
  ceiling minimum CAC 35**,** NRC 0.70
- Audio and visual control from secretarial area

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

RECEPTION AREA
H-AD-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

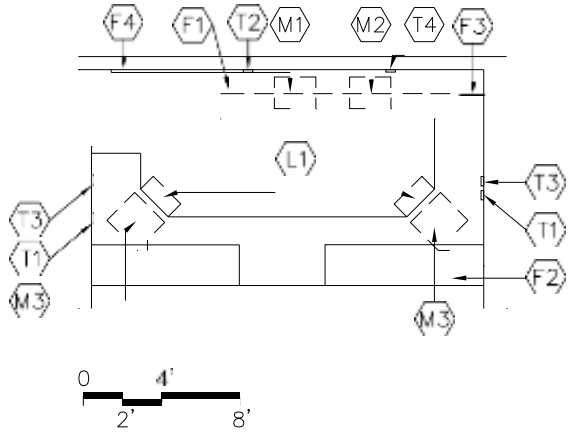
LOOSE FURNISHINGS:
L1 Visitor chairs
L2 End table
L3 Racks for forms (optional)
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tack board or tackable wall surface (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
2 duplex receptacles	262726
Double duplex receptacle adjacent to video port	262726
Means of egress lighting per code	265100
Communications:	
T1 1 ***projector*** video port, monitor, and brackets	271543/274119
T2 1 voice port and phone	271513/273123
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior windows	081113/088000

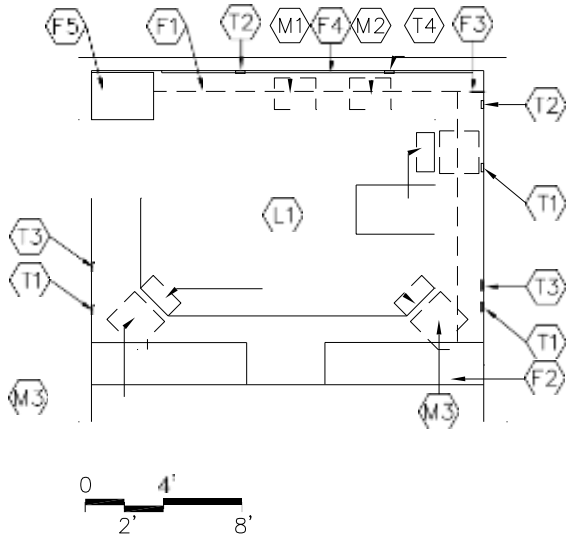
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

200 SF ADA Compliant Approach



600 SF ADA Compliant Approach



CAPACITY:	1 - 2 or 2 - 3 staff
SIZE:	200 – 1,000 SF
ANCILLARY SPACES:	Reception Area H-AD-1

PROGRAM ACTIVITIES:

- Conduct administrative support duties, and receive and direct visitors

SPATIAL RELATIONSHIPS:

- Easy access to all areas of the building
- Open to reception area
- Near principal's office
- Near main entrance to the building
- Visual access to main entrance of the building

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 40
  ceiling minimum CAC 35, NRC 0.70
- Audio and visual control of reception area

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

SECRETARIAL AREA

H-AD-2

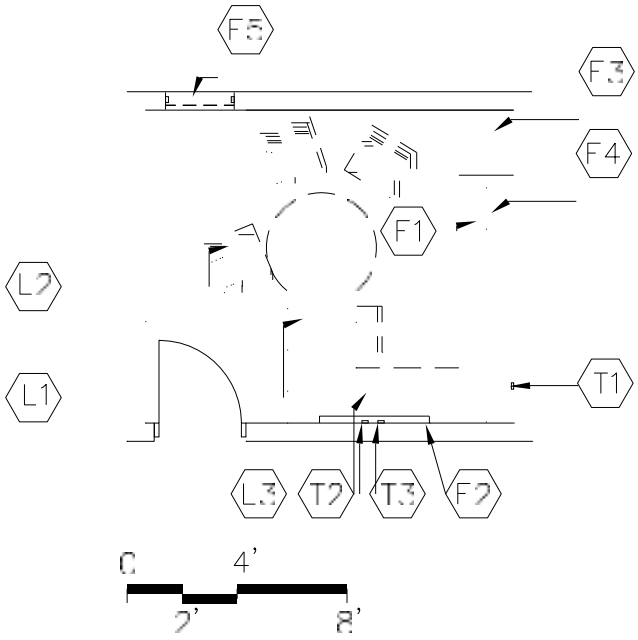
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Secretarial chairs
Wastebasket

Miscellaneous:
The following items are to be funded by the school district:
M1 Fax machine
M2 Printer
M3 Computer/typewriter

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 24’ - 60’ of work surface with file drawers	123550
F2 42” high counter top with portion of counter 34” high or lower	123550
F3 16’-24’ of wall cabinets for forms, supplies, books, and manuals	123550
F4 Tackable wall surface (optional)	101100
F5 Tall cabinet for coats (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Temperature control with reception area (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
3 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Emergency lighting	265100
Communications:	
T1 1 voice port and phone at each secretarial workstation	271513/***273123***
T2 1 fax port	271513/273113
T3 1 data port at each secretarial workstation	271513
T4 1 data port for printer	271513
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown illustrate quantities for the smallest and largest possible room size.



PROGRAM ACTIVITIES:

- Instructional and administrative leader of the building
- One-on-one conferences with parents, small group meetings, and coordination of administrative tasks

SPATIAL RELATIONSHIPS:

- Near reception area
- Near secretarial area
- Easy access to school circulation areas
- Near main entrance to the building
- Near conference room

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	1 - 4 persons
SIZE:	150 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

PRINCIPAL'S OFFICE
H-AD-3

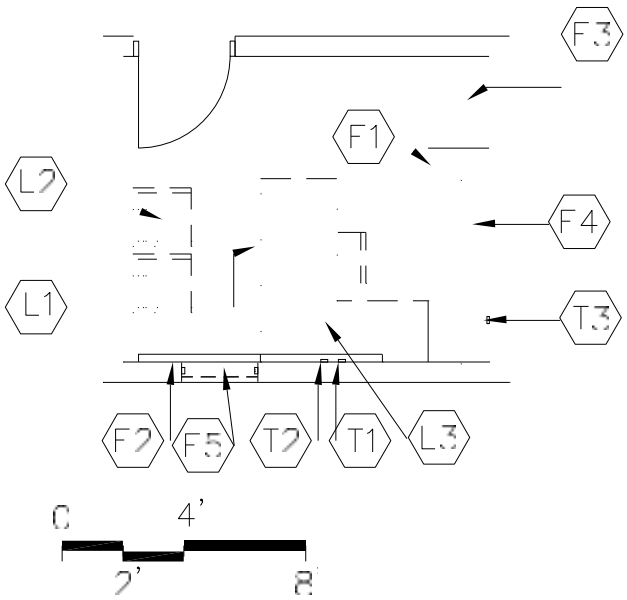
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116 / 099100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe (optional)	123550
F4 Wall cabinets above work surface	123550 F5
Window with integral blind	085116
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near workstation	271513
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.



PROGRAM ACTIVITIES:

- To assist principal in administrative tasks
- One-on-one conferences with parents and coordination of administrative tasks

SPATIAL RELATIONSHIPS:

- Near reception area
- Near secretarial area
- Direct access to school circulation areas
- Near main entrance to the building
- Near or accessible to principal's office
- Near conference room

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	1 - 3 persons
SIZE:	120 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

ASSISTANT PRINCIPAL'S OFFICE
H-AD-4

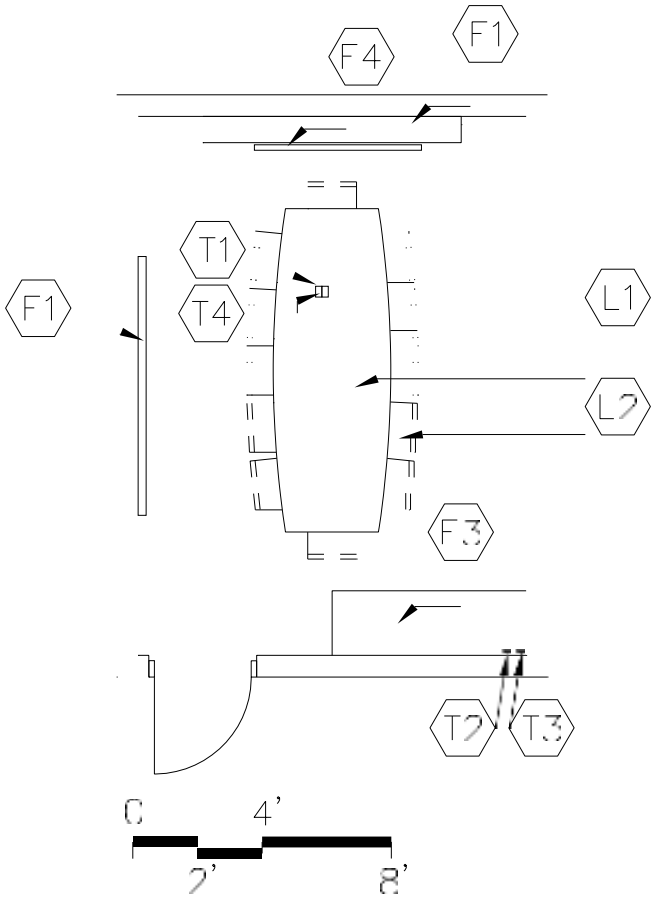
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets above work surface	123550 F5
Window with integral blind	085116
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.



CAPACITY: 12 – 15 persons
SIZE: 250 SF

PROGRAM ACTIVITIES:

- Conferences with staff, students, parents, and other community groups

SPATIAL RELATIONSHIPS:

- Near principal's office
- Near assistant principal's office
- Near reception area
- Near secretarial area

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall ***only*** minimum STC ***45***
  ceiling minimum CAC 35**,** NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

CONFERENCE ROOM
H-AD-5

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

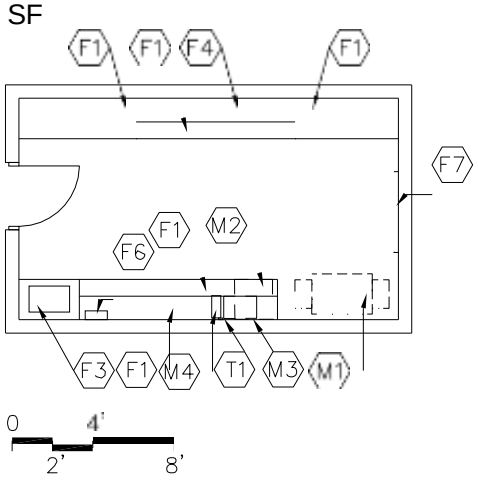
LOOSE FURNISHINGS:
L1 Conference table
L2 Chairs
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 16'-20' combination marker board, tack board, tackable wall surface	101100
F2 Reserved	
F3 4'-6' of base cabinets (optional)	123550
F4 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Multilevel switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
3 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port and video display device	271543/274119
T2 1 voice port and phone	271513/273123
T3 1 data port	271513
T4 ***Ultra-short throw interactive*** projector	274119
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

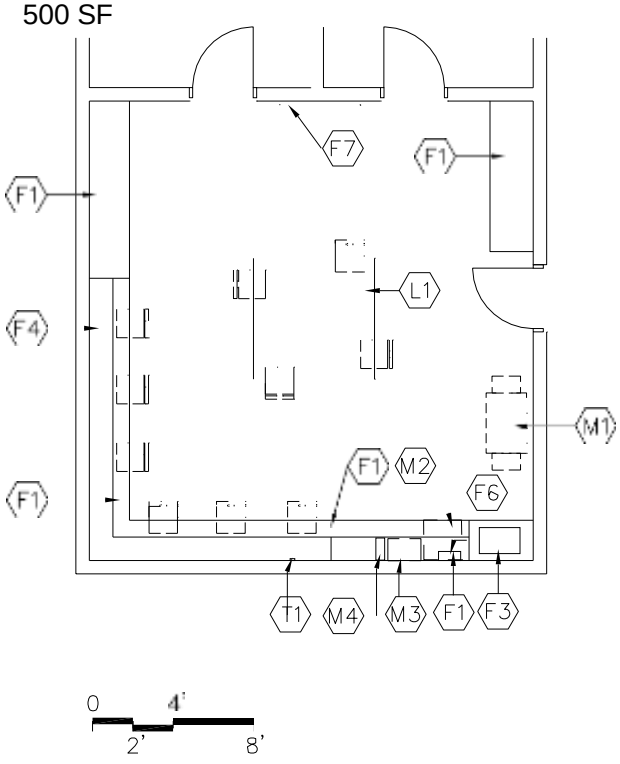
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.

200 SF



500 SF



CAPACITY: N/A
SIZE: 200 - ***800 SF***

PROGRAM ACTIVITIES:

- Distribution area for preparation/copying of mail and materials.
- Staff receives messages and obtains supplies.

SPATIAL RELATIONSHIPS:

- Near secretarial area

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 40
  ceiling minimum CAC 35**,** NRC 0.70

NOTES:

1. The mail cubicles can be either on the wall or through the wall.

MAIL/WORK/COPY ROOM
H-AD-6

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, linoleum, ET, rubber, or sheet vinyl	096500 096813 096816 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

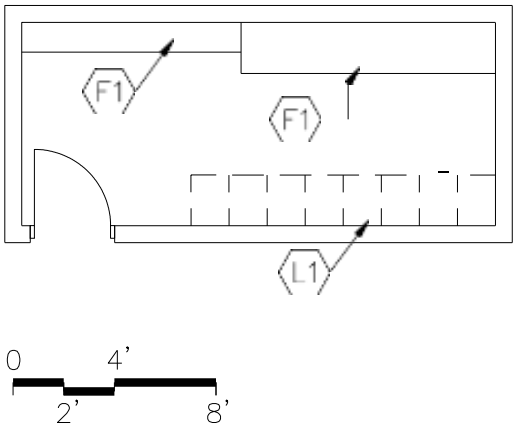
LOOSE FURNISHINGS:
L1 Work table and chairs
(applicable in 300 SF space only)
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 20'-24' combination wall and base cabinets	123550
F2 8'-12' of tall storage cabinets or about 32' maximum of a combination storage cabinets	123550
F3 3' sink base cabinet	123550
F4 Mail cubicles for all staff	123200
F5 Reserved	
F6 Towel dispenser (optional)	102813
F7 4' tack board or marker board (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
3 - 5 duplex receptacles	262726
Receptacle for copier	262726
Communications:	
T1 1 voice port and phone	271513/273123
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
The following items are to be funded by the school district:	
M1 Copier	
M2 Undercounter refrigerator	
M3 Microwave	
M4 Coffee maker	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

150 SF



PROGRAM ACTIVITIES:

- Supplies, books, records, forms, and equipment storage

SPATIAL RELATIONSHIPS:

- Near mail/work/copy room
- Near vault/records storage

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY: N/A
SIZE: 150 - 400 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

ADMINISTRATIVE STORAGE
H-AD-7

FINISHES[1]:	Spec. Ref.#
Flooring:	
Rubber, ***carpet, carpet tile, linoleum, ET or sheet vinyl***	096500 ***096813*** ***096816*** ***096516***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

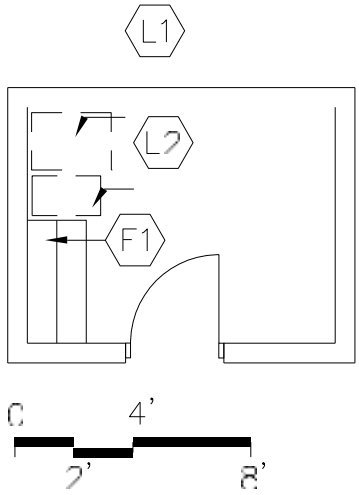
LOOSE FURNISHINGS:
L1 File cabinets

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 10'-20' of open shelving depth may vary (fixed or loose)	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

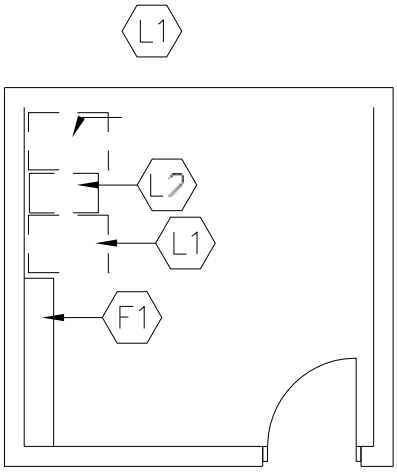
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

85 SF



140 SF



CAPACITY: N/A
SIZE: ***85 - 200 SF***

PROGRAM ACTIVITIES:
- Storage of records and security files in a secure area

SPATIAL RELATIONSHIPS:
- Access to guidance area
- Access to secretarial personnel

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

VAULT/RECORDS STORAGE
H-AD-8

FINISHES[1]:	Spec. Ref.#
Flooring:	
Rubber, ***carpet, carpet tile***, ***linoleum, ET or sheet vinyl***	096500 ***096813*** ***096816*** ***096516***
Base:	
Resilient base	096500
Ceiling:	
Rated 2-hour construction	---
Walls:	
Painted concrete masonry units or painted gypsum wallboard Rated 2-hour construction	042000/099100 092116/099100

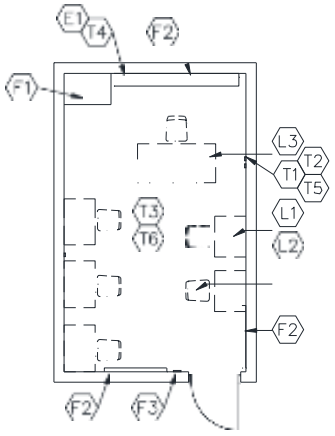
LOOSE FURNISHINGS:
L1 File cabinet
L2 Safe (loose or fixed)

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 3'-6' of open shelving, (depth may vary)(fixed or loose)	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
Wall, ceiling, and door construction to have a 2-hour fire rating	

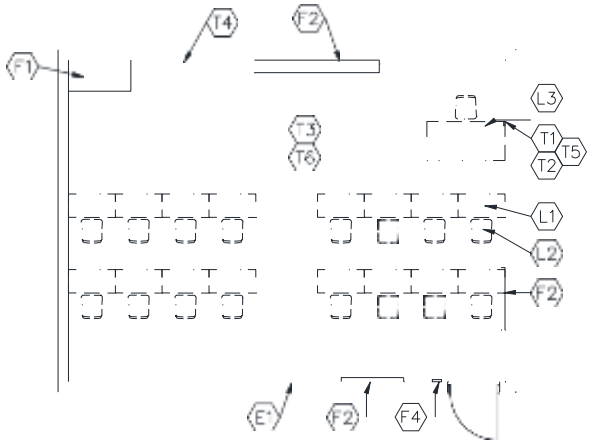
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

200 SF



575 SF



CAPACITY: 5 - 8 students
SIZE: 200 - 600 SF

PROGRAM ACTIVITIES:

- Instructional area for students who require time away from the normal classroom due to behavioral problems

SPATIAL RELATIONSHIPS:

- Near principal's office
- Near secretarial area

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35**,** NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

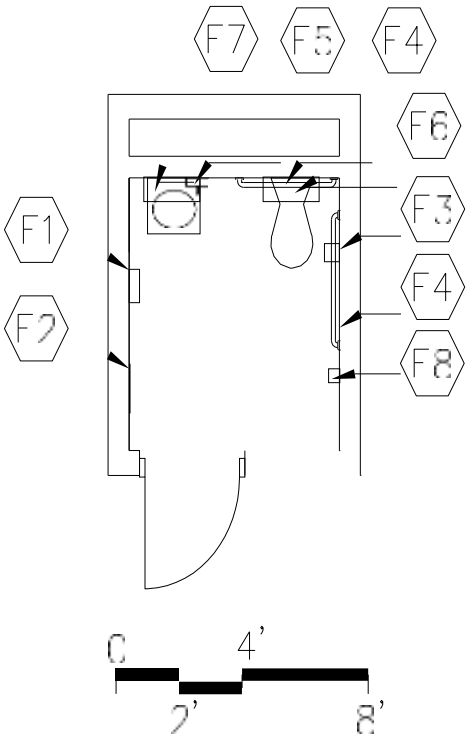
IN-SCHOOL SUSPENSION
H-AD-9

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, ET, linoleum,	096816
sheet vinyl, or rubber	096500
	096516
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	092113
LOOSE FURNISHINGS:	
L1 Student carrels and/or desks	
L2 Student chairs	
L3 Teacher workstation and chair	
L4 Reserved	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
E1 Duplex receptacle with dedicated circuit for wireless devices	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 3'-4' of base cabinets (optional)	123550
F2 10'-16' combination marker board, tack board, tackable wall surface	101100
F3 Reserved	
F4 Pencil sharpener support (optional)	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123
T2 1 data port near teacher workstation	271513
T3 Wireless access point cable above ceiling	271513
T4 1 ***projector*** video port	271543
Clock	275313
Central sound system	275123
T5 Classroom technology center video port	271543, 274116, 274119, 275127
T6 Wireless access point (WAP) as determined by Design – refer to Note 2	272133

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:

- Personal and health needs for teachers and staff
- Restroom facilities for clinic

SPATIAL RELATIONSHIPS:

- Located in the administrative area

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35**,** NRC 0.70
- Moisture- and stain-resistant finishes

CAPACITY: 1 person
SIZE: ***60*** SF

NOTES:

RESTROOM
H-AD-10

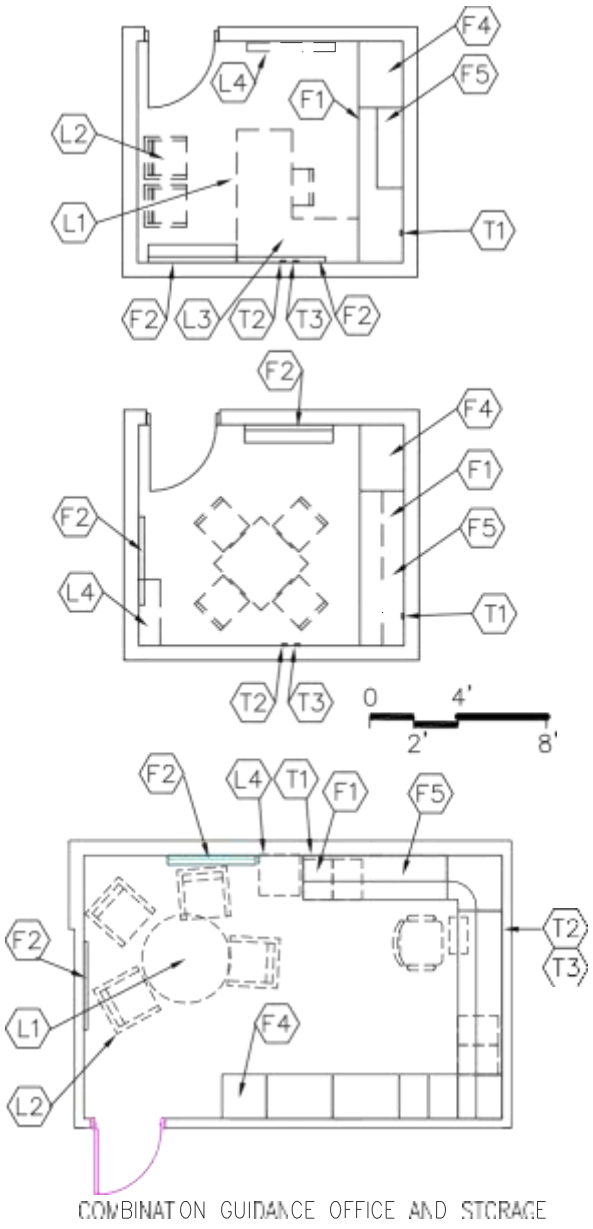
FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, ***ceramic mosaic, porcelain***	096516
or sheet vinyl	096500
Optional: resinous flooring	093000 096723
Base:	
Resilient base	096500
Optional: ceramic mosaic tile, porcelain tile, resinous flooring	093000 096723
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
Optional: moisture & abuse-resistant gypsum wall board	092116/099100
LOOSE FURNISHINGS:	
Wastebasket	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 24" x 60" mirror	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 8” deep wall cabinet above toilet for supplies (optional)	102813 F7
Stainless steel shelf (optional)	102813 F8
Coat hook	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

GUIDANCE COUNSELOR'S OFFICE
H-AD-11



COMBINATION GUIDANCE OFFICE AND STORAGE

CAPACITY: 1 - 3 persons
SIZE: 120 SF

PROGRAM ACTIVITIES:

- Guidance counselor to do individual work and provide assistance to students
- One-on-one conferences with parents and coordination of administrative tasks
- Could be combined with guidance records/storage

SPATIAL RELATIONSHIPS:

- Near guidance/records storage
- Near reception area
- Near secretarial area
- Access to school circulation areas

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blinds

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

GUIDANCE COUNSELOR'S OFFICE
H-AD-11

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

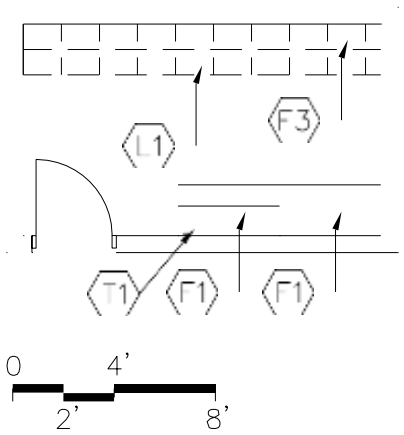
LOOSE FURNISHINGS:
L1 Desk or table, with chair
L2 Visitor chairs
L3 Computer desk return
L4 Bookcase (fixed or loose)
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 8'-12' combination chalk/marker board, tack board, tackable wall surface	101100
F3 Reserved	
F4 Tall wardrobe	123550
F5 Wall cabinets	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near workstation	271513
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

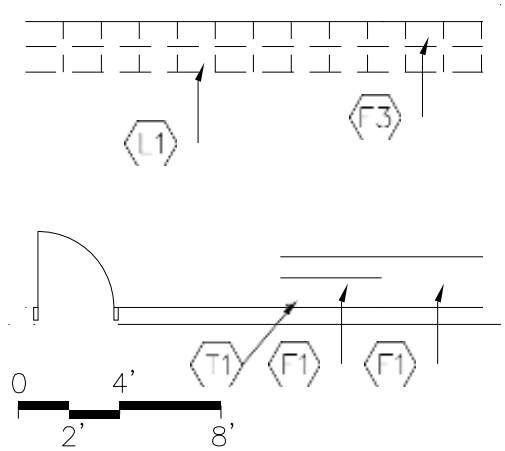
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.

100 SF



200 SF



CAPACITY: N/A
SIZE: 100 - 300 SF

PROGRAM ACTIVITIES:
- Storage of supplies, files, and equipment in a secure area

SPATIAL RELATIONSHIPS:
- Near guidance counselor's office
- Could be combined with guidance counselor's office

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

GUIDANCE RECORDS/STORAGE
H-AD-12

FINISHES[1]:	Spec. Ref.#
Flooring:	
Rubber***, carpet, carpet tile, linoleum, ET, or sheet vinyl***	096500 ***096813 096816 096516***
Base:	
Resilient base	096500
Ceiling:	
Rated 2-hour construction	---
Walls:	
Painted gypsum wallboard over metal studs or	092116/099100
Painted concrete masonry units	042000/099100
Rated 2-hour construction	

LOOSE FURNISHINGS:
L1 File cabinets

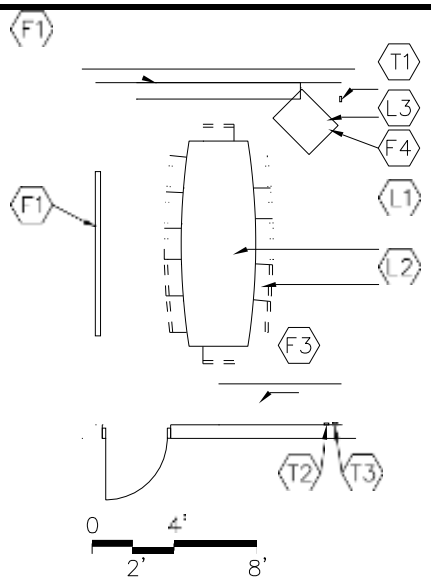
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 ***6'-10' combination wall and base cabinets and tall cabinets***	123550
F2 ***Reserved***	
Option: mobile storage shelving ***or file cabinets***	105626
F3 4'-10' shelving (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
T1 1 data port (optional)	271513
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Wall, ceiling, and door construction to have a 2-hour fire rating	

NOTES:

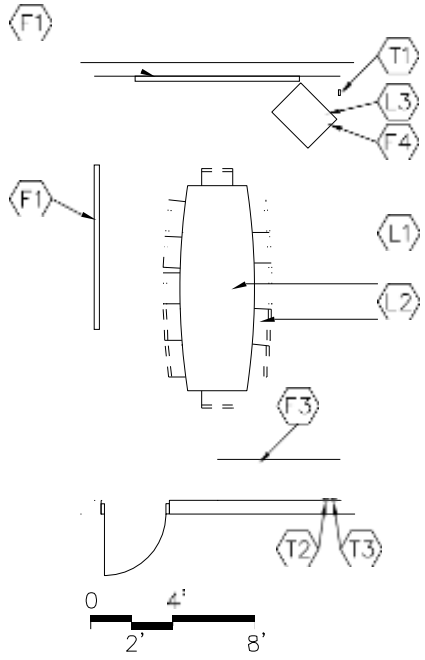
1. Finishes/Features: Refer to Chapter 9 for specification references.

GUIDANCE CONFERENCE ROOM
H-AD-13

150 SF



250 SF



CAPACITY: 12 - 15 persons
SIZE: 150 - 250 SF

PROGRAM ACTIVITIES:
- Conferences with staff, students, parents, and other community groups

SPATIAL RELATIONSHIPS:
- Near guidance counselors office
- Near principal's office
- Near reception area
- Near guidance records/storage area

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blinds

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

GUIDANCE CONFERENCE ROOM
H-AD-13

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

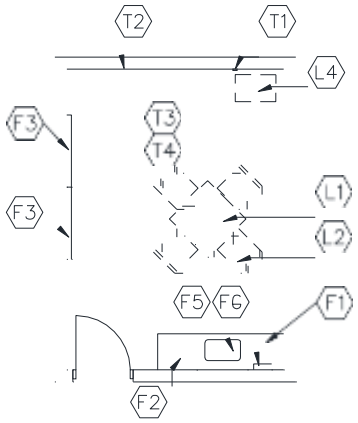
LOOSE FURNISHINGS:
L1 Conference table
L2 Chairs
L3 Monitor cart or cabinet (could be fixed casework)
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 10'-16' combination marker board, tack board, tackable wall surface	101100
F2 Reserved	
F3 4'-6' of base cabinets	123550
F4 Technology support casework (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Multilevel switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
3 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port and video display device	271543/274119
T2 1 voice port and phone	271513/273123
T3 1 data port	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

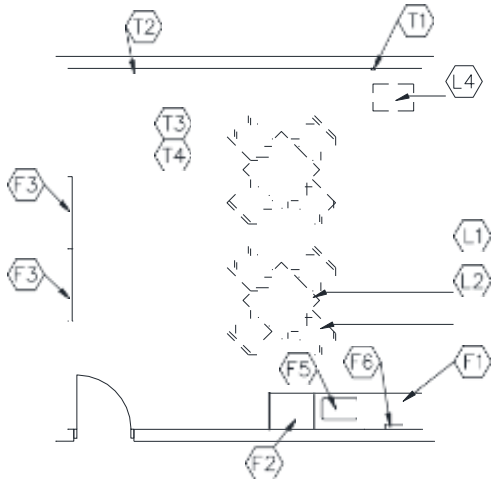
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed casework and loose furnishings can be also either all fixed or all loose.

200 SF



400 SF



CAPACITY: 2 - 8 persons
SIZE: 200 - 400 SF

PROGRAM ACTIVITIES:
- After school meetings, community, and small group meetings

SPATIAL RELATIONSHIPS:
- Near administrative area

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blinds

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

PARENT/VOLUNTEER ROOM
H-AD-14

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Table
L2 Chairs
L3 Reserved
L4 Monitor cart
Wastebasket

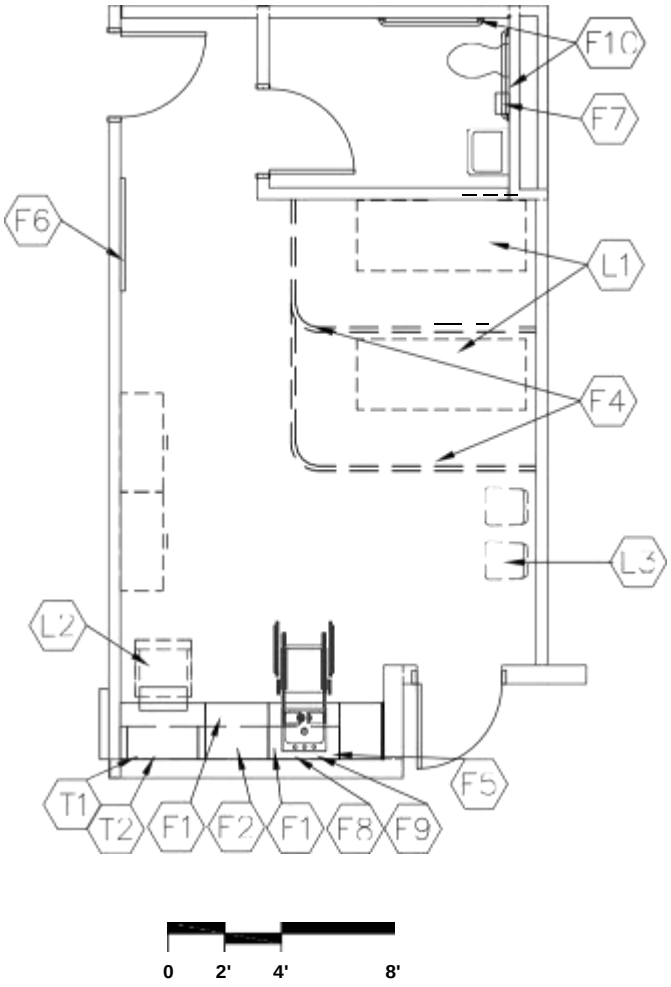
Miscellaneous:
Pencil sharpener (optional)

Electronic Safety and Security:
Life safety devices per code 283111

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 About 3' of base cabinets	123550
F2 Tall wardrobe or coat cabinet (optional)	123550
F3 8'-12' combination marker board, tack board, and tackable wall surface	101100
F4 Pencil sharpener support (optional)	062000
F5 3' sink base cabinet	123550
F6 Towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 15
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 Reserved	
T2 voice port with phone	271513/273123
T3 Wireless access point cable above ceiling	***271513***
T4 Wireless access point (WAP) as determined by design – refer to note 2	
271533	
Clock	275313
Central sound system	275123

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable. WAP device quantity / placement per 272133 requirements.

450 SF



PROGRAM ACTIVITIES:
- Treatment of minor injuries, administration of medication, and conduction of hearing or vision tests

SPATIAL RELATIONSHIPS:
- Near reception area
- Adjacent to individual restroom
- Near special education shower

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Stain-resistant floor covering

CAPACITY: 2 - 3 patients
SIZE: Clinic…….***340 - 540 SF***
Restroom…..……60 SF
ANCILLARY SPACES: Secretarial Area
H-AD-2

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

HEALTH CLINIC *(includes restroom)*
H-AD-15

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, sheet vinyl, or	096516
resinous flooring	096500
	096723
Restroom: ET, sheet vinyl, resinous flooring, ceramic mosaic, or porcelain tile	***093000***
Base:	
Resilient base, resinous flooring, integral vinyl cover base***, or ceramic mosaic, or porcelain tile***	096500 096730
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:

L1 Cots
L2 Desk and chair

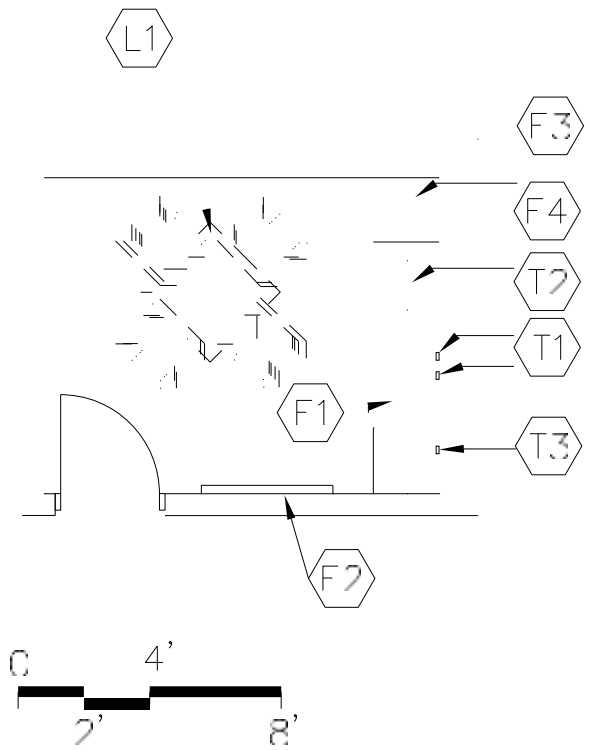
L3 Chairs
Wastebasket

EQUIPMENT
E1 Refrigerator with ice making capabilities

Miscellaneous:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 ***8'-18' combination base and wall cabinets, lockable***	123550
F2 3' sink base cabinet	123550
F3 ***Reserved***	
F4 Cubicle curtain and track	102123
F5 Towel dispenser	102813
F6 4’ of tack board	101100
F7 Sanitary napkin dispenser/disposal	102813
F8 Soap dispenser	102813
F9 24” x 60” mirror	102813
F10 36” and 42” grab bars	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Sink - with goose neck	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Exhaust directly to exterior	
Electrical:	
Single level switching with dimmer	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
2 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Receptacle for refrigerator	262726
Emergency lighting	265100
Communications:	
T1 1 voice port and phone	271513/***273123***
T2 1 data port near workstation	271523
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:

- Office and work area for specialists such as psychologist, reading specialist, etc., who regularly spend a portion of their schedule at one of several schools

SPATIAL RELATIONSHIPS:

- Near reception area
- Near secretarial area
- Direct access to school circulation areas
- Near main entrance to the building
- Near or accessible to principal's office and guidance counselor's office

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blind

APACITY: 1 - 3 persons
SIZE: 120 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

ITINERANT PERSONNEL OFFICE
H-AD-16

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

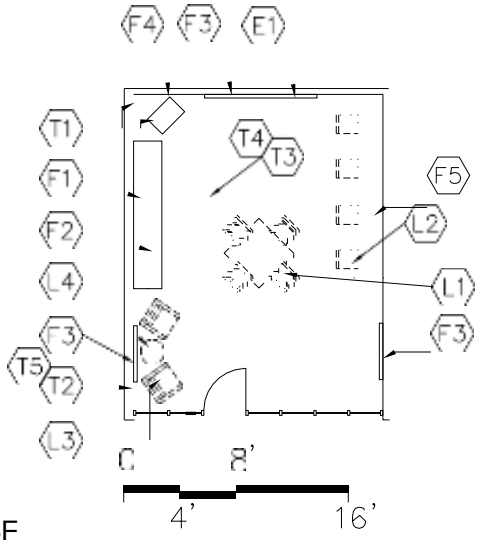
LOOSE FURNISHINGS:
L1 Table and chairs
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers(optional)	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe (optional)	123550
F4 Wall cabinets	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123
T2 1 data port	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

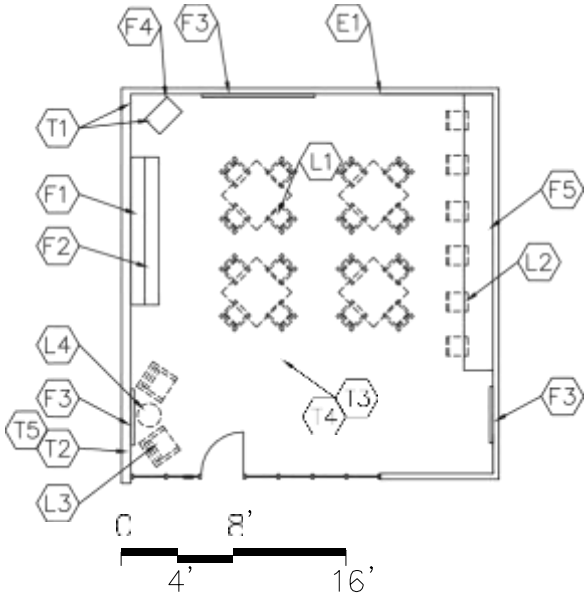
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.

300 SF



700 SF



CAPACITY: 6 - 16 persons
SIZE: 300 - 715 SF

PROGRAM ACTIVITIES:
- Counselors assisting students with career exploration and college planning
- Small group presentation
- Small group meetings
- Interviews

SPATIAL RELATIONSHIPS:
- Close to secretarial area
- Close to guidance counselor's office

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control - wall minimum STC 45
- ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

CAREER CENTER
H-AD-17

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

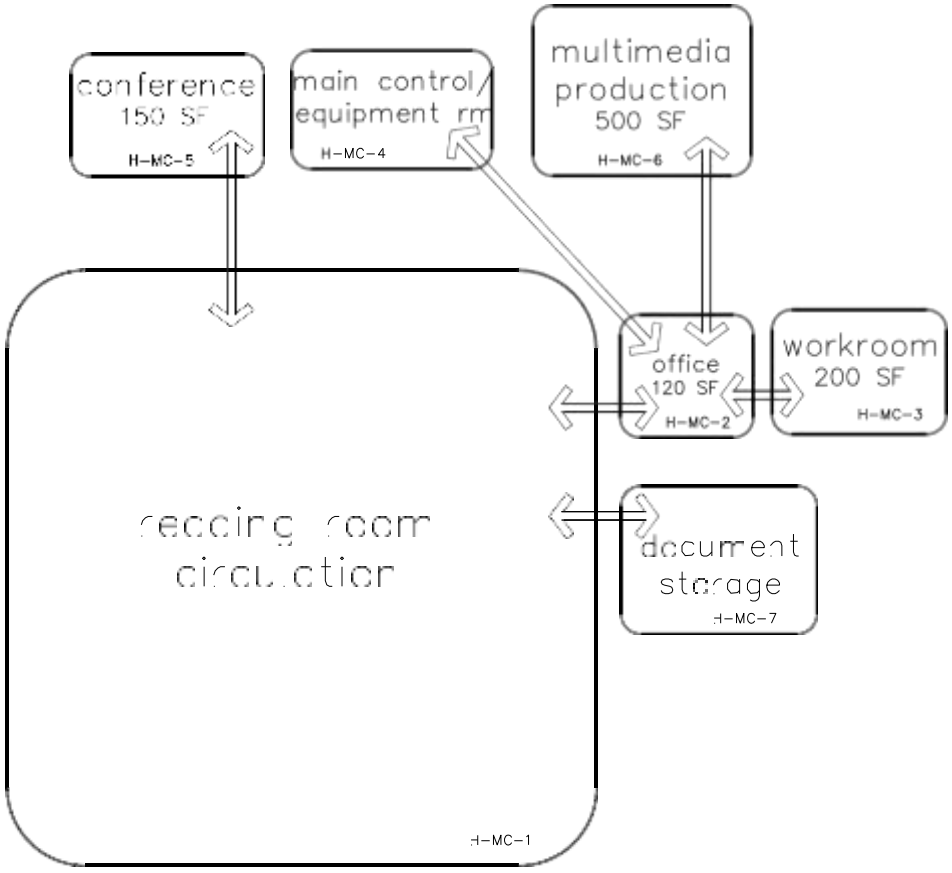
LOOSE FURNISHINGS:
- L1 Work tables and chairs
- L2 Workstation chairs
- L3 Reading chairs
- L4 Small table
- Wastebasket

Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
- ***E1 Duplex receptacle with dedicated circuit for wireless devices***

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 8’-16’ display cabinets	123550
F2 About 9' base cabinets	123550
F3 12'-16' combination marker board, tack board, tackable wall surface	101100
F4 Technology support casework	123550
F5 Workstation	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacles adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port and video display device	271543/274119
T2 1 voice port	271513/273113
T3 ***Wireless access point cable above ceiling***	271513
Clock	275313
Central sound system	275123
T4 Wireless access point (WAP) as determined by Design – refer to Note 4	***272133***
T5 Classroom technology center video port	***271543, 274116, 274119, 275127***

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed casework and loose furnishings can also be all fixed or all loose.
3. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
4. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***



NOTE:

This is an example of how the media center spaces in a high school could be arranged. This is only meant to demonstrate the relationships between various areas of the building.

Following are the Media Center space plates:

H-MC-1 Reading Room/Circulation H-MC-2 Media Specialist Office
H-MC-3 Workroom/Storage
H-MC-4 Main Control / Equipment Room
H-MC-***5*** Conference Room
H-MC-***6*** Multimedia Production Room
H-MC-***7*** Document Storage

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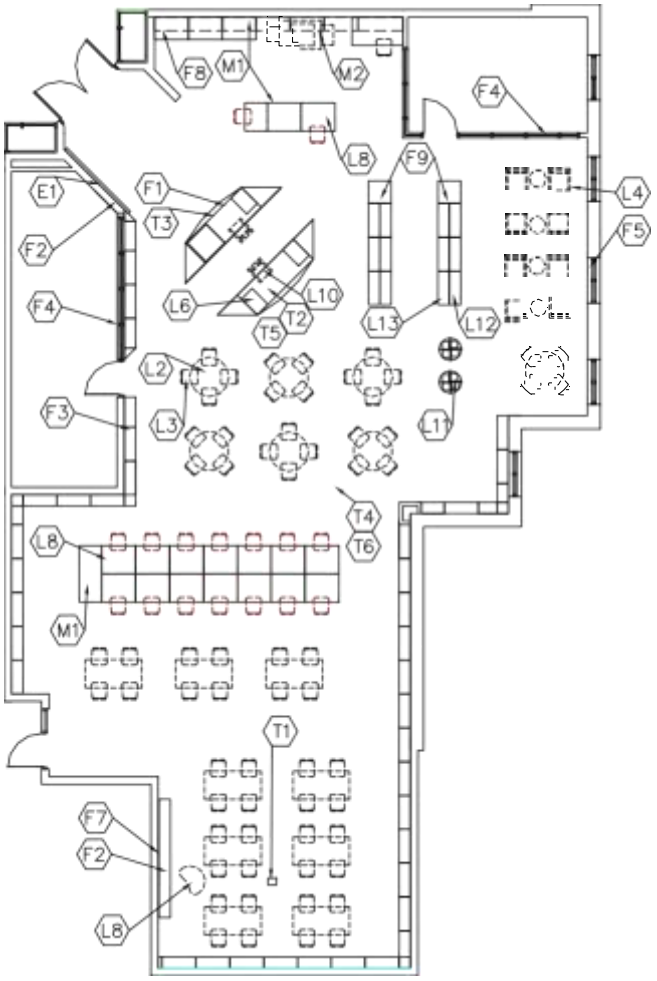


PROGRAM ACTIVITIES:

- Information laboratory that serves the instructional needs of the entire school.
- Recreational reading, research, accessing information, using technology, storing, cataloging, and reproduction of materials and information.
- Individual, small group, and class reading and researching.

SPATIAL RELATIONSHIPS:

- Centrally located and accessible to all areas of the facility
- Locate with access to academic core classrooms
- Easy access to public parking

ENVIRONMENTAL CONSIDERATIONS:

- Natural light opening
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Visual awareness of space to students and staff through transparency to corridor

CAPACITY:	10% of student capacity
SIZE:	10% of student capacity multiplied by 35 SF per student

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

READING ROOM/CIRCULATION
H-MC-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
Acoustical wall treatment	098000

LOOSE FURNISHINGS[2]:

L1 Mobile book carts
L2 Student tables
L3 Student chairs
L4 Casual seating chairs
L5 Study carrels (optional)
L6 (3) Desk height file cabinets
L7 Atlas stand (optional)
L8 Computer workstation furniture
L9 Dictionary stand (optional)
L10 Circulation desk task chair
L11 Paperback book racks
L12 Newspaper racks
L13 Magazine display
Wastebaskets

Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
Pencil sharpener (optional)
The following items are to be funded by the owner:
M1 2 printers: 1 at circulation desk and 1 in student work area
M2 Copier

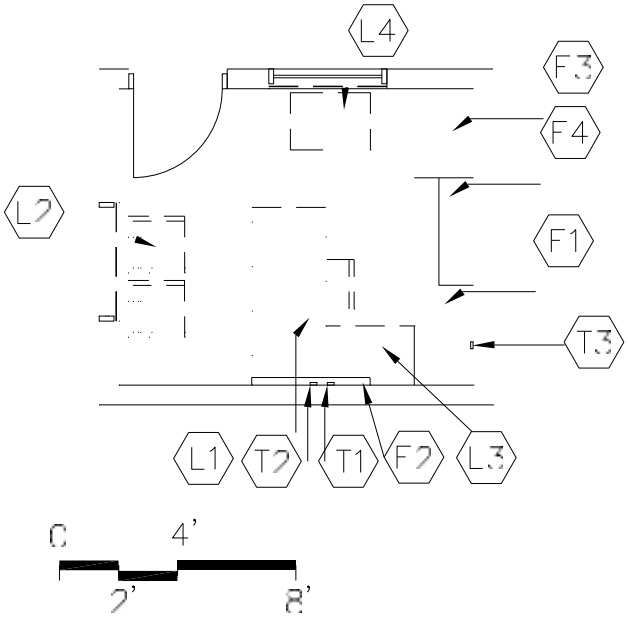
E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]: Fixed Items:	Spec. Ref.#
F1 Circulation desk casework	123550
F2 12'-20' combination marker board, tack board, tackable wall surface	101100
F3 Library book shelving (see notes)	115123
F4 Interior windows	081113/088000
F5 Windows with integral blinds or shades	085113
F6 Pencil sharpener support (optional)	062000
F7 Projection screen (optional)	115213
F8 Technology support casework	123550
F9 Search station terminals	123550
Roller window shades (optional)	122413
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
10 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Communications:	
T1 1 ***projector*** video port and video display device	271543/274119
T2 1 voice port and phone at circulation desk	271513/273123
T3 2 data ports for media center automation system	271513
T4 ***Wireless access point cable above ceiling***	271513
Clock	275313
Central sound system	275123
T5 ***Classroom technology center video port***	***271543, 274116, 274119, 275127***
T6 Wireless access point (WAP) as determined by Design – refer to Note 6.	***272133***

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Circulation desks and library shelving can be loose furnishings.
3. Technology components maybe be placed in a separate small cabinet, or integrated in the other casework in the room.
4. Fixed casework and loose furnishings can be interchangeable.

5. Up to 20% of book shelving can be moveable.

6. Baseline includes WAP cable. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:
- Media specialist to conduct duties

SPATIAL RELATIONSHIPS:
- Near reading room/circulation area
- Near workroom/storage
- Could be part of the media center reading room

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	1 - 3 persons
SIZE:	120 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

MEDIA SPECIALIST OFFICE
H-MC-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

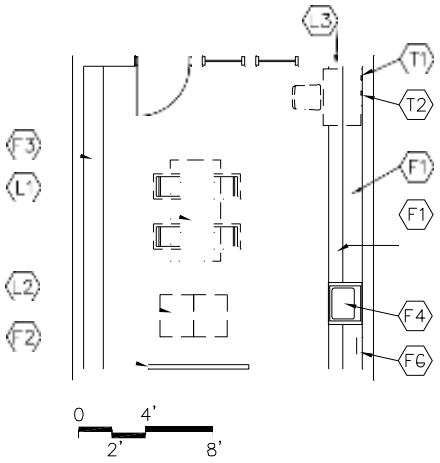
LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
L4 File cabinet
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets	123550
F5 Bookcases (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window	081113/088000

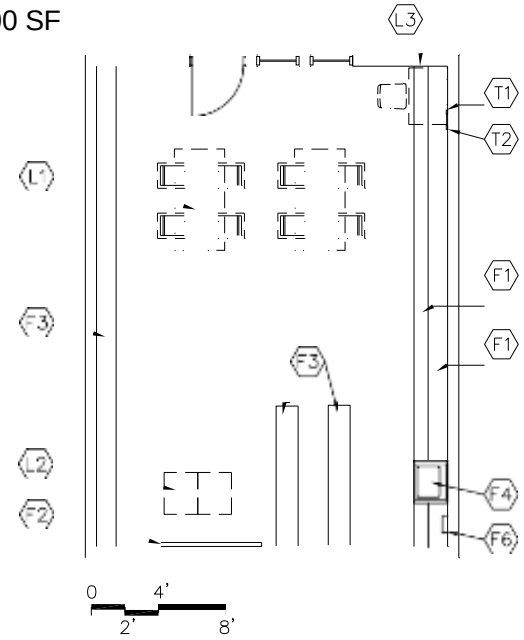
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.

300 SF



600 SF



CAPACITY: 2 - 8 staff
SIZE: 300 - 700 SF

PROGRAM ACTIVITIES:
- Space for receiving, processing, and repairing media material

SPATIAL RELATIONSHIPS:
- Near reading room/circulation
- Near media specialist office

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Visual access to reading room/circulation

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

WORKROOM/STORAGE
H-MC-3

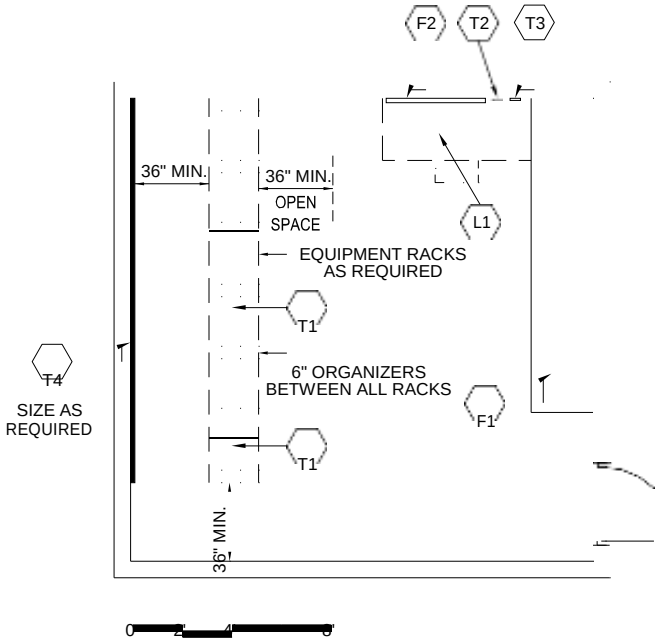
FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber***, ET or sheet Vinyl***	096500 ***096516***
Option: Carpet, carpet tile	***096813 096816***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Table and chairs
L2 Book trucks
L3 Computer workstation
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 ***26'-50' combination base, wall and tall cabinets***	123550
F2 4'-8' of tack board ***or marker board***	101100
F3 16'-60' of bookcases	123550
F4 3' sink base cabinet	123550
F5 ***Reserved***	
F6 Towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
3 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Communications:	
T1 1 voice port and phone	271513/***273123***
T2 1 data port	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window	081113/088000

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



PROGRAM ACTIVITIES:

- Collection and distribution hub for the voice, video, and data networks within the facility
- Contains racks for distribution equipment

SPATIAL RELATIONSHIPS:

- Near the center of the building to minimize the number of Telecommunication Rooms (TR)

ENVIRONMENTAL CONSIDERATIONS:

- Ventilation and cooling of heat-generating electronic equipment

Note: Technology designer shall confer with school district technology director to determine equipment and space needed and coordinate with project designer.

CAPACITY: N/A
SIZE: ***(Baseline) (Minimum)*** 300 - 400 SF

ER Utilized for local serving zone – add minimum 80 SF
ER Utilized as district N.O.C. – add minimum 150 SF
ER Utilized as building data center for central servers/thin client – add minimum 30 SF per 10 classrooms

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. ***Verify and coordinate ER size and location with the technology designer during programming phase.***

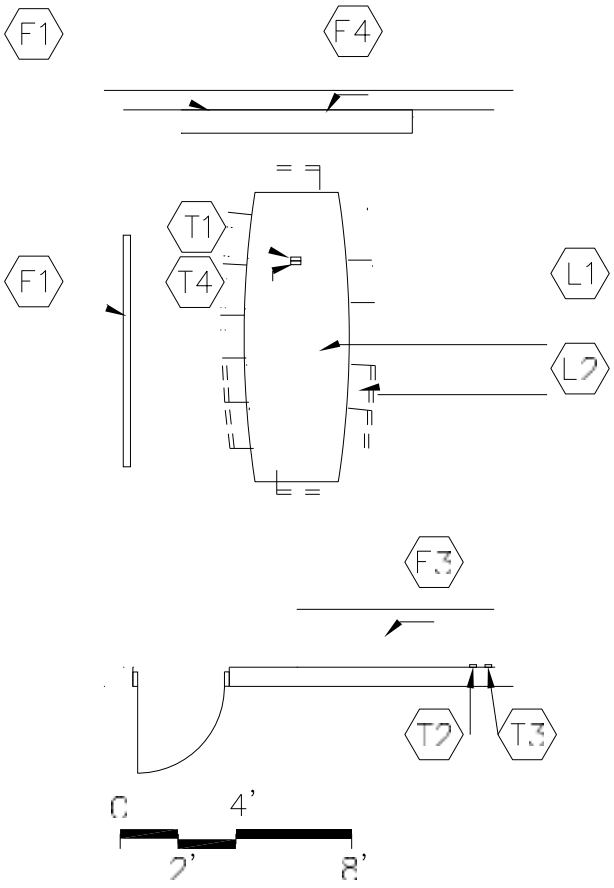
MAIN CONTROL / EQUIPMENT ROOM
H-MC-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET or sheet vinyl	096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Desk and chair
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 8'-16' of open shelving, depth may vary (fixed or loose)	123550
F2 4' of tack board or marker board	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Independent, packaged system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
3 duplex receptacles	262726
Duplex receptacle for electronic systems	262726
Telecommunications Grounding	270526/260526
Standby Power	263213/263600
Communications:	
T1 Technology Equipment	
Central sound system	275123
Telephone wiring	271313/271513
Integrated telephone system	273123
Video wiring	271543
Digital on demand delivery system	274125
Local area network wiring	271513/271323
Local area network electronics	272100/272133
Grounding & Infrastructure Equipment	270526/271100
T2 1 voice port and phone	271513/273123
T3 1 data port near workstation	271513
T4 ***3/4***" plywood back board	271313
Electronic Safety and Security:	
Life safety devices per code	283111
Security system	281300/281600/282300
Miscellaneous:	
Provide distribution equipment with an equipment electrical ground.	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.



CAPACITY: 8 - 12 persons
SIZE: 250 SF

PROGRAM ACTIVITIES:

- Used primarily by students for group projects

SPATIAL RELATIONSHIPS:

- Near reading room/circulation

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35**,** NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

CONFERENCE ROOM
H-MC-*5*

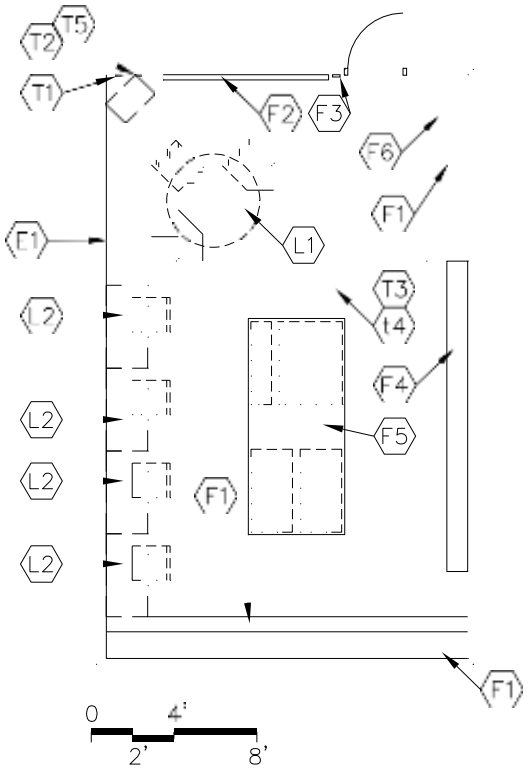
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Conference table
L2 Chairs
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 14'-18' combination marker board, tack board and tackable wall surface	101100
F2 Reserved	
F3 4'-6' of base cabinets (optional) (fixed or mobile)	123550
F4 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Multilevel switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
3 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123 T3
1 data port	271513
T4 ***Ultra-short throw interactive*** projector	274119
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.
3. Fixed casework and loose furnishings can be also all fixed or all loose.

500 SF



PROGRAM ACTIVITIES:

- Production of a variety of media
- Individual student project work and student instruction
- Putting together student project presentations in media such as PowerPoint, video, reports, 3D models, etc.

SPATIAL RELATIONSHIPS:

- Near workroom/storage
- Near media center

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control –
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: 5 - 7 persons
SIZE: 500 - 800 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. This space could be an area inside the media center.

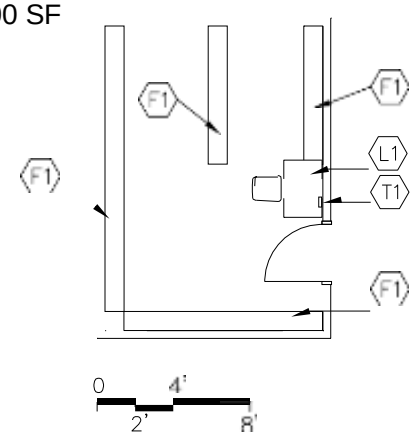
MULTIMEDIA PRODUCTION ROOM
H-MC-6

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096500
ET, sheet vinyl, or rubber	096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
L1 Tables and chairs/stools	
L2 Computer workstation furniture	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
Interior windows for supervision (optional)	081113/088000
The following items to be provided by the school district:	
Copier, scanner, printers, binders, laminators	
E1 Duplex receptacle with dedicated circuit for wireless devices	

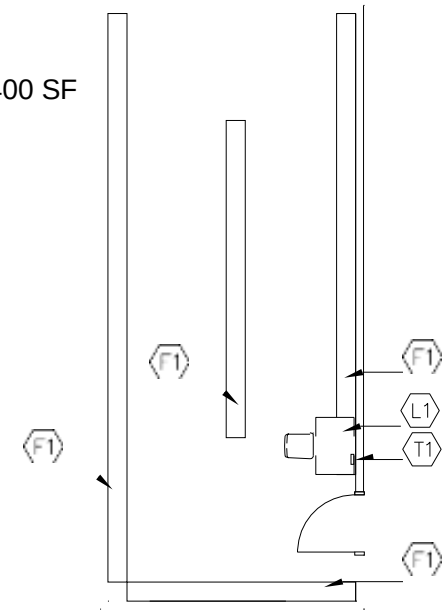
FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 15'-45' combination base, wall and tall cabinets	123550
F2 4'-8' of tack board or marker board	101100
F3 Pencil sharpener support (optional)	062000
F4 4' - 16' of tall bookcases	123550
F5 Work surface	123550
F6 Technology support casework (if applicable)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Multilevel switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port and video display device	271543/274119
T2 1 voice port and phone	271513/273123
T3 ***Wireless access point cable above ceiling***	271513
Clock	275313
Central sound system	275123
T4 Wireless access point (WAP) as determined by Design – refer to Note 3	***272133***
T5 Classroom technology center video port	***271543, 274116, 274119, 275127***

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

200 SF



400 SF



CAPACITY: N/A
SIZE: 200 - 500 SF

PROGRAM ACTIVITIES:

- Secured storage for documents, including newspapers, periodicals, microfilm and microfiche

SPATIAL RELATIONSHIPS:

- Near reading room/circulation

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

DOCUMENT STORAGE
H-MC-*7*

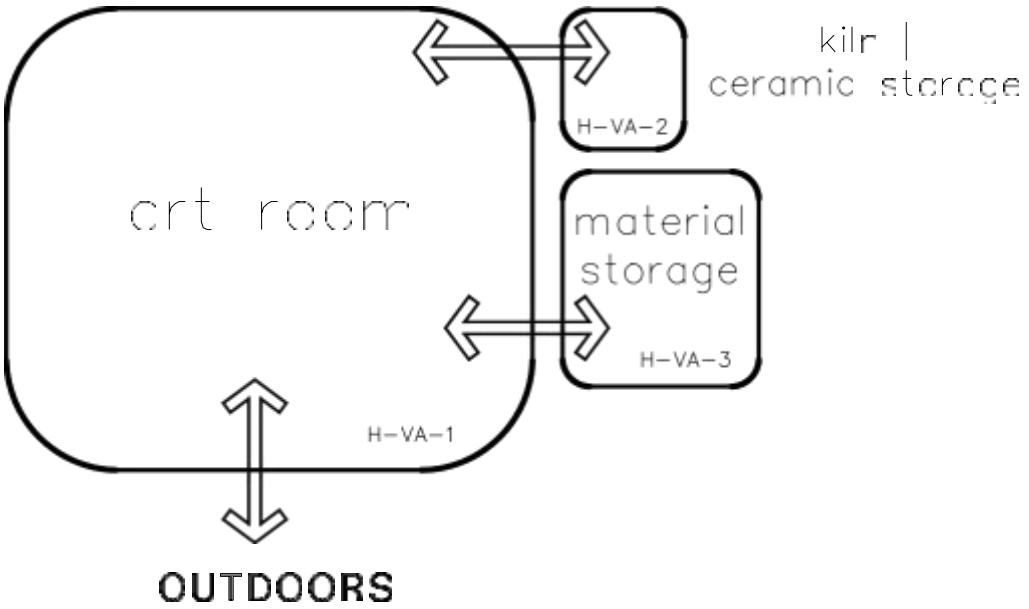
FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber***, ET,***	096500
sheet vinyl	***096516***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Computer worksurface

FEATURES:	Spec. Ref.#
Fixed Items[2]:	
F1 36' – 80' of open shelving (fixed or loose)	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-***5***	
Single level switching	262726
2 duplex receptacles	262726
Communications:	
T1 1 data port (optional)	271523
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



NOTE:

This is an example of how the visual arts spaces in a high school could be arranged. This is meant only to demonstrate the relationships between various areas of the building.

Following are the Visual Art space plates:

H-VA-1	Art Room
H-VA-2	Kiln/Ceramic Storage
H-VA-3	Art Material Storage

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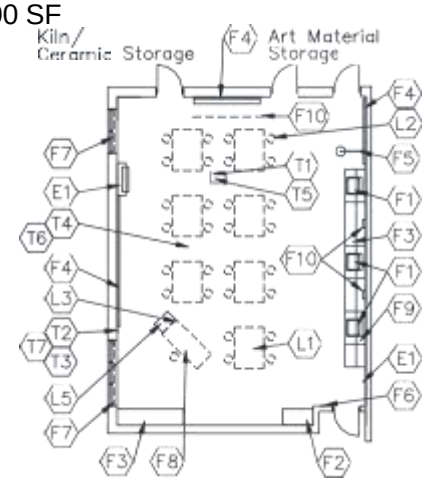
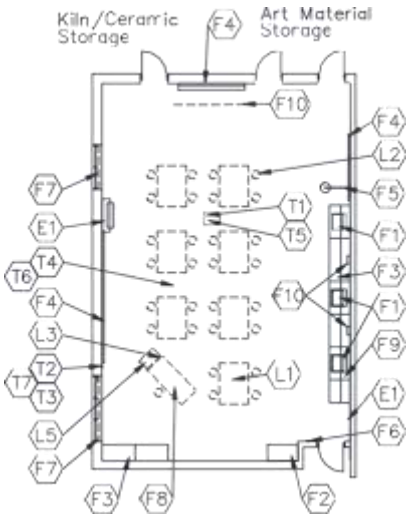
1200 SF



1400 SF



CAPACITY: 25 students
SIZE: 1,200 – 1,400 SF
ANCILLARY SPACES: Kiln/Ceramic Storage H-VA-2
Art Material Storage H-VA-3

PROGRAM ACTIVITIES:

- Art students will work on a variety of art projects,both two- and three-dimensional. Projects will include drawing and painting, computer graphics, sculpture and model making, collage, fiber arts, and ceramics.

SPATIAL RELATIONSHIPS:

- Near academic core classrooms
- Direct access to outdoors or access through adjacent corridor

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum STC 35, NRC 0.70
- Stain-resistant floor covering

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

ART ROOM
H-VA-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096516
ET, sheet vinyl, rubber,	096500
sealed concrete,	033000
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	085113
Walls:	
Paint	099100

LOOSE FURNISHINGS:
L1 Student work tables
L2 Student chairs or stools
L3 Teacher desk and chair and teacher computer support
L4 Reserved
L5 Desk height file cabinet
Wastebasket

EQUIPMENT
E1 Drying rack

Electronic Safety and Security:	
Life safety devices per code	283111

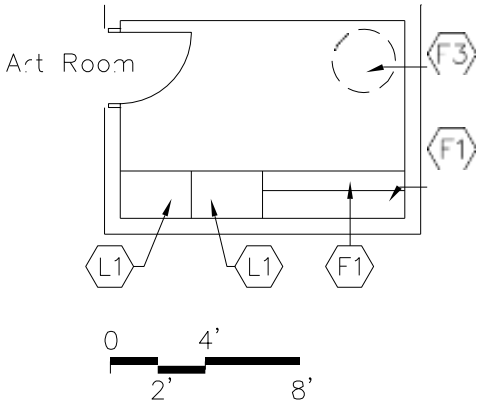
Miscellaneous:
Pencil sharpener (optional)
Potter wheels by owner

E1 Duplex receptacle with dedicated circuit for wireless devices

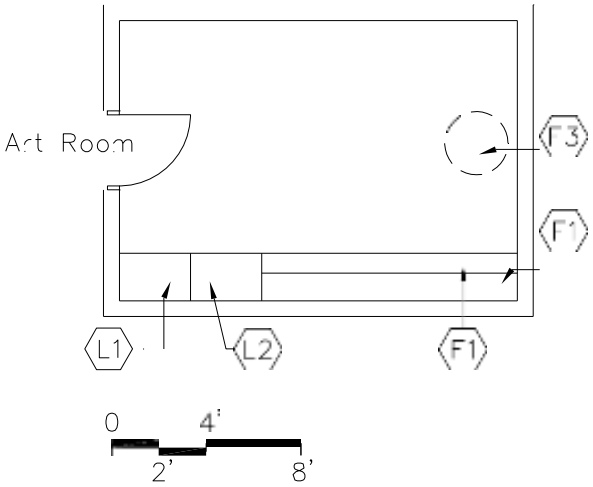
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 3'-4' sink base cabinet with wall cabinets above or wash fountains	123550
F2 Tall wardrobe with file drawers	123550
F3 16'-22' combination base, wall and tall cabinets	123550
F4 22'-36' combination marker board, tack board, tackable wall surface	101100
F5 Emergency eyewash	224000
F6 Pencil sharpener support(optional)	062000 F7
Windows with integral blinds	085113
F8 Technology support casework	123550
F9 Towel dispenser	102813
F10 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sinks with solids interceptor	224000
Plumbing connections	224000/221116/221119
Emergency eyewash connections	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Manually controlled general exhaust	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Track lighting (optional)	265100
Means of egress lighting per code	265100
Emergency lighting per code	265100
Power for potters wheels	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Overhead projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

100 SF



200 SF



CAPACITY: N/A
SIZE: 100 - 300 SF
ANCILLARY SPACES: Art Room
H-VA-1

PROGRAM ACTIVITIES:
- Firing of art projects in ceramics and pottery by the teacher

SPATIAL RELATIONSHIPS:
- Adjacent to art room
- Near art material storage

ENVIRONMENTAL CONSIDERATIONS:
- Ventilation controlled by a thermostat

NOTES:

KILN/CERAMIC STORAGE
H-VA-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, sheet vinyl,	***033000***
sealed concrete,	***096500***
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 3' of tall dry storage units (total)
L2 3' of tall damp storage units (total)

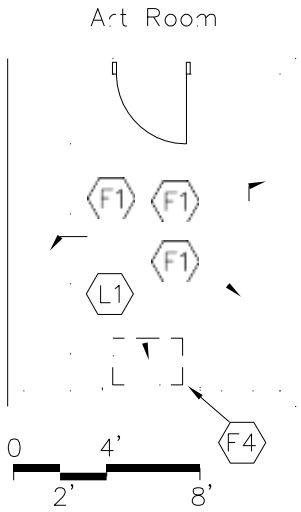
L1 and L2 could be fixed casework.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 ***6'-12' combination base and wall cabinets***	123550
F2 ***Reserved***	
F3 Kiln	119200
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Temperature controlled exhaust	Div. 23
Ventilation for kiln	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Electrical connection for kiln	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

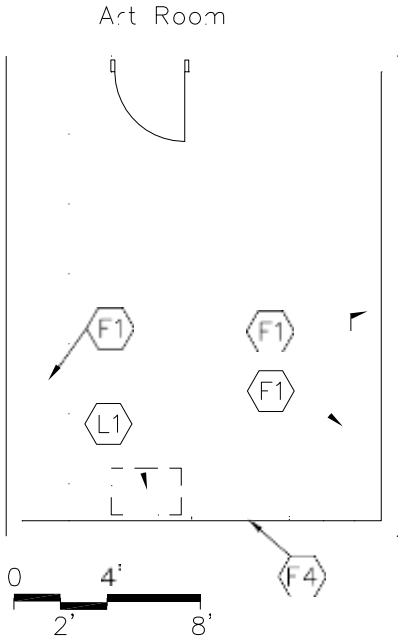
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

200 SF



300 SF



CAPACITY: N/A
SIZE: 200 - 400 SF
ANCILLARY SPACES: Art Room
H-VA-1

PROGRAM ACTIVITIES:
- Storage of art supplies and materials

SPATIAL RELATIONSHIPS:
- Adjacent to art room

ENVIRONMENTAL CONSIDERATIONS:
- Stain-resistant floor covering

NOTES:

ART MATERIAL STORAGE
H-VA-3

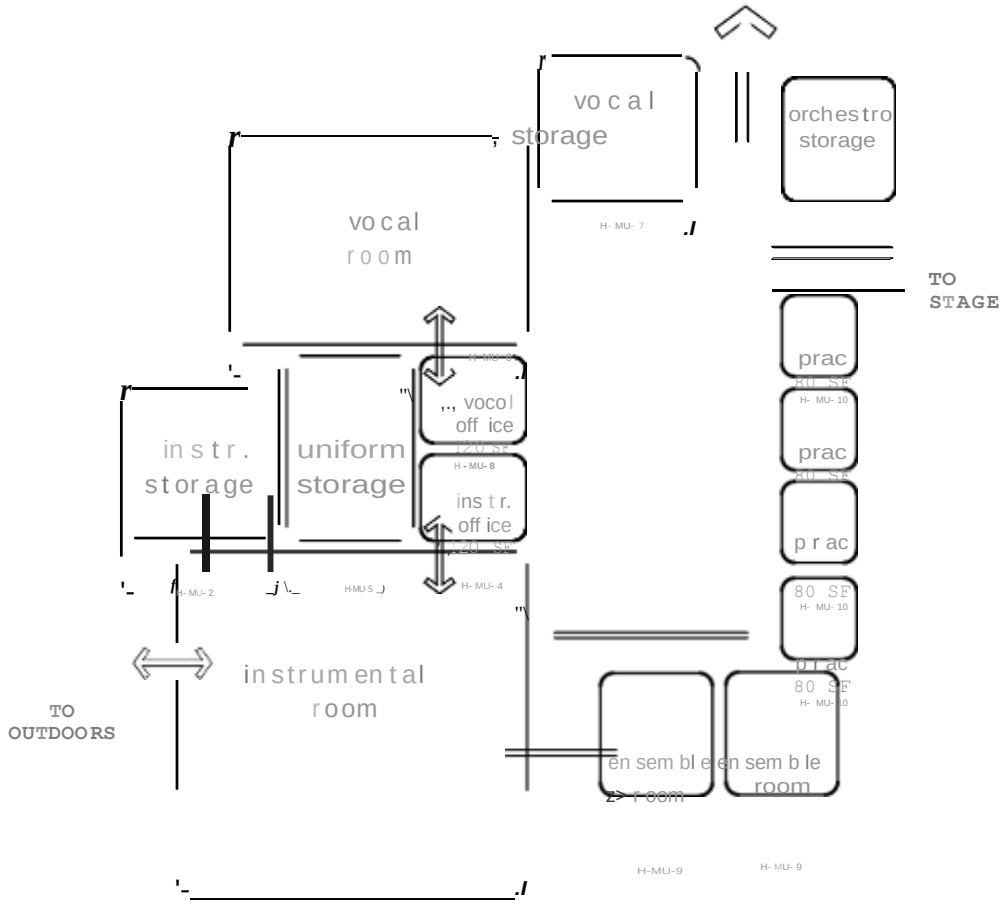
FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, ***sealed concrete, rubber,*** sheet vinyl,	096500 ***033000***
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Mobile materials cart

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 ***16' – 28' combination tall storage cabinets and wall cabinets***	123550
F2 8' - 14' base cabinets, (depth for school's need)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
Duplex receptacle above base cabinet	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



NOTES:

This is an example of how the music spaces in a high school could be arranged. This is meant only to demonstrate the relationships between various areas of the building.

Following are the Music space plates:

H-MU-1 Instrumental Room H-MU-2 Instrument Storage H-MU-3 Orchestra Storage
H-MU-4 Instrumental Music Library
H-MU-5 Uniform Storage
H-MU-6 Vocal Room
H-MU-7 Vocal Storage
H-MU-8 Vocal Music Library
H-MU-9 Ensemble Room
H-MU-10 Practice Room

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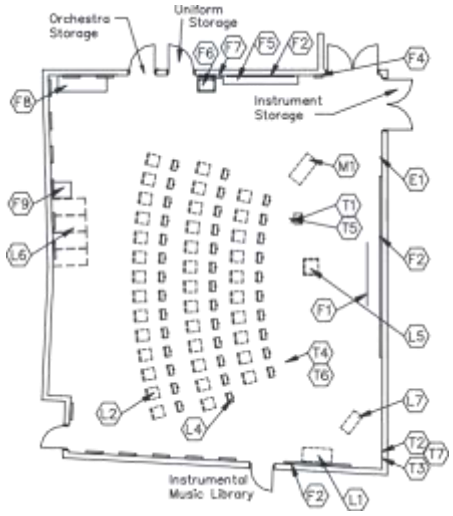
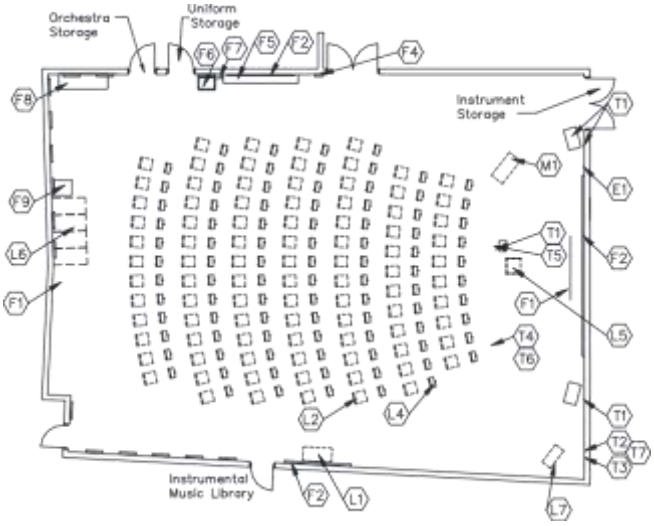
1,800 SF



3,000 SF



CAPACITY: 40 – 90 students
SIZE: 1,800 – 3,000 SF
ANCILLARY SPACES: Instrument Storage H-MU-2
Orchestra Storage, H-MU-3
Instrumental Music Library, H-MU-4
Uniform Storage, H-MU-5

PROGRAM ACTIVITIES:

- All instrumental music activities including marching band, concert jazz, and pep bands
- Individual, small group and class size practice
- Computer composition and performance of music
- Music reading instruction

SPATIAL RELATIONSHIPS:

- ☐ Grouped with other noise producing activities
- ☐ Access to parking
- ☐ Direct access to outdoors
- ☐ Convenient access to stage
- ☐ Near vocal room
- ☐ Adjacent to instrumental music library, and instrument, orchestra and uniform storage
- ☐ Near practice rooms

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 60
  ceiling minimum CAC 35, NRC 0.70
- Large doors
- Ceiling heights: 14’ minimum,
  18’-20’ preferred; 24’ maximum
- Acoustical requirements and other factors as determined by final configuration and other factors of the space

NOTES:
1 Loose furnishings shown represent one of many possible arrangements.

INSTRUMENTAL ROOM

H-MU-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile,	096500
linoleum, rubber, ET,	096516
or sheet vinyl	096816
	096813
Base:	
Resilient	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100
Acoustical wall treatment (varies with geometry of room) absorptive 25%, reflective 25%, diffusive 50%	098000

LOOSE FURNISHINGS:

- L1 Mobile sheet music cabinet
- L2 Music chairs and caddies
- ***L3 Reserved***
- L4 Music stands
- L5 Conducting podium
- L6 Mobile percussion instrument storage cabinet
- L7 Teacher workstation

Wastebasket

Electronic Safety and Security:

Life safety devices per code 283111

Miscellaneous:

Pencil sharpener (optional)

Doors are to have acoustic trim accessories or sound doors.

The following items are to be funded by the school district:

M1 Piano

E1 Duplex receptacle with dedicated circuit for wireless devices

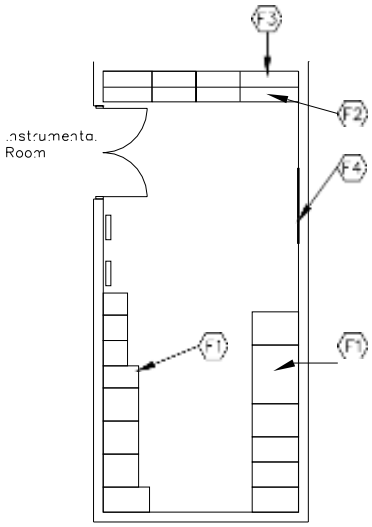
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Projection screen (optional)	115213
F2 12'-32' combination marker board, tack board & tackable wall surface	101100
F3 Technology support casework	123550
F4 Pencil sharpener support (optional)	062000
F5 4'-9' of bookcases (see note 3)	123550
F6 3' sink base cabinet	123550
F7 Towel dispenser	102813
F8 Wardrobe (optional in storage room)	
F9 Stereo cabinet (optional)	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink, 10" deep	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting:	265100
Illumination level: see table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Telecommunications Grounding	270526/260526
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port	271513
T4 Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
High school music sound system	275126
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:

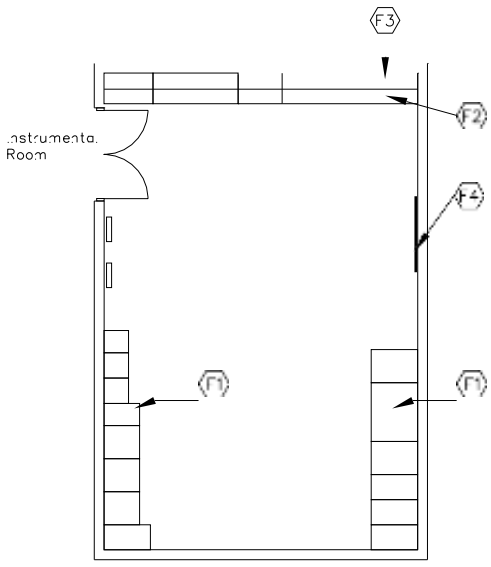
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Sink could be in storage room.
3. For small population schools, provide additional bookcases or cabinets in lieu of H-MU-3 music library.
4. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.

400 SF



700 SF



CAPACITY: N/A
SIZE: 400 - 800 SF
ANCILLARY SPACES: Instrumental Room H-MU-1

PROGRAM ACTIVITIES:
- Storage of band instruments

SPATIAL RELATIONSHIPS:
- Adjacent to instrumental room
- Access to outdoors through instrumental room
- Instrument storage casework to accommodate the potential number and type of instruments

ENVIRONMENTAL CONSIDERATIONS:
- Wide doors

NOTES:

INSTRUMENT STORAGE
H-MU-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber***, ET, or sheet vinyl***	096500 ***096516***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
Wastebasket

FEATURES:	Spec. Ref.#
Fixed Items[2]:	
F1 Miscellaneous instrument storage Cabinets and racks	123550
F2 3'-5' of base cabinets (optional)	123550
F3 3'-5' of wall cabinets (optional)	123550
F4 4' of tackboard (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-***5***	
Single level switching	262726
1 duplex receptacle	262726

Communications:
N/A

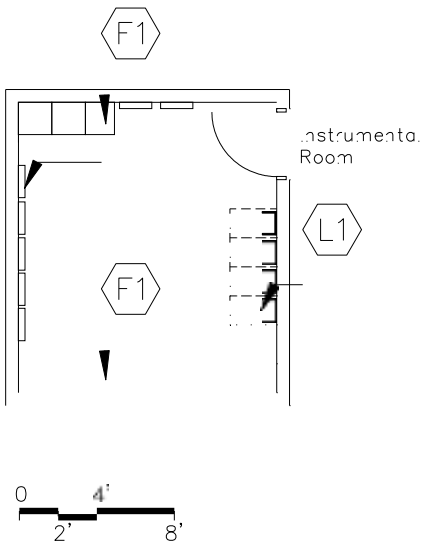
Electronic Safety and Security:
N/A

Miscellaneous:
N/A

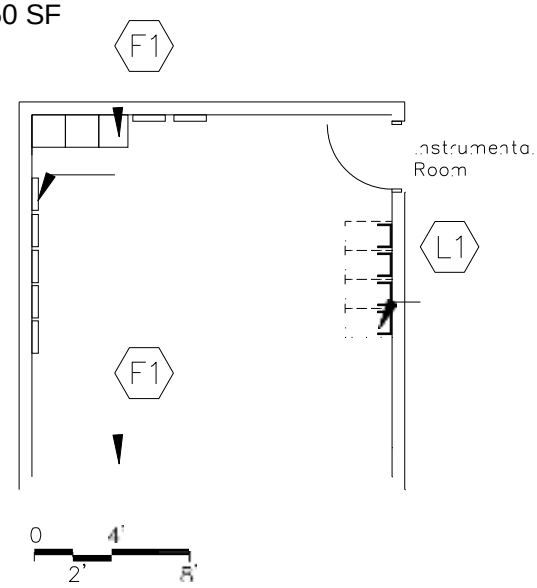
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.

200 SF



350 SF



CAPACITY: N/A
SIZE: 200 - 500 SF
ANCILLARY SPACES: Instrumental Room
H-MU-1

PROGRAM ACTIVITIES:
- Storage of orchestra instruments

SPATIAL RELATIONSHIPS:
- Direct access to instrumental room
- Access to outdoors through instrumental room
- Instrument storage casework to accommodate the potential number and type of instruments

ENVIRONMENTAL CONSIDERATIONS:
- Wide doors

NOTES:

ORCHESTRA STORAGE
H-MU-3

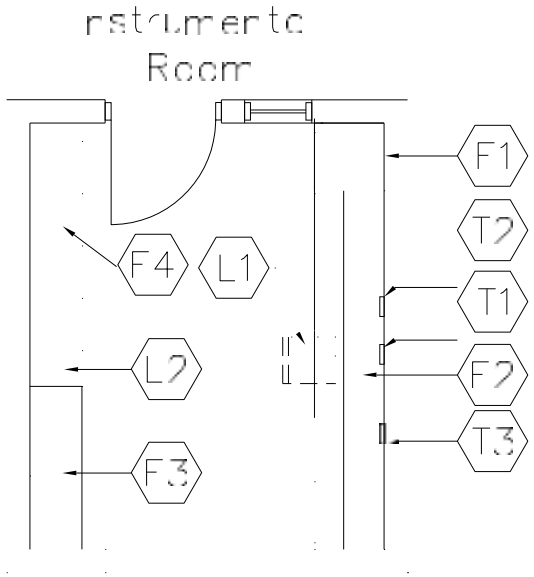
FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber***, ET, or sheet vinyl***	096500 ***096516***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Carts for large instruments

FEATURES:	Spec. Ref.#
Fixed Items:	
F1 Miscellaneous instrument storage Cabinets and racks	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-***5***	
Single level switching	262726
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:

- Area for the band director to do planning, scheduling, grading, and conferencing

SPATIAL RELATIONSHIPS:

- Adjacent to instrumental room
- Adjacent to ensemble and practice rooms

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  walls minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	1 - 3 persons
SIZE:	120 SF
ANCILLARY SPACES:	Instrumental Room H-MU-1

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

INSTRUMENTAL MUSIC LIBRARY
H-MU-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, linoleum,	096816
ET, sheet vinyl	096813
	096516
	096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

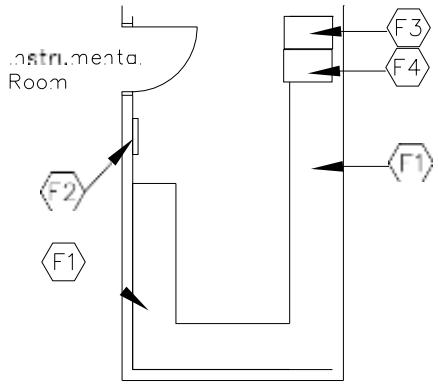
LOOSE FURNISHINGS:
L1 Chair
L2 Sheet music storage
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe	123550
F2 Work surface with file drawers	123550 F3
2'-4' tall storage cabinet (optional)	123550 F4
Shelving or	123550
mobile music storage shelving	105626
F5 4' of tack board (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

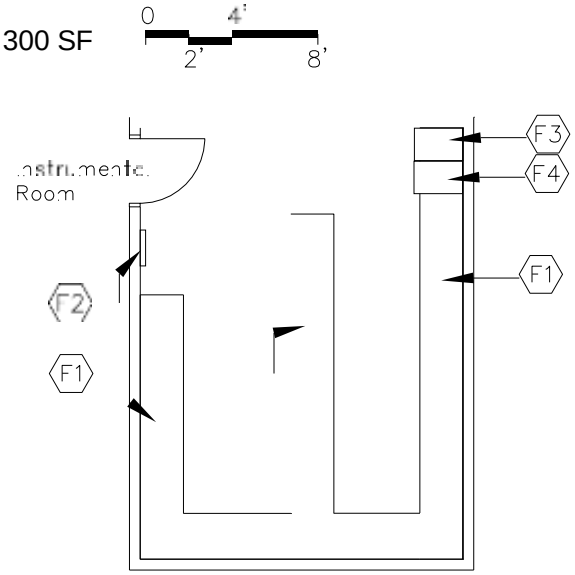
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

150 SF



300 SF



PROGRAM ACTIVITIES:
- Storage of instrumental uniforms

SPATIAL RELATIONSHIPS:
- Adjacent to instrumental room

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	150-400 SF
ANCILLARY SPACES:	Instrumental Room H-MU-1

NOTES:

UNIFORM STORAGE
H-MU-5

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber, ***ET, or sheet vinyl***	096500 ***096516***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

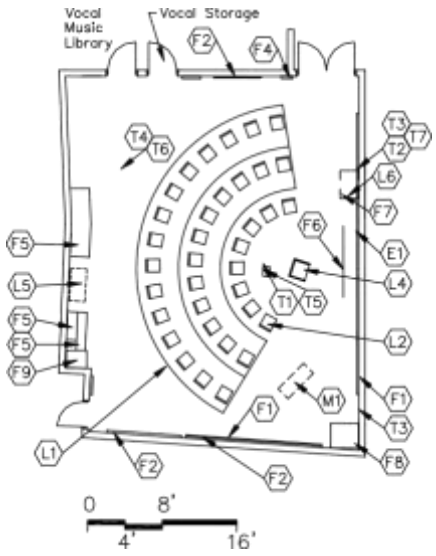
LOOSE FURNISHINGS:
N/A

FEATURES:	Spec. Ref.#
Fixed Items[2]:	
F1 20'-44' of uniform and hat storage cabinets	123550
F2 20" x 60" mirror (optional)	102813
F3 Tall cabinets (optional)	123550
F4 Bins for auxiliary core equipment (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Fluorescent lighting:	265100
Illumination level: see table 8600-***5***	
Single level switching	262726
1 Duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

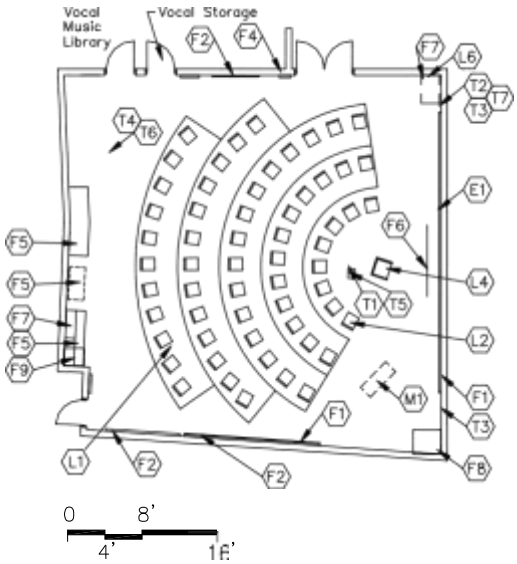
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.

1,200 SF



1,500 SF



CAPACITY: 35 - 60 students
SIZE: 1200 - 1500 SF
ANCILLARY SPACES:
Vocal Music Library, H-MU-8
Vocal Storage, H-MU-7

PROGRAM ACTIVITIES:
- Vocal music activities including chamber choir, concert and swing choirs
- Solo, sectional, and class size practice
- Computer composition and performance of music
- Music reading instruction

SPATIAL RELATIONSHIPS:
- ☐ Grouped with other noise producing activities
- ☐ Convenient access to stage
- ☐ Near instrumental room
- ☐ Adjacent to vocal music library and vocal storage
- ☐ Near practice and ensemble rooms

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 60
  ceiling minimum CAC 35, NRC 0.70
- Large doors
- High ceilings
- Acoustical requirements and other factors as determined by final configuration of the space

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

VOCAL ROOM
H-MU-6

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile	096816
Optional: ET, sheet vinyl	096500
linoleum, or rubber	096516
	096813
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Absorptive 25%, reflective 25%, diffusive 50%	
Walls:	
Paint	099100
Acoustical wall treatment	
(varies with geometry of room)	098000

LOOSE FURNISHINGS:

L1 Portable risers
L2 Music chairs and caddies
L3 Reserved
L4 Conducting podium
L5 Mobile sheet music cabinet
L6 Teacher computer workstation
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)
Gasketing on doors or sound doors
The following item is to be funded by the owner:
M1 Piano & electronic keyboard(s)

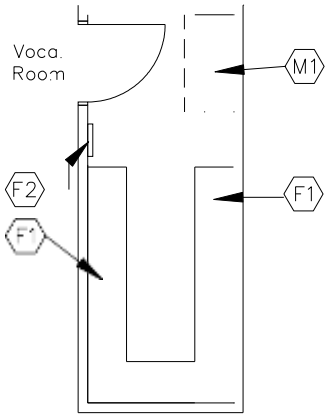
E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 5'-6' high mirror mounted 12" above floor	088300
F2 16'-32' combination marker board, tack board, tackable wall surface	101100
F3 Reserved	
F4 Pencil sharpener support (optional)	062000
F5 11'-18' combination base, wall and tall cabinets	123550
F6 Projection screen (optional)	115213
F7 Technology support casework	123550
F8 Stereo cabinet (optional)	123550
F9 Tall wardrobe (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting:	265100
Multilevel switching	262726
6 duplex receptacles	262726
Illumination level: See Table 8600-5	
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Telecommunications Grounding	270526/260526
Communications:	
T1 2 projector video ports	271543
T2 1 voice port and phone	271513/273123
T3 1 data port	271513
T4 Wireless access point cable above ceiling	271513
Clock	275313
High school sound system	275126
Central sound system	275123
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T7 Classroom technology center video port	271543, 274116, 274119, 27512

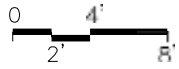
NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.

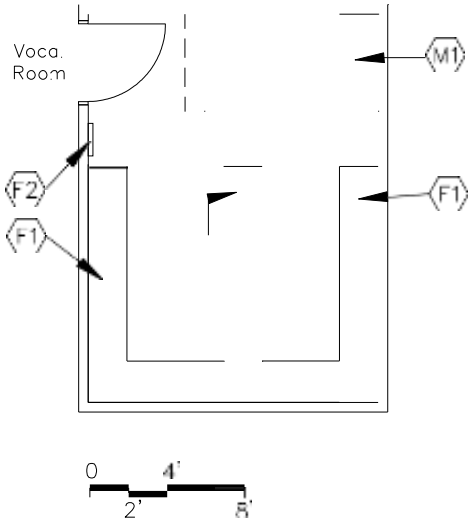
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

150 SF



300 SF





CAPACITY:	N/A
SIZE:	150-400 SF
ANCILLARY SPACES:	Vocal Room H-MU-6

PROGRAM ACTIVITIES:

- Secure storage of choir costumes, tuxedos, and risers

SPATIAL RELATIONSHIPS:

- Adjacent to vocal room

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

VOCAL STORAGE
H-MU-7

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber***, ET, or sheet vinyl***	096500 ***096516***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
N/A

FEATURES:	Spec. Ref.#
Fixed Items[2]:	
F1 20'-40' of high robe storage cabinets	123550
F2 20" x 60" mirror (optional)	102813
Fire Suppression:	
Fire suppression system	211000

Plumbing:
N/A

HVAC:
To be determined by Design Professional
Supplemental heating as required Div. 23

Electrical:
Fluorescent lighting: 265100
Illumination level: See Table 8600-***5***
Single level switching 262726
1 duplex receptacle 262726

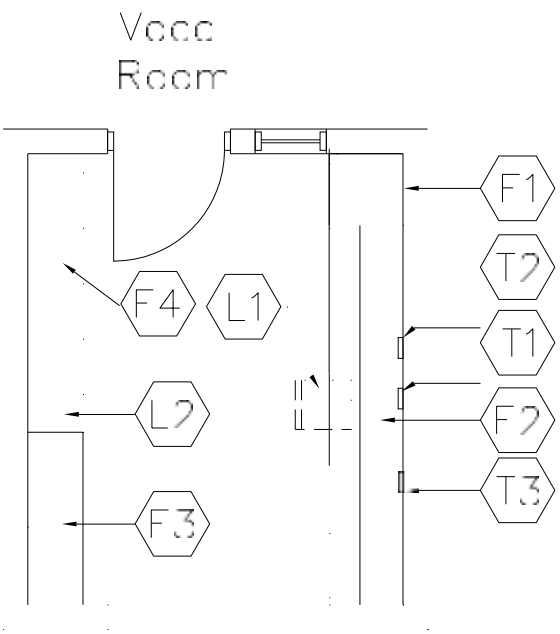
Communications:
N/A

Electronic Safety and Security:
N/A

Miscellaneous:
M1 Space for storage of portable risers

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



PROGRAM ACTIVITIES:

- Area for the choir director to do planning, scheduling, grading, and conferencing

SPATIAL RELATIONSHIPS:

- Adjacent to instrumental room
- Adjacent to ensemble and practice rooms

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	1 - 3 persons
SIZE:	120 SF
ANCILLARY SPACES:	

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

VOCAL MUSIC LIBRARY
H-MU-8

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile	096816
Option: Linoleum, rubber, ET or sheet vinyl	096813 096516 096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

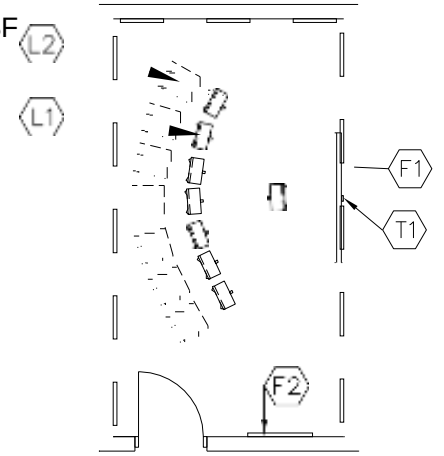
LOOSE FURNISHINGS:
L1 Chair
L2 Sheet music storage
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe	123550
F2 Work surface with file drawers	123550 F3
2'-4' tall storage cabinet	123550
F4 Shelving or	123550
mobile storage shelving	105626
F5 4' of tack board (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

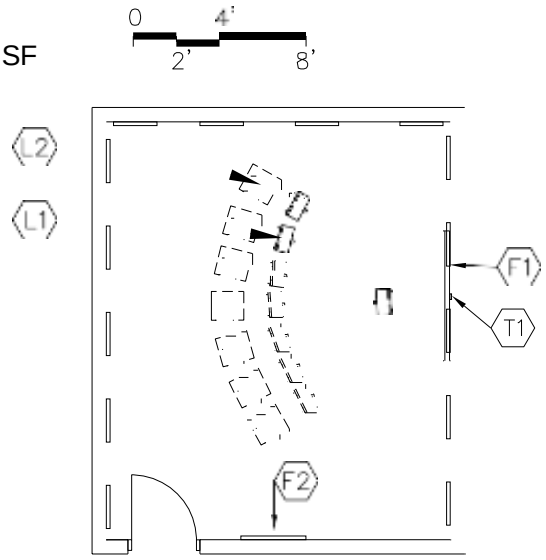
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

200 SF



300 SF



CAPACITY: 5 - 7 students
SIZE: 200 - 400 SF

PROGRAM ACTIVITIES:
- Small group practice

SPATIAL RELATIONSHIPS:
- Near practice room
- Close proximity to vocal and instrumental rooms
- Close proximity to vocal, instrument and orchestra storage rooms

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 60
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

ENSEMBLE ROOM
H-MU-9

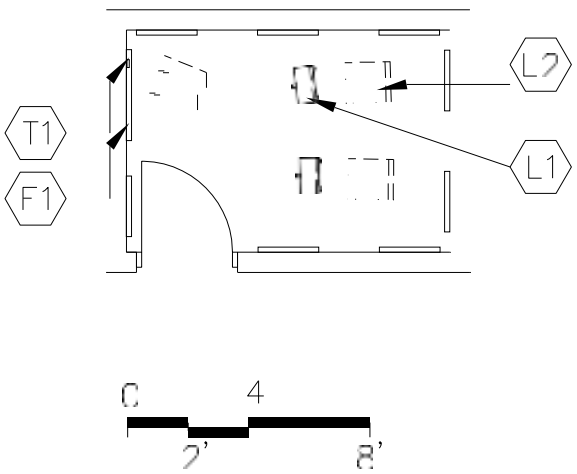
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile	096816
Option: Linoleum, rubber, ET, or sheet vinyl	096813 ***096516 096500***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical absorptive 25%, reflective 25%, diffusive 50%	095113
Walls:	
Painted concrete masonry units	042000/099100
Acoustical wall treatment (varies with geometry of room)	098000

LOOSE FURNISHINGS:
L1 Music stands
L2 Music chairs

FEATURES:	Spec. Ref.#
Fixed Items:	
F1 4'-6' of marker board (optional)	101100
F2 4' of tack board (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-***5***	
Single level switching	262726
3 duplex receptacles	262726
Communications:	
Clock	275313
Central sound system	275123
T1 1 data port	271513
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Provide 4' door	
Gasketing on doors or sound doors	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Individual and small group practice
- Private lessons

SPATIAL RELATIONSHIPS:
- Near ensemble room
- Close proximity to vocal and instrumental rooms
- Close proximity to vocal, instrument and orchestra storage rooms

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 60
  ceiling minimum CAC 35, NRC 0.70
- Access capability

CAPACITY:	1 - 2 students
SIZE:	80 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

PRACTICE ROOM
H-MU-10

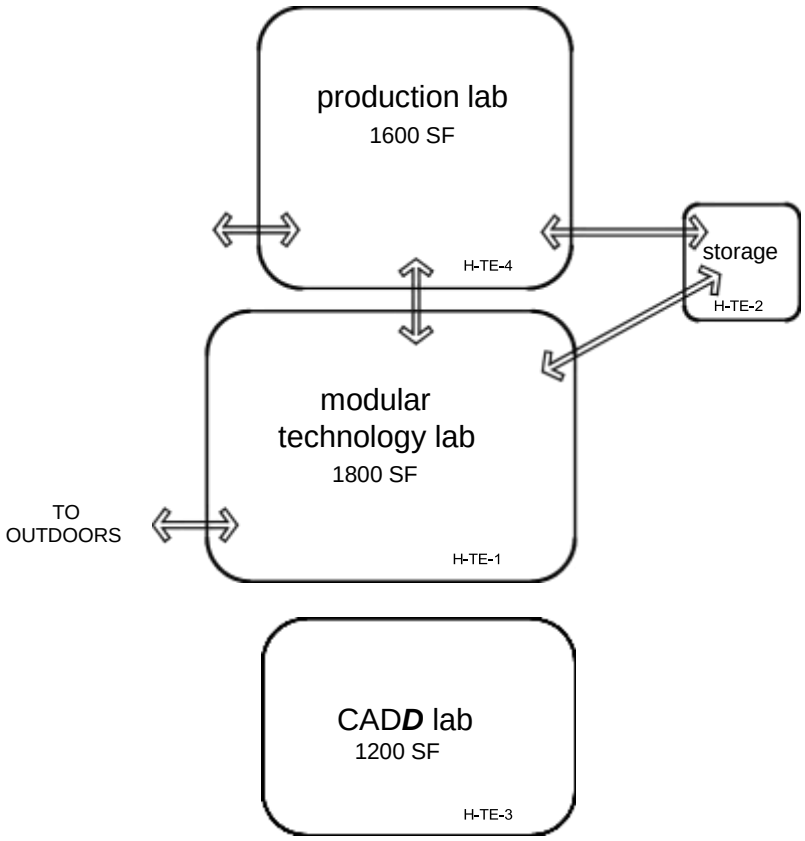
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile	096816
Option: Linoleum, rubber, ET or sheet vinyl	096813 ***096516*** ***096500***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical Absorptive 25%, reflective 25%, diffusive 50%	095113
Walls:	
Painted concrete masonry units	042000/099100
Acoustical wall treatment (varies with geometry of room)	098000

LOOSE FURNISHINGS:
L1 Music stands
L2 Music chairs

FEATURES	Spec. Ref.#
Fixed Items:	
F1 3' wide x 5' high mirror mounted 12" above finish floor (optional)	088300
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Fluorescent lighting: Illumination level: See Table 8600-***5***	265100
Single level switching	262726
2 duplex receptacles	262726
Communications:	
Central sound system	275123
T1 1 data port	271513
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Gasketing on doors or sound doors	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



NOTE:

This is an example of how the technology education spaces in a high school could be arranged. This is meant to demonstrate the relationships between various areas of the building.

Following are the Technology Education space plates:

H-TE-1	Modular Technology Lab
H-TE-1a	Ag-Ed Lab
H-TE-2	Storage
H-TE-3	CADD Lab
H-TE-4	Production Lab

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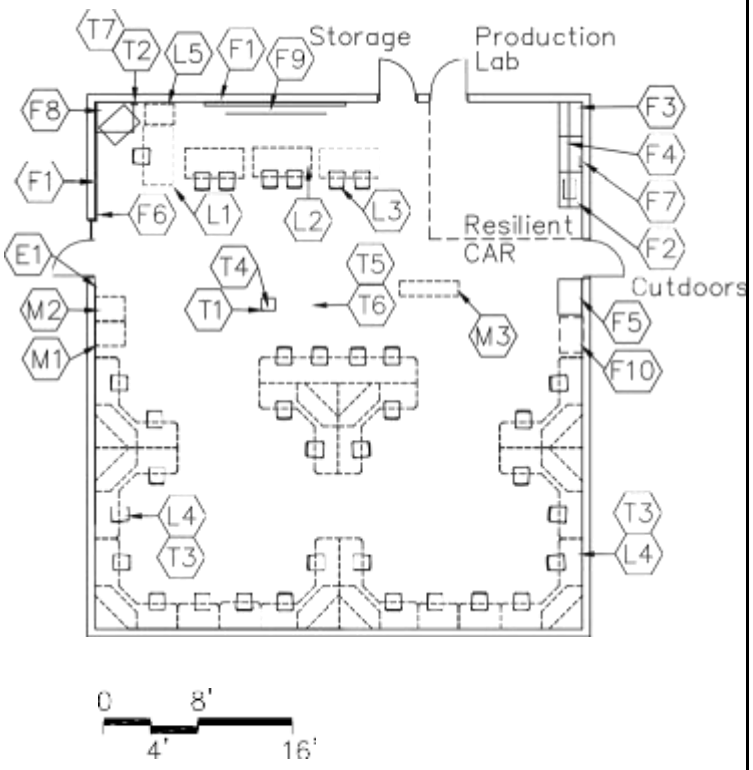


PROGRAM ACTIVITIES:

- Accommodate groups of 2 or 3 students working with separate computerized modules in various technical areas that could include robotics, electronics, thermodynamics, research and design, and desktop publishing.
- Integrate this curriculum with the science and math programs.
- Introduce students to problem solving activities.
- Variety of hands-on activities/experiments which could include automation, wind tunnels, flight technology, digital imaging, and meteorology.

SPATIAL RELATIONSHIPS:

- Grouped with other noise producing type activities
- Access to driveway and parking
- Direct access to outdoors
- Adjacent to production lab
- Adjacent to storage room

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Resilient floor covering

CAPACITY:	25 students
SIZE:	1,800 SF
ANCILLARY SPACES:	H-TE-4 Production Lab

NOTES:

1. Loose furnishings represent one of many possible arrangements.

MODULAR TECHNOLOGY LAB

H-TE-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber, ET, or sheet	096500
vinyl 4' width in front of cabinets	096516
Carpet, carpet tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:

L1 Teacher desk/computer support and chair
L2 Tables with heavy duty top
L3 Student stools/chairs
L4 Computer technology workstation
L5 File cabinet
Wastebasket

Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:

Pencil sharpener (optional)
The following items are to be funded by the school district:
M1 Classroom Area Network file server
M2 Printer
M3 Plotter

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 12'-26' combination marker board tack board, tackable wall surface	101100
F2 3' sink base cabinet	123550
F3 About 9' of wall cabinets	123550
F4 About 6' of base cabinet with heavy duty counter top	123550
F5 Tall cabinet (optional)	123550
F6 Pencil sharpener support (optional)	062000
F7 Towel dispenser	102813
F8 Tall wardrobe	123550
F9 Projection screen (optional)	115213
F10 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink, 12" deep	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature controls	230923
Electrical:	
Fluorescent lighting with ***computer aided*** lenses	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Receptacle for printer	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 Classroom area network (25 data ports minimum)	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T4 Ultra-short throw interactive projector	274119
T5 Wireless access point cable above ceiling	271513
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133.

requirements.

CAPACITY:	18 students
SIZE:	1,800 SF
ANCILLARY SPACES:	H-TE-2 Storage

PROGRAM ACTIVITIES:

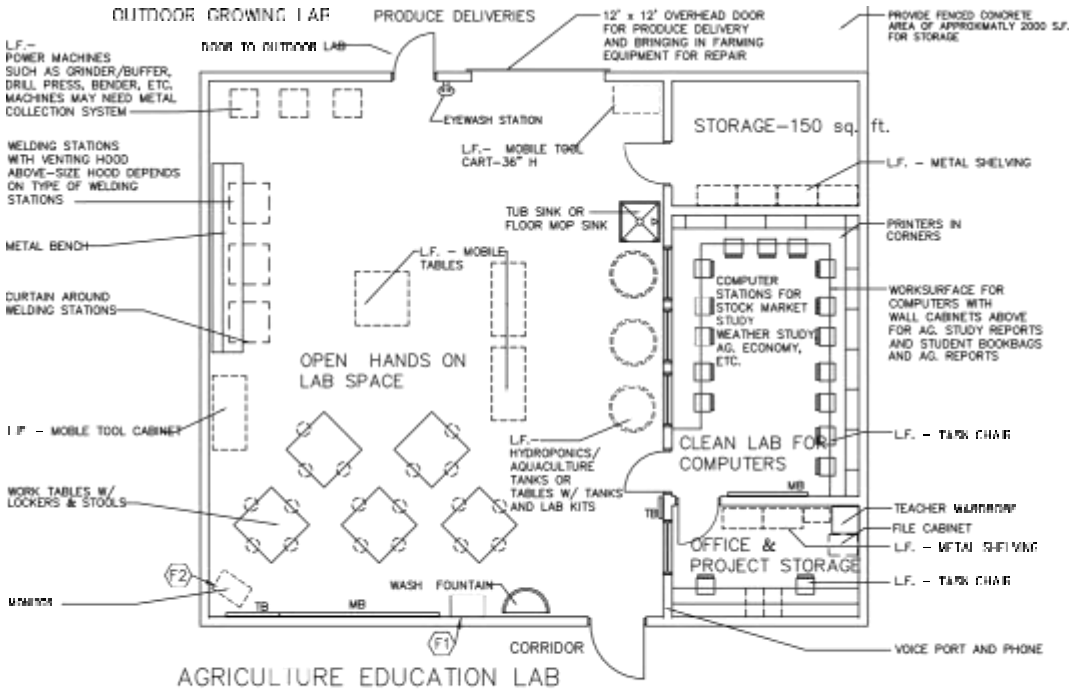
- Individual instruction in agriculture programs such as plant and animal science, soil management, natural resources and mechanical systems.
- Individual and group project work
- Equipment repair
- Small group meetings
- Lab activities related to curriculum

SPATIAL RELATIONSHIPS:

- Near technology education
- Near large group restrooms
- Access to driveway and parking
- Adjacent to classroom

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control-
  wall ***only*** minimum STC ***45***
  ceiling minimum CAC 35



AGRICULTURE EDUCATION LAB

Space includes clean lab for computers, office, and open lab
Storage is an additional programmed space of 150 sq. ft.
(NOTE: Programs vary greatly from district to district and will probably continue to change and develop as the ag. industry changes.

NOTES:

1. Loose furnishings represent one of many possible arrangements.
2. This is a multi-use space for agriculture education, wood shops, metal shops, or other industrial education laboratories.
3. This space can be selected in place of modular technology lab H-TE-1, but not in addition to H-TE-1.

AG-ED LAB
H-TE-1a

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete,	033000
linoleum, rubber, ET,	096500
polished concrete finishing, or	033510
colored concrete finishing	033519
Sheet vinyl in office/storage	096516
Base:	
Resilient base	096500
Ceiling:	
Painted exposed structure	099100
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:

Tables with heavy duty tops
Waste receptacle
Task chairs
Metal shelving
Teacher wardrobe
File cabinet
Mobile tool cabinet

Electronic Safety and Security:

Life safety devices per code 283111

Miscellaneous:

Plan for shop equipment as necessary
Overhead door
Pencil sharpener (optional)

Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
16'-20' combination marker board, tack board, and tackable wall surface	101100
Pencil sharpener support (optional)	062000
14' Wall and base cabinets	123550
Workbenches with locker bases	
40' Work surface with heavy duty countertop 36" high, with knee space	123550
2 towel dispensers	123550
F1 Tall storage cabinet	123550
F2 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wash fountain	224000
Plumbing connections	224000/221116/221119
Tub sink or floor mop sink	224000
Emergency eyewash station connection	224000
Sanitary drainage products	221316
HVAC:	
Supply/return air system	Div. 23
Independent temperature controls	230923
Localized welding station venting hood	233515
Electrical:	
High intensity discharge lighting	265100
Illumination level: See Table 8600-5	
16 duplex receptacles (42" height)	262726
Double duplex receptacle adjacent to data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Electrical power for shop equipment	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127

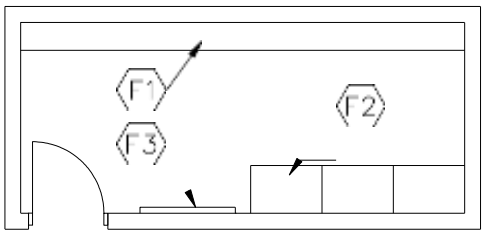
Wireless access point (WAP) as determined by Design – refer to Note 2 272133

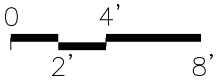
Classroom technology center video port 271543, 274116, 274119, 275127

NOTES:

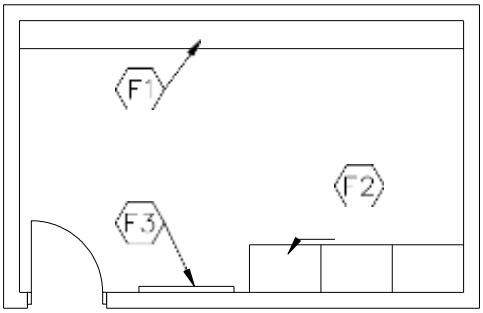
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***

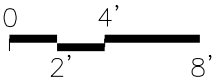
150 SF





200 SF





CAPACITY: N/A
SIZE: 150 – ***250 SF***

PROGRAM ACTIVITIES:

- This space will house equipment, instructional aids and materials use in the technology education activities.

SPATIAL RELATIONSHIPS:

- Adjacent with direct access to the modular technology lab and production lab
- Access to service drive

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

STORAGE
H-TE-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 10'-18' of open shelving depth may vary (fixed or loose)	123550
Option: mobile storage shelving	105626
F2 4'-8' of tall storage cabinets	123550
F3 4' of pegboard (optional)	102813
Fire Suppression:	
Fire suppression system	211000

Plumbing:
N/A

HVAC:
To be determined by Design Professional

Electrical:

Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726

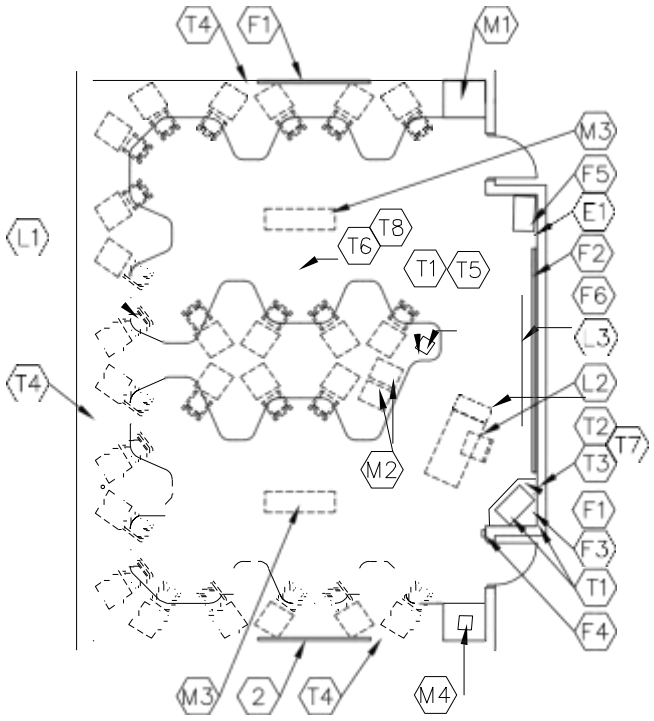
Communications:
N/A

Electronic Safety and Security:
N/A

Miscellaneous:
N/A

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:

- Group instruction on computer drafting and design
- Exploration of design concepts, technical drawing, CADD, geometric dimensioning, and facilities design

SPATIAL RELATIONSHIPS:

- Near modular technology lab

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Flexibility of space

CAPACITY:	25 students
SIZE:	1,200 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

CADD LAB
H-TE-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, ET, linoleum, or sheet vinyl	096816 096500 096516 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Computer workstation furniture
L2 Teacher desk and chair
L3 File cabinet
Wastebasket

L1 could be fixed casework.

Electronic Safety and Security:
Life safety devices per code 283111

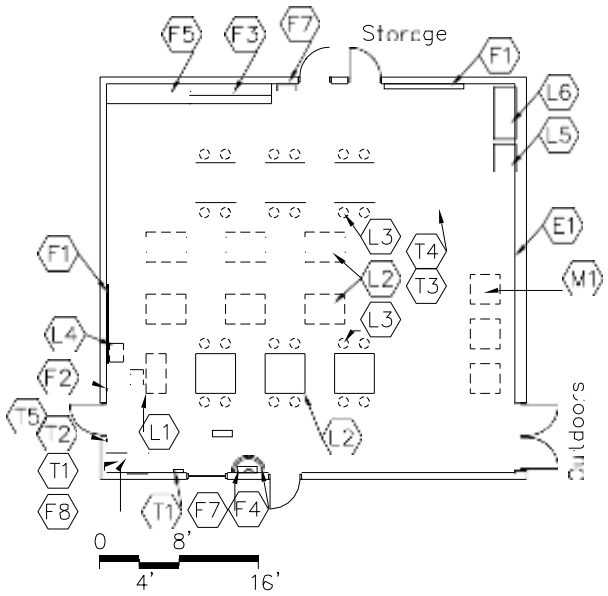
Miscellaneous:
Interior windows to production lab (optional)
Pencil sharpener (optional)

E1 Duplex receptacle with dedicated circuit for wireless devices

The following items are to be funded by the school district:
M1 Classroom area network file server
M2 Printers
M3 Plotters
M4 Scanner

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123550
F2 16-32' combination marker board, tack board, tackable wall surface	101100
F3 Technology support casework	123550
F4 Pencil sharpener support (optional)	062000
F5 4'-8' base and wall cabinets for printers and storage of paper, cartridges, etc.	123550
F6 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing: N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting with ***computer aided*** lenses	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacles adjacent to each data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Receptacle for printer/plotter	262726
Communications:	
T1 2 projector video ports	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Classroom area network (25 data ports minimum)	271513
Clock	275313
Central sound system	275123
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127
T8 Wireless access point cable above ceiling	271513

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:

- Provides space for instruction in developing skills in use of tools, materials and processes to apply knowledge of planning and design to actual fabrication of projects.

SPATIAL RELATIONSHIPS:

- Grouped with other noise producing type activities
- Access to driveway and parking
- Direct access to outdoors
- Adjacent to modular technology lab
- Adjacent to storage room

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	25 students
SIZE:	1,600 SF
ANCILLARY SPACES:	Storage, H-TE-2
	Modular Technology Lab, H-TE-1

NOTES:

1. Loose furnishings represent one of many possible arrangements.
2. This is a multi-use space for vocational agriculture, wood shops, metal shops, or other industrial education laboratories.

PRODUCTION LAB
H-TE-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete,	033000
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Painted exposed structure	099100
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Teacher desk**/**computer support and chair
L2 Tables with heavy duty tops & lockers below
L3 Stools
L4 File cabinet
L5 Mobile tool cabinet
L6 Material storage racks
Waste receptacle

Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
Pencil sharpener (optional)
M1 Shop equipment with localized dust collection as necessary.

E1 Duplex receptacle with dedicated circuit for wireless devices

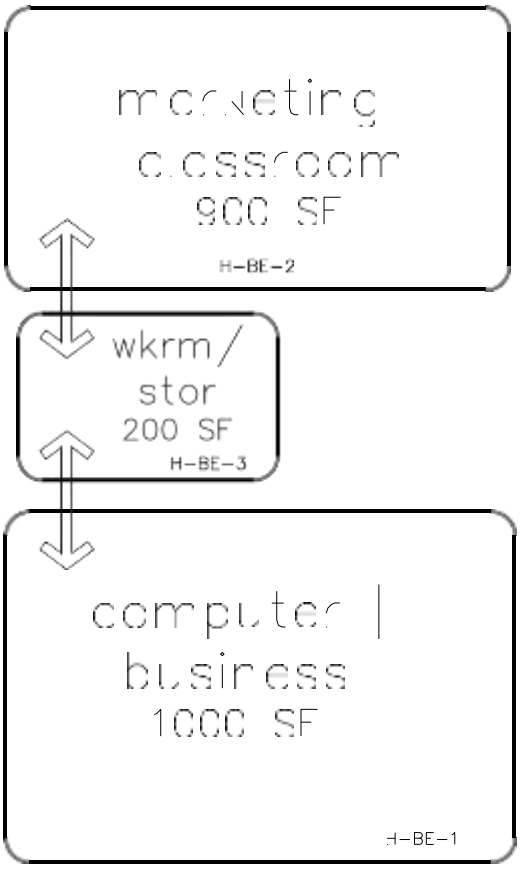
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 14'-24' combination marker board, tack board, tackable wall surface	101100
F2 Pencil sharpener support (optional)	062000
F3 12'of wall and 12'of base cabinets	123550
F4 Wash fountains	
F5 6'-12' of work surface with heavy duty countertop 36" high, with knee space	123550
F6 Reserved	
F7 2 towel dispensers	102813
F8 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wash fountain	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature controls	230923
Localized dust collection as necessary	Div. 23
Electrical:	
High intensity discharge lighting	265100
Illumination level: See Table 8600-5	
8 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Electrical power for shop equipment	262726
Communications:	
T1 1 ***projector*** video port and video display Device	271543/274119
T2 1 voice port and phone	271513/273123
T3 ***Wireless access point cable above ceiling***	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T4 Wireless access point (WAP) as determined by Design – refer to Note 3	***272133***
T5 Classroom technology center video port	***271543, 274116, 274119,275127***

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.

3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.



NOTE:

This is an example of how the business education spaces in a high school could be arranged. This is meant only to demonstrate the relationships between various areas of the building.

Following are the Business Education space plates:

H-BE-1 Computer and Business Classroom
H-BE-2 Marketing Classroom
H-BE-3 Workroom/Storage

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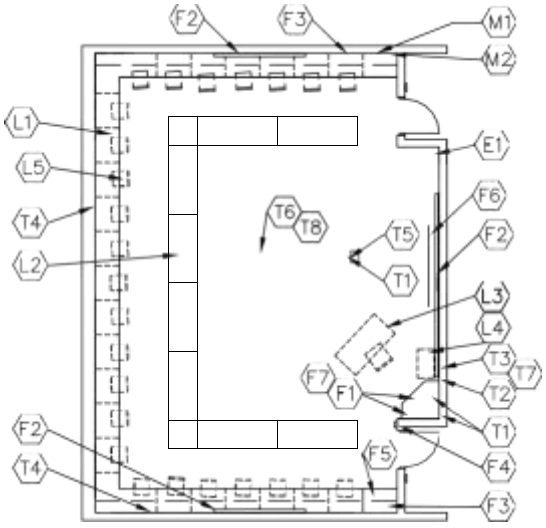
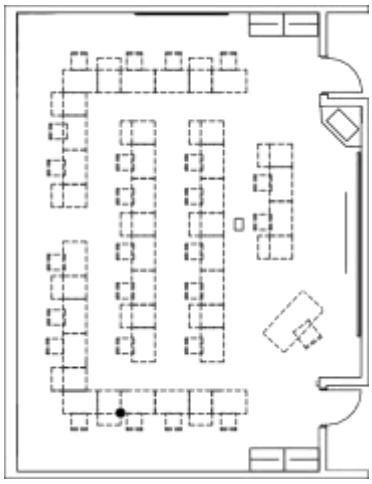
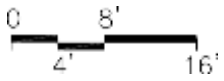


PERIMETER WORKSTATIONS LAYOUT



FREE STANDING WORKSTATIONS LAYOUT



CAPACITY: 25 students
SIZE: 1000 SF

PROGRAM ACTIVITIES:
- Instruction in business and computer curricula
- Group instruction
- Multimedia presentation
- Group discussion
- Cooperative learning

SPATIAL RELATIONSHIPS:
- ☐ Close proximity to marketing classroom
- ☐ Proximity to large group restrooms
- ☐ Adjacent to workroom/storage

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

COMPUTER AND BUSINESS CLASSROOM
H-BE-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile,	096816
Optional: ET, sheet vinyl,	096500
linoleum, or rubber	096813 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Computer workstation furniture
L2 Work tables
L3 Teacher desk/computer support and chair
L4 File cabinet
L5 Appropriate ergonomic chairs
Wastebasket

L1 could be fixed casework.

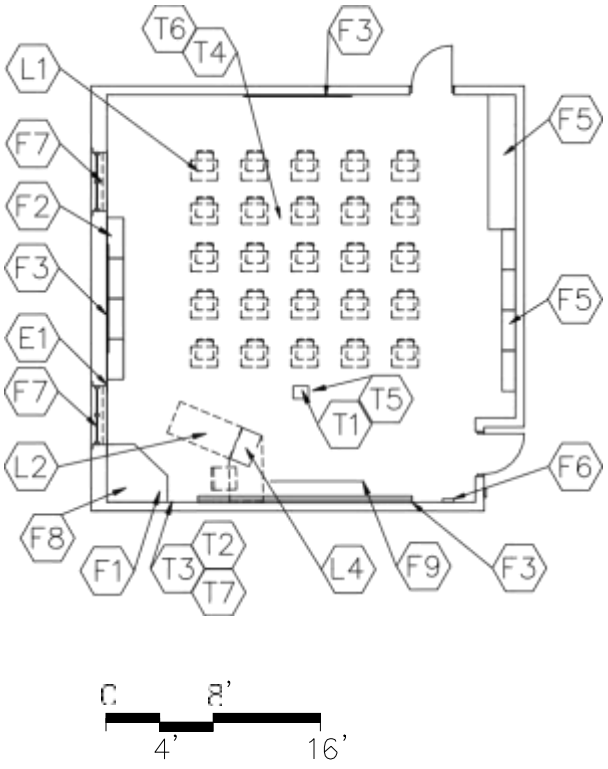
Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
Pencil sharpener (optional)
The following items are to be funded by the school district:
M1 Classroom Area Network file server (optional)
M2 Printer

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123550
F2 16'-32' combination marker board, tack board, tackable wall surface	101100
F3 Wall cabinets for student book storage and program manuals	123550 F4
Pencil sharpener support (optional)	062000 F5
Base cabinets	123550
F6 Projection screen (optional)	115213
F7 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing: N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting with ***computer aided*** lenses	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Communications:	
T1 2 projector video ports	271543
T2 1 voice port and phone	271513/273123 T3
1 data port near teacher workstation	271513 T4
Classroom area network (25 data ports minimum)	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 2	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127
T8 Wireless access point cable above ceiling	271513

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:
- Instruction in marketing curriculum
- Group discussion
- Simulations
- Cooperative learning
- Multimedia presentations

SPATIAL RELATIONSHIPS:
- Close proximity to computer and business classrooms
- Adjacent to workroom/storage

ENVIRONMENTAL CONSIDERATIONS:
- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	25 students
SIZE:	900 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

MARKETING CLASSROOM

H-BE-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile	096816
Optional: ET, sheet vinyl,	096500
linoleum, or rubber	096516
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:

L1 Student desks and chairs
L2 Teacher desk/computer support and chair
L3 Reserved
L4 Desk height file cabinet
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

E1 Duplex receptacle with dedicated circuit for wireless devices

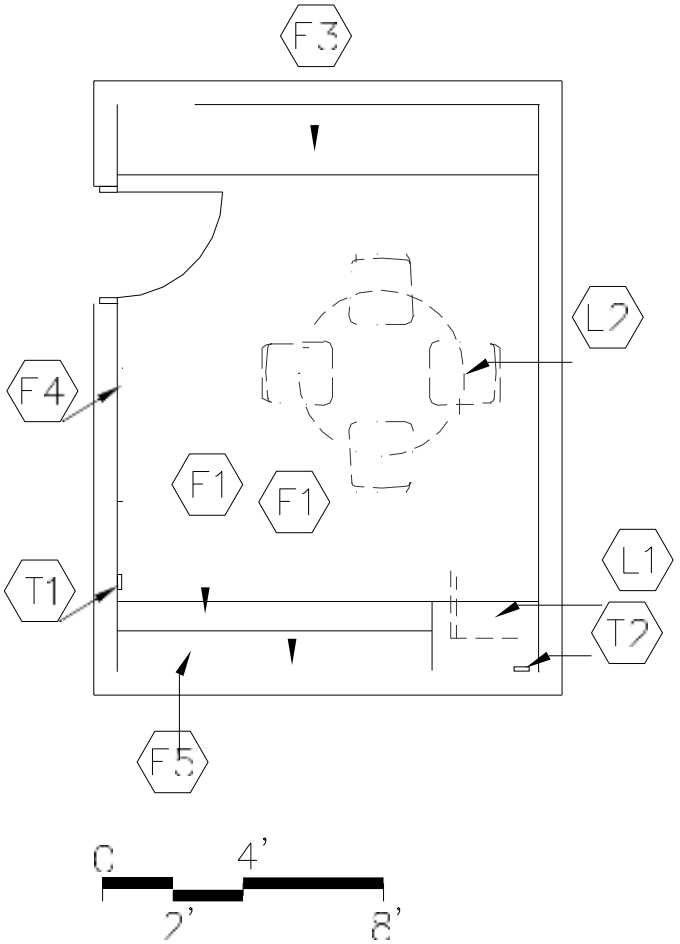
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123550
F2 6'-10' of bookcases	123550
F3 18'-32' combination marker board, tack board, tackable wall surface	101100
F4 Reserved	
F5 12'-20' combination base and wall cabinets	123550
F6 Pencil sharpener support (optional)	062000
F7 Windows with integral blinds	085113
F8 Technology support casework	123550
F9 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513 T4
Wireless access point cable above	
Ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.

3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

200 SF



PROGRAM ACTIVITIES:

- Preparation and storage of instructional materials and equipment

SPATIAL RELATIONSHIPS:

- Adjacent to business and marketing classrooms

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: 2 - 4 teachers
SIZE: 100 - 400 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

WORKROOM/STORAGE

H-BE-3

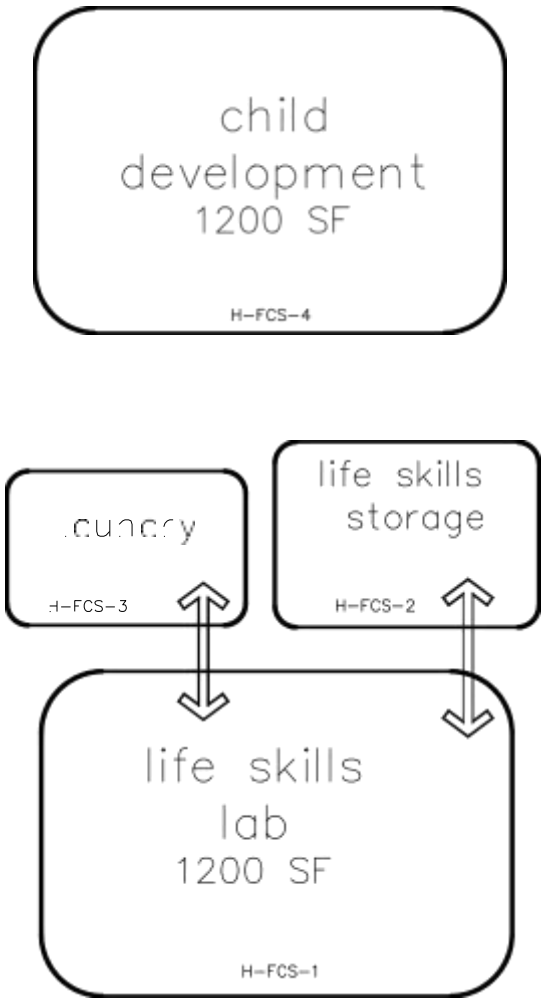
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, ET, linoleum,	096816
Or sheet vinyl	096500
	096516
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Computer workstation furniture
L2 Tables and chairs
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 ***12'-18' combination base and wall cabinets***	123550
F2 ***Reserved***	
F3 12'-24' of tall storage cabinets or bookshelves	123550
F4 4' of tack board or ***marker board*****,** tackable wall surface	101100
F5 Work surface (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
2 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Duplex receptacle for office-type equipment	262726
Communications:	
T1 1 voice port and phone	271513/***273123***
T2 1 data port	271513
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



NOTE:

This is an example of how the family and consumer science spaces in a high school could be arranged. This is meant only to demonstrate the relationships between various areas of the building.

Following are the Family and Consumer Science space plates:

H-FCS-1 Life Skills Lab
H-FCS-2 Life Skills Storage
H-FCS-3 Laundry
H-FCS-4 Child Development

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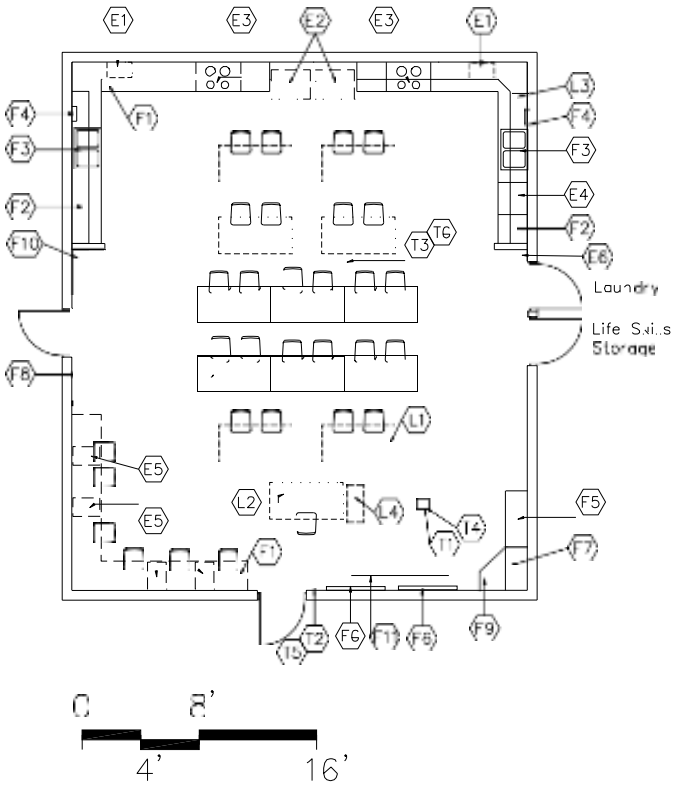


PROGRAM ACTIVITIES:

- Houses the facilities for the home economics programs, family living program, and consumer science programs
- Activities will include hands-on activities, demonstrations, and lectures which will be delivered in individual, small group, and total group methods.

SPATIAL RELATIONSHIPS:

- Grouped with other support service programs
- Adjacent to storage
- Adjacent to laundry

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Resilient floor covering

CAPACITY:	24 students
SIZE:	1,200 SF
ANCILLARY SPACES:	Life Skills Storage H-FCS-2 Laundry, H-FCS-3

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

LIFE SKILLS LAB

H-FCS-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096500
ET, sheet vinyl, or rubber	096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	
099100	

LOOSE FURNISHINGS:

L1 Tables and chairs
L2 Teacher desk/computer support and chair
L3 Reserved
L4 File cabinet
Wastebaskets

EQUIPMENT:

E1 Microwaves
E2 Refrigerators
E3 Range and oven
E4 Dishwasher
E5 Sewing machines

Electronic Safety and Security:

Life safety devices per code 283111

Miscellaneous:

Pencil sharpener (optional)

E6 Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):

T5 Classroom technology center video port 271543, 274116, 274119, 275127
T6 Wireless access point (WAP) as determined by Design – refer to Note 3 272133

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Base cabinets	123550
F2 Wall cabinets	123550
F3 Double bowl sink base cabinet	123550
F4 2 towel dispensers	102813
F5 4'-8' of bookcases (optional)	123550
F6 16'-32' combination marker board, tack board, tackable wall surface	101100
F7 Technology support casework	123550
F8 Pencil sharpener support (optional)	062000 F9
Tall wardrobe with file drawers	123550
F10 3'-9' of tall storage cabinets (could have trays)	123550
F11 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Double sinks	224000
Plumbing connections	224000/221116/22119
Garbage disposals (optional)	
HVAC:	
Supply/return air system	Div. 23
Manually operated exhaust air system	Div. 23
Independent temperature controls	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Receptacles for refrigerators, microwaves, ranges, dishwashers, and sewing machines	262726
Means of egress lighting per code	265100
Emergency lighting per code	265100
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 Wireless access point cable above ceiling	271513
Central sound system	275123
Clock	275313
Sound reinforcement system	275127
T4 Ultra-short throw interactive projector	274119

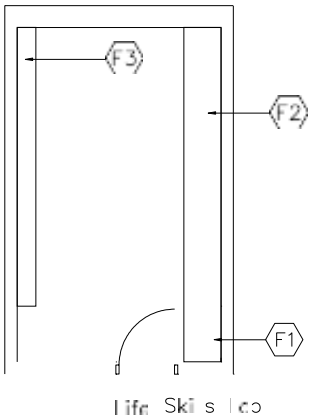
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the

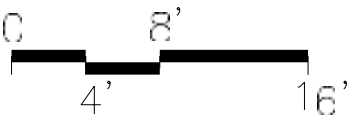
other casework in the room.

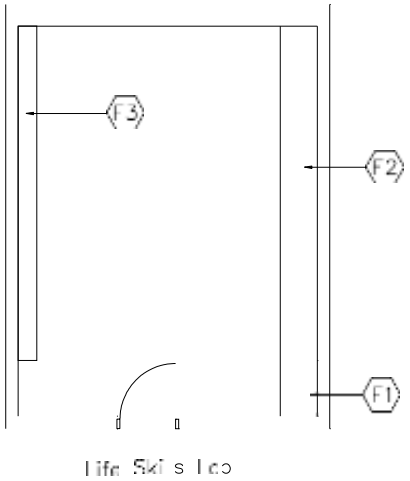
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

200 SF



350 SF





CAPACITY:	N/A
SIZE:	200 - 400 SF
ANCILLARY SPACES:	H-FCS-1 Life Skills Lab

PROGRAM ACTIVITIES:

- Storage of materials, supplies, and equipment used in the delivery of the family and consumer science program.

SPATIAL RELATIONSHIPS:

- Adjacent to life skills lab

ENVIRONMENTAL CONSIDERATIONS:

- Resilient floor covering

NOTES:

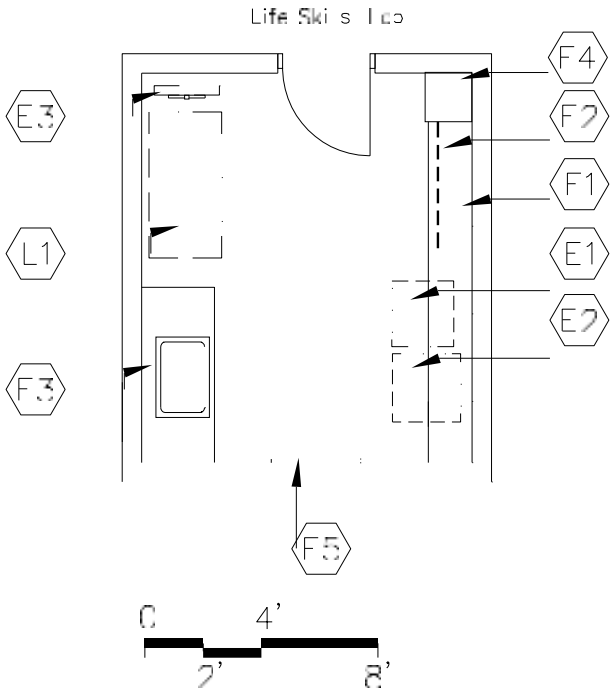
LIFE SKILLS STORAGE
H-FCS-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber***, ET, or sheet vinyl***	096500 ***096516***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Supply cart	

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 3' of tall wardrobe (optional)	123550
F2 10'–18' of tall cabinets or wall & base cabinets	123550
F3 10'–18' of open cabinets	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



PROGRAM ACTIVITIES:
- Laundry to be used by the family and consumer science department

SPATIAL RELATIONSHIPS:
- Adjacent to life skills lab

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control –
  wall minimum STC 45
  ceiling minimum CAC 35

CAPACITY:	N/A
SIZE:	150 SF
ANCILLARY SPACES:	Life Skills lab H-FCS-1

NOTES:

LAUNDRY
H-FCS-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096516
ET, or sheet vinyl	096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

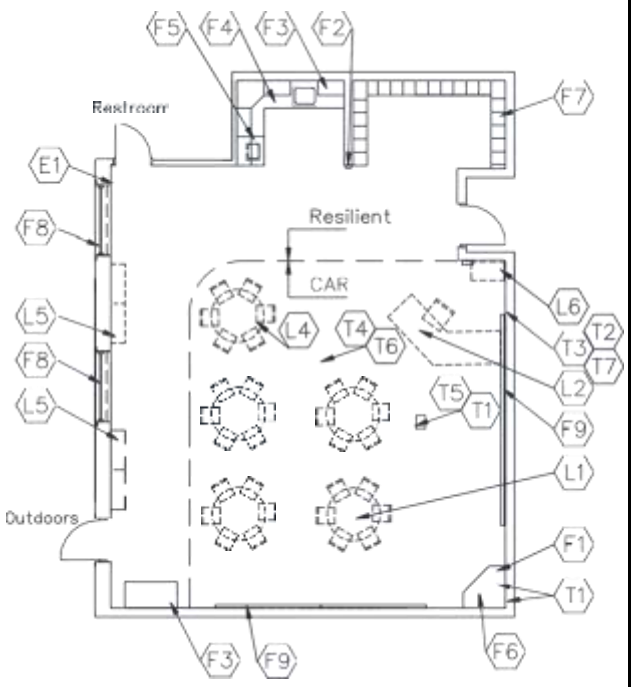
LOOSE FURNISHINGS:
L1 Folding table
Wastebasket

EQUIPMENT:
E1 Washer
E2 Electric dryer
E3 Ironing board

FEATURES:	Spec. Ref.#
Fixed Items[1]:	
F1 14' of wall cabinets	123550
F2 6' hanging bar/drying rack (optional)	123550 F3
6' sink base cabinet	123550
F4 3' tall cabinet (optional)	123550
F5 5' high mirror (optional)	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink, 12" deep	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supplemental heat as required	Div. 23
Exhaust air system	Div. 23
Exhaust for dryer	Div. 23
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-***5***	
Single level switching	262726
2 duplex receptacles	262726
Receptacle for electric dryer and washer	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



CAPACITY: 25 students
SIZE: 1,200 SF
ANCILLARY SPACES:
Individual Restroom, H-AC-7

PROGRAM ACTIVITIES:
- Training for early childhood careers
- Training for parenting
- Preschool and toddler care

SPATIAL RELATIONSHIPS:
- Classrooms should have direct access to outdoors
- Near vehicle drop-off/pick-up area
- Adjacent to individual restroom

ENVIRONMENTAL CONSIDERATIONS:
- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  walls only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Resilient- and stain-resistant floor covering

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

CHILD DEVELOPMENT
H-FCS-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Combination of carpet and carpet tile, linoleum, ET, sheet vinyl, or rubber	096816 096500 096516 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint 099100	

LOOSE FURNISHINGS:

L1 Student desks and chairs
L2 Teacher desk/computer support and chair
L3 Reserved
L4 Tables and chairs for preschool children
L5 Low mobile storage units
L6 File cabinet
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

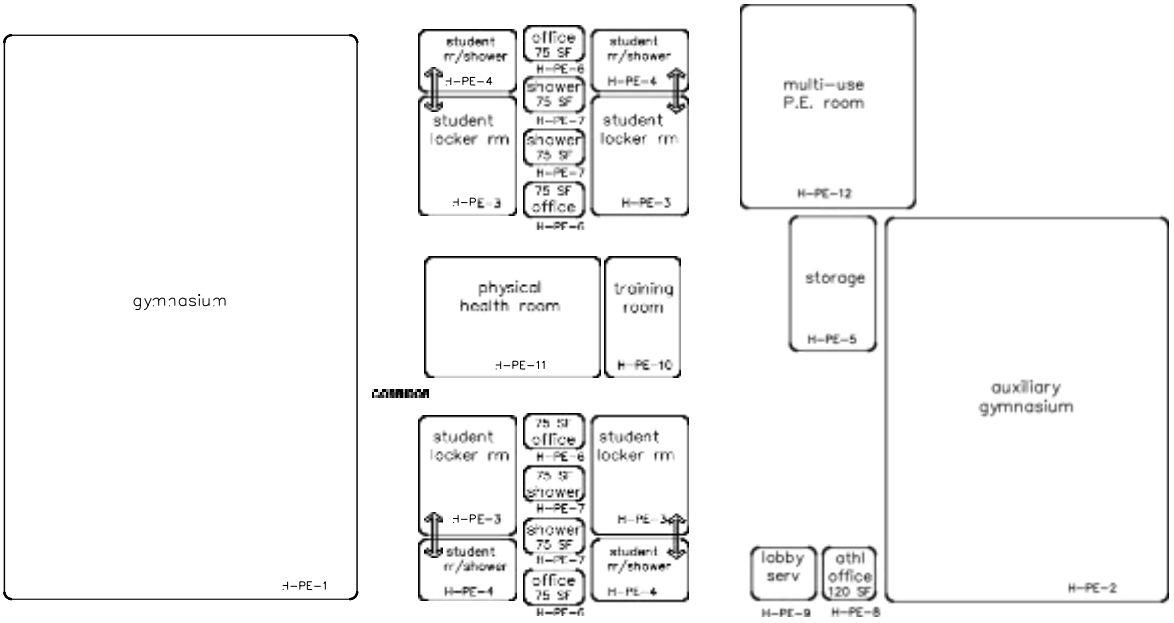
E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123550
F2 Pencil sharpener support (optional)	062000
F3 16'-20' combination wall and tall cabinets	123550
F4 3' of sink base cabinet, 36" high	123550
F5 3' of sink base cabinet, (ADA compliant)	123550
F6 Technology support casework	123550
F7 Open casework - coats	123550
F8 Windows with integral blinds	085113
F9 16'-32' of marker board, tack board, or tackable wall surface	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
2 sinks (1 with drinking fountain)	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Means of egress lighting per code	265100
Emergency lighting per code	265100
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the

other casework in the room.

3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



NOTES:

This is an example of how the physical education spaces in a high school could be arranged. This is meant only to demonstrate the relationships between various areas of the building.

Following are the Physical Education space plates:

- H-PE-1 Gymnasium
- H-PE-2 Auxiliary Gymnasium
- H-PE-3 Student Locker Room
- H-PE-4 Student Restroom/Shower
- H-PE-5 Physical Education Storage
- H-PE-6 P.E./Athletic Office
- H-PE-7 Staff Shower
- H-PE-8 Athletic Director's Office
- H-PE-9 Lobby Services
- H-PE-10 Training Room
- H-PE-11 Physical Health Classroom
- H-PE-12 Multi-use P.E. Room

GYMNASIUM SIZE

When designing spaces for physical education activities, it is important to consider the type of activities, the number of participants, equipment needed, and space allocation for each space. Consideration should also be given as to the size of the activity area and safety borders (run-outs). Adequate co-funded space for these design considerations, and others, should be provided in the square footage allowed for the gymnasium.

The table on page 6110-3 illustrates the maximum gymnasium size for each of the student enrollment examples found in the Program of Requirements (POR). For example, a school with 1,200 students would have approximately 102 staff members indicating a total number of persons in the facility of 1,302. The maximum size of the gymnasium would be 12,400 sf. That value, 12,400 sf., would be inserted into the POR for the gym size.

Additional student enrollment examples (600-700, 900-1,100, 1,300-1,500, 1,700-2,300) have been added to assist in planning and design of various sized gymnasiums. These examples are bolded.

SEATING

Regarding seating/bleachers, in high schools, space for seating in the gym is provided for the entire student enrollment and staff. The approximate number of seats to be included is shown in the table below.

Additional student enrollment examples (600-700, 900-1,100, 1,300-1,500, 1,700-2,300) have been added to assist in planning and design of various seat layouts. These examples are bolded in the table below.

FINAL LAYOUT

The actual Gym and seating layout will be determined during the design process.

High School Gymnasium Design Guidelines

STN ENRL	Staff	Total Occup	Gym SF	Court Size	Approx. # Seats
450	41	491	**9,300**	50 x 84	517
600	**51**	**651**	**9,800**	**50 x 84**	**645**
700	**60**	**760**	**10,200**	**50 x 84**	**748**
800	69	869	**10,700**	50 x 84	876
900	**77**	**977**	**11,100**	**50 x 84**	**978**
1,000	**85**	**1,085**	**11,500**	**50 x 84**	**1,080**
1,100	**94**	**1,194**	**11,900**	**50 x 84**	**1,183**
1,200	102	1,302	**12,400**	50 x 84	1,311
1,300	**108**	**1,408**	**12,800**	**50 x 84**	**1,413**
1,400	**116**	**1,516**	**13,200**	**50 x 84**	**1,516**
1,500	**125**	**1,625**	**13,600**	**50 x 84**	**1,618**
1,600	133	1,733	**14,000**	50 x 84	1,721
1,700	**139**	**1,839**	**14,500**	**50 x 84**	**1,849**
1,800	**148**	**1,948**	**14,900**	**50 x 84**	**1,951**
1,900	**156**	**2,056**	**15,300**	**50 x 84**	**2,053**
2,000	**164**	**2,164**	**15,700**	**50 x 84**	**2,156**
2,100	**172**	**2,272**	**16,100**	**50 x 84**	**2,258**
2,200	**180**	**2,380**	**16,600**	**50 x 84**	**2,386**
2,300	**189**	**2,489**	**17,000**	**50 x 84**	**2,489**
2,400	197	2,597	**17,400**	50 x 84	2,591

Note: Aux. Gym bleachers are a district expense. 2011

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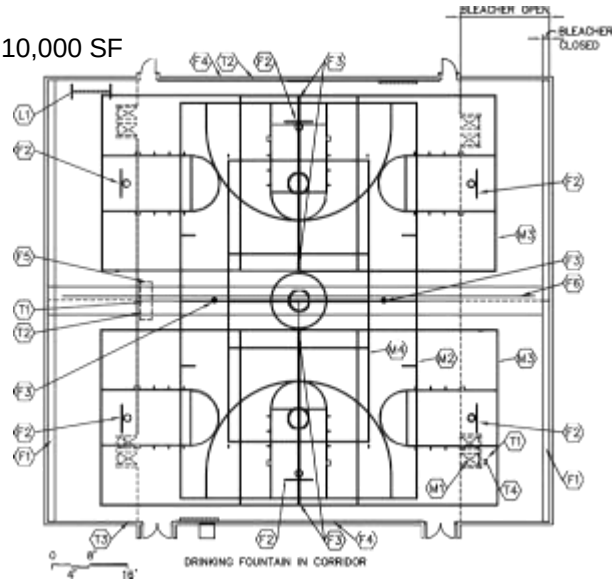
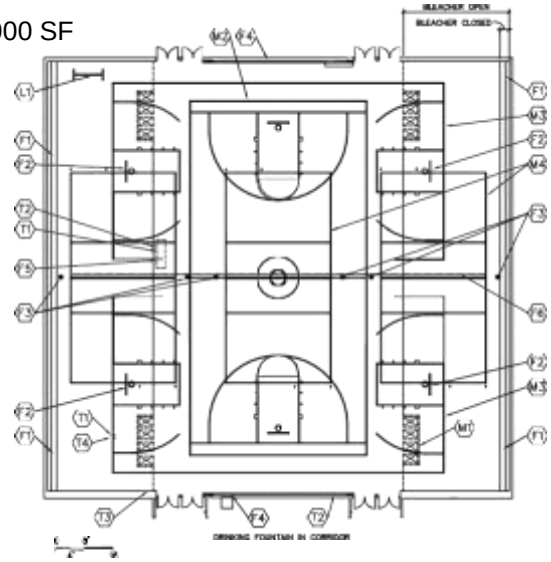
10,000 SF



Please see page 6110-***7*** for an enlargement of this drawing.

16,000 SF



Please see page 6110-8 for an enlargement of this drawing.

CAPACITY: 60 – 75 Students
SIZE: 9,300 – 17,400 SF
ANCILLARY SPACES:
Physical Education Storage
H-PE-5

PROGRAM ACTIVITIES:
- Physical education classes and interscholastic athletic competition
- Student assemblies
- Community use

SPATIAL RELATIONSHIPS:
- Near locker rooms
- Adjacent to outdoors
- Near student dining

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control - walls minimum STC 60
- Acoustical requirements and other factors as determined by final configuration of the space
- Clear, ***fixed*** height of ***23'*** from floor to nearest obstruction

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

GYMNASIUM
H-PE-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Wood	096466
Base:	
Ventilated resilient base	096466
Ceiling:	
Painted exposed structure	099100
Walls:	
Painted	099100
Sound absorption concrete masonry units on 2 walls or	042000
abuse-resistant acoustical wall treatment	098000

LOOSE FURNISHINGS:
L1 Portable ***markerboard***

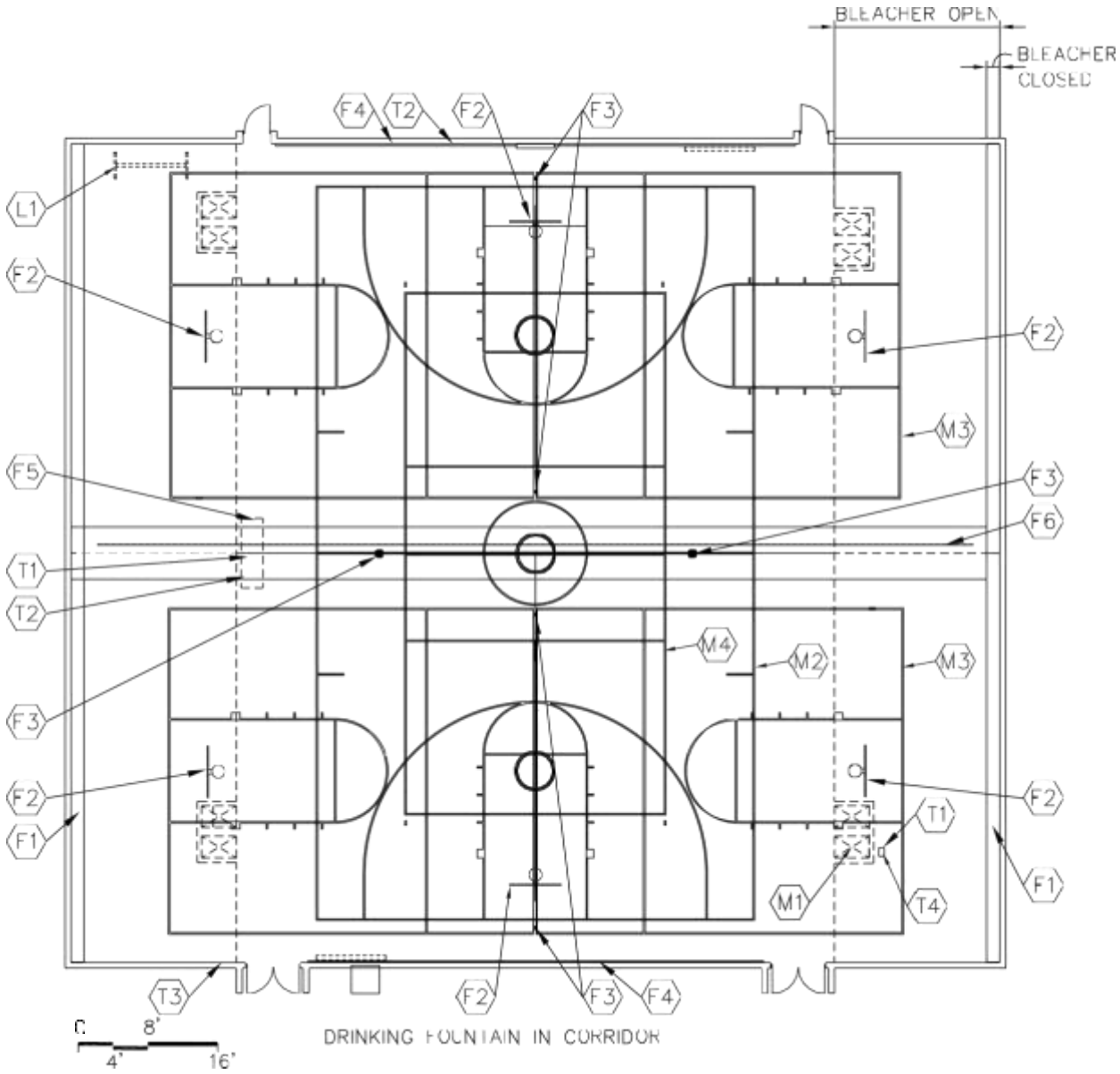
Miscellaneous:
M1 Bleacher seating (ADA accessible)
Court markings (***optional***)
M2 84' x 50' basketball court
M3 (2) cross-court basketball courts
M4 30'x60' volleyball court
M5 36' x 78' tennis courts
Provide wire guards on light fixtures and wall-mounted electrical devices

FEATURES:	Spec. Ref.#
Fixed Items:	
F1 Telescoping stands	126600
F2 6 basketball backstops, glass	116623
F3 Volleyball sleeves and standards on a cart	116623
F4 Safety wall wainscot	116623
F5 Scorer's table	126600
F6 Divider gym curtain	116623
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Drinking fountain directly outside the entrance	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
Multi-level switching	262726
8 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Electrical connections to P.E. equipment where necessary	262726
Scoreboard	116643
Telecommunications Grounding	270526/260526
Communications:	
T1 2 ***projector*** video ports,1 monitor w/cart	271543/274119
T2 2 data ports	271513
T3 1 voice port	271513/273113
Clocks with wire guards	275313
Central sound system	275123
Gymnasium sound system	275124
T4 Overhead projector	274119
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:

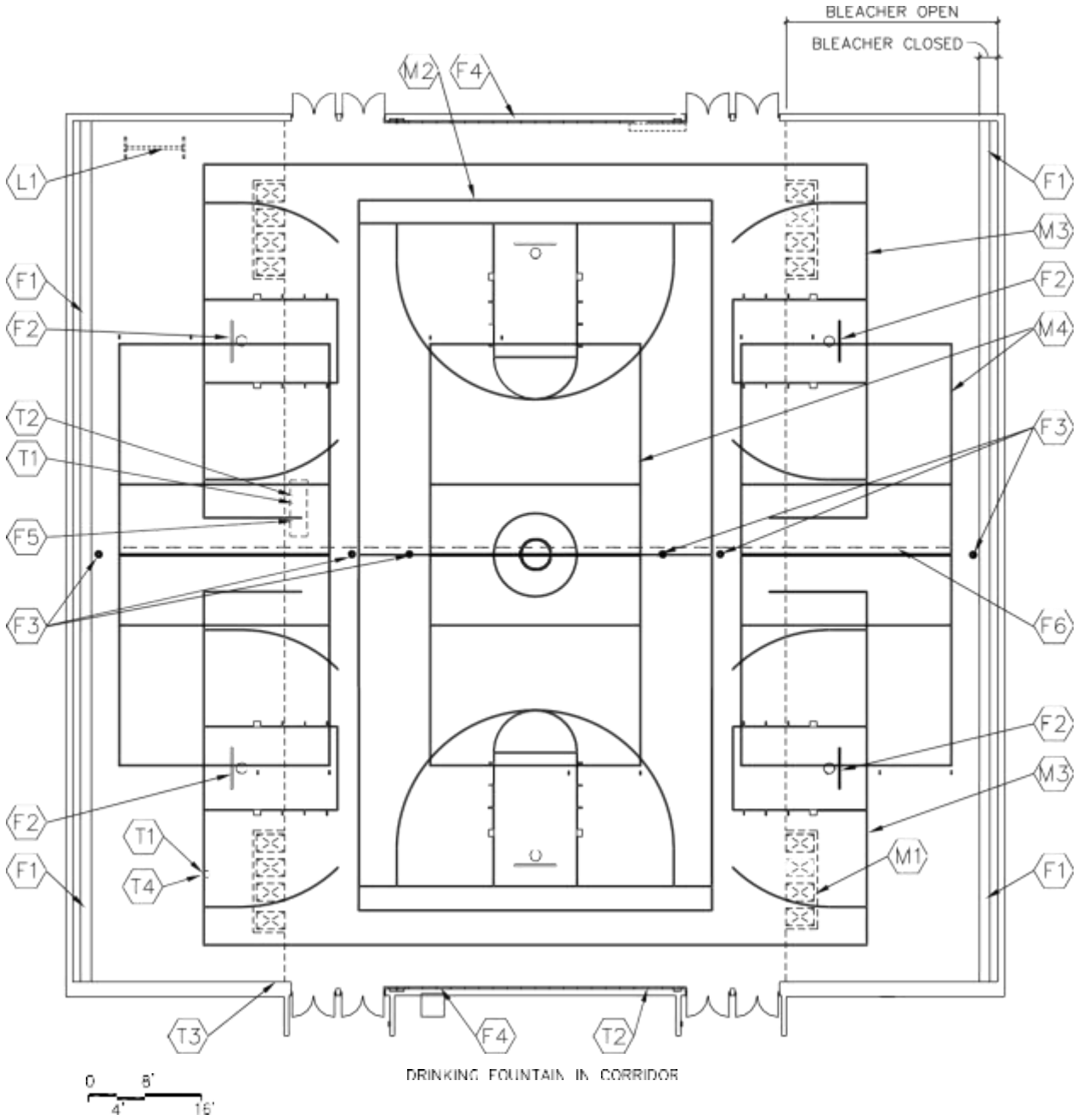
1. Finishes/Features: Refer to Chapter 9 for specification references.

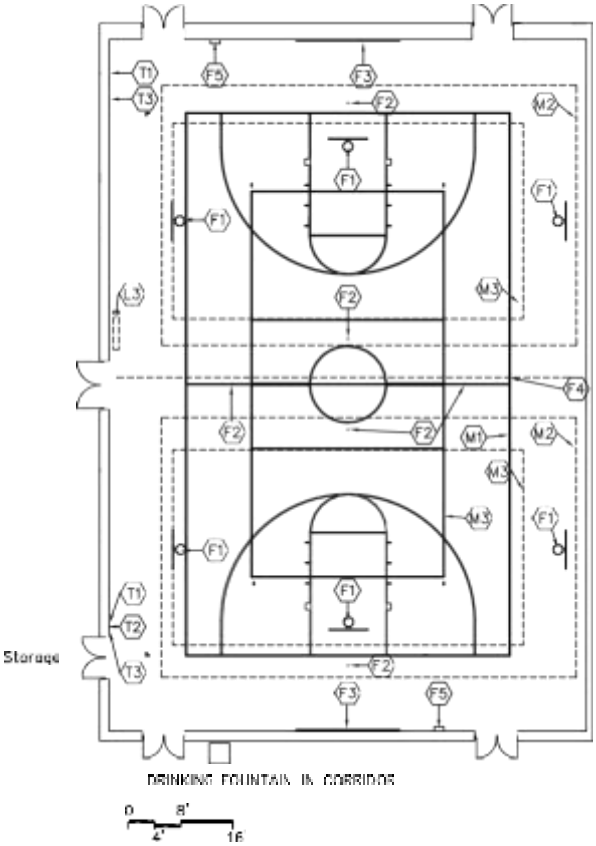
10,000 SF


BLEACHER OPEN
BLEACHER CLOSED
F4
T2
F2
F3
L1
F2
F2
M3
F5
F3
F6
T1
T2
M4
M2
M3
F3
F2
F2
T1
F1
F1
M1
T4
T3
F2
F3
F4
0
8'
4'
16'
DRINKING FOUNTAIN IN CORRIDOR

GYMNASIUM
H-PE-1

16,000 SF





Please see page 6110-11 for an enlargement of this diagram.

CAPACITY: 25 - 60 students
SIZE: 7,000 SF
ANCILLARY SPACES:

PROGRAM ACTIVITIES:
- Physical education classes, interscholastic athletic competition and practice during non-school hours
- Community use

SPATIAL RELATIONSHIPS:
- Near P.E./athletic offices
- Convenient access to outside
- Near student locker rooms

ENVIRONMENTAL CONSIDERATIONS:
- Adequate sound control/acoustics
- Clear height of ***23'*** from floor to nearest obstruction
- Environmental sound control - wall minimum STC 60

NOTES:

1. Loose furnishings shown represent two of many possible arrangements.

AUXILIARY GYMNASIUM
H-PE-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Wood flooring	096466
Base:	
Ventilated resilient base	096466
Ceiling:	
Painted exposed structure	099100
Walls:	
Painted	099100
Sound absorbing concrete masonry units on 2 walls or abuse-resistant acoustical wall treatment	042000

LOOSE FURNISHINGS:
L1 Portable ***markerboard***

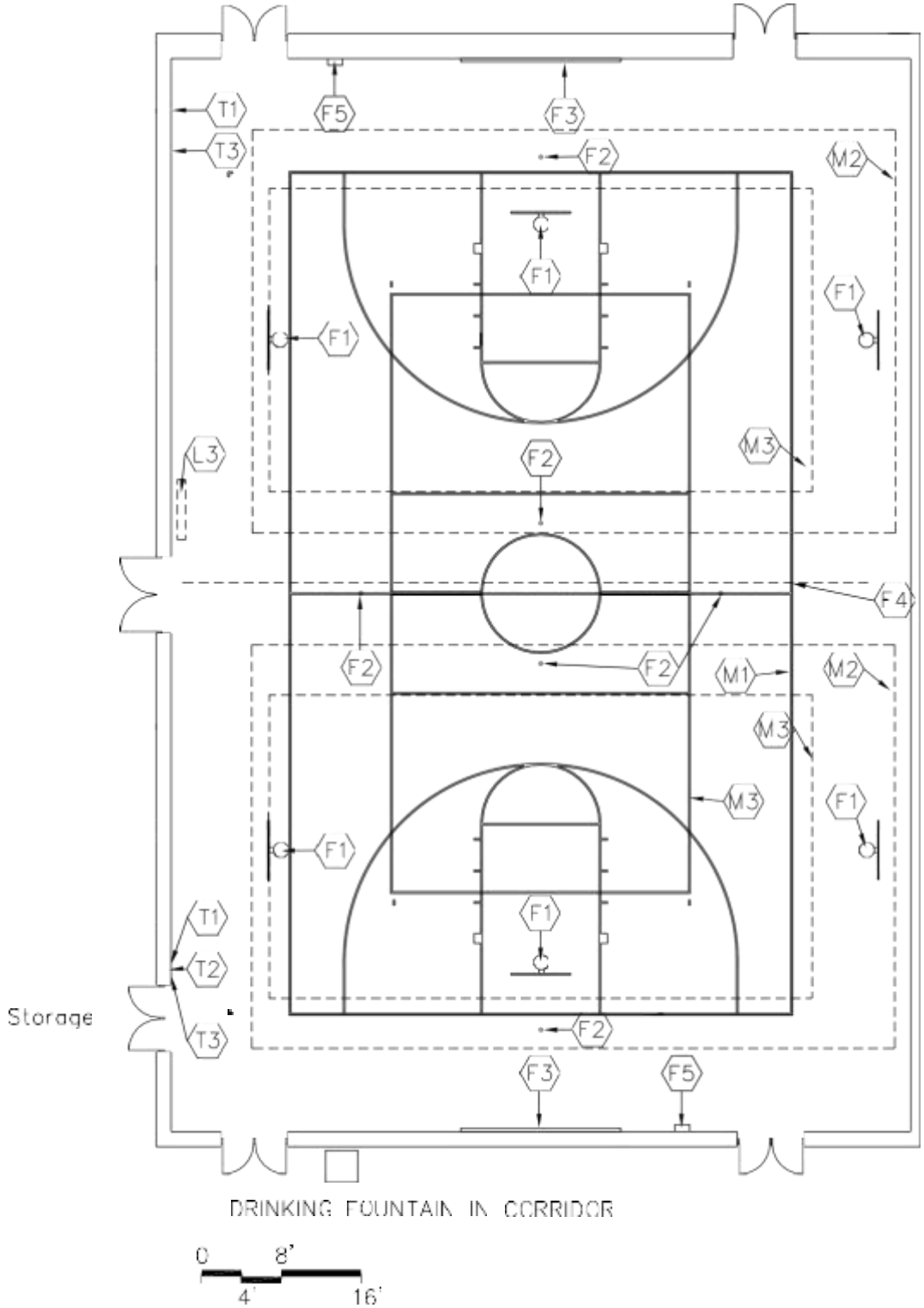
Miscellaneous:
Court markings (minimum)
M1 74' x 50' main basketball court
M2 2 cross courts to fit
M3 30'x60' volleyball court
Provide wire guards on light fixtures and wall-mounted electrical devices.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 6 basketball backstops, glass	116623
F2 Volleyball sleeves and standards on a cart	116623
F3 Safety wall wainscot	116623
F4 Divider gym curtain	116623
F5 Chin-up bar (optional)	116623
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Drinking fountain directly outside the entrance	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Multi-level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
8 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Electrical connections to P.E. equipment where necessary	262726
Telecommunications Grounding	270526/260526
Communications:	
T1 2 ***projector*** video ports, 1 monitor with cart	271543/274119
T2 1 voice port	271513/273113
T3 2 data port	271513
Clocks with wire guards	275313
Central sound system	275123
Gymnasium sound system	275124
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. The OFCC does not co-fund telescoping bleachers in auxiliary gyms. District may provide telescoping bleachers in accordance with section 126600 at district's expense.

AUXILIARY GYMNASIUM
H-P E-2



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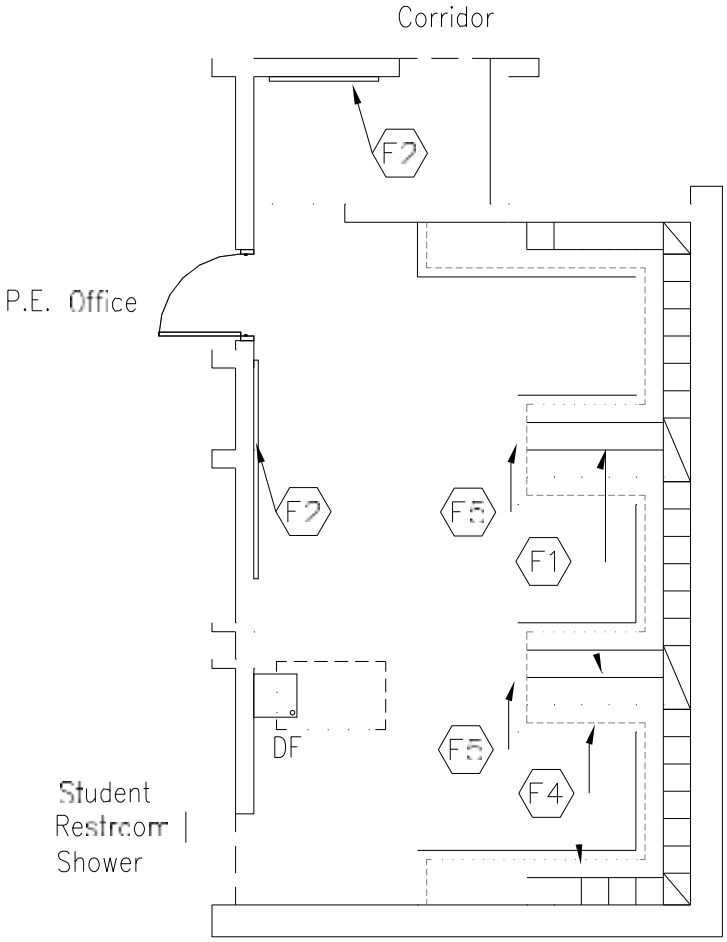


PROGRAM ACTIVITIES:

- Students change from their regular clothes into clothes appropriate for physical education
- Storage for personal items while students are attending physical education class

SPATIAL RELATIONSHIPS:

- Adjacent to student restroom/shower
- Adjacent to P.E./athletic office
- Direct access to both gymnasium and outdoor area
- Located on gymnasium level

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: 25 - 60 students
SIZE: 550 - 850 SF
ANCILLARY SPACES:
Student Restroom/Shower, H-PE-4
P.E./Athletic Office, H-PE-6

NOTES:

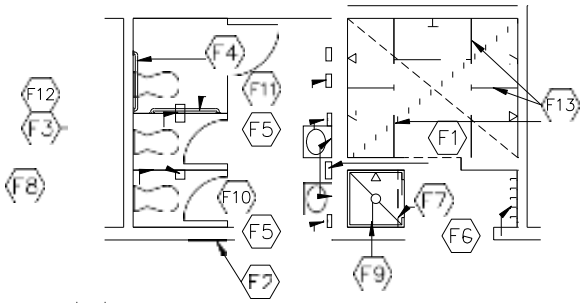
STUDENT LOCKER ROOM
H-PE-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Vinyl or rubber sheet flooring,	096500
rubber tile, or	096723
resinous flooring	
Base:	
Resilient base or	096500
resinous flooring	096723
Ceiling:	
Suspended, acoustical with high-impact, hold-down clips	095113
Option: Exposed, painted pre-cast units	099100
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Wastebaskets	

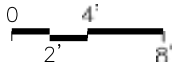
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Athletic lockers	105113
F2 8'-16' combination marker board, tack board, tackable wallsurface	101100
F3 Reserved	
F4 Locker benches	062000
F5 Mirrors	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Drinking fountain	224000/224700
HVAC:	
Supply air system	Div. 23
Exhaust air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
2 duplex receptacles	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Communications:	
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

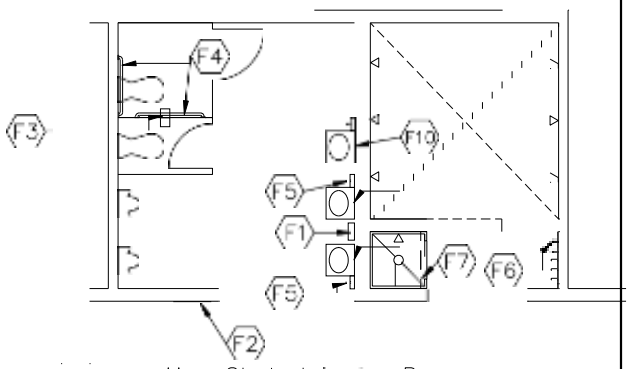
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

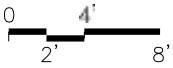


Female Student Locker Room





Male Student Locker Room



CAPACITY: 5 students
SIZE: 200 – 350 SF
ANCILLARY SPACES: Student Locker Room
H-PE-4

PROGRAM ACTIVITIES:

- Serves as separate shower and restroom areas for males and females in the physical education and athletic programs
- Community adults and children may also use this facility after hours

SPATIAL RELATIONSHIPS:

- Adjacent to student locker room
- Direct access to both gymnasium and outdoor area

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

NOTES:

STUDENT RESTROOM/SHOWER
H-PE-4

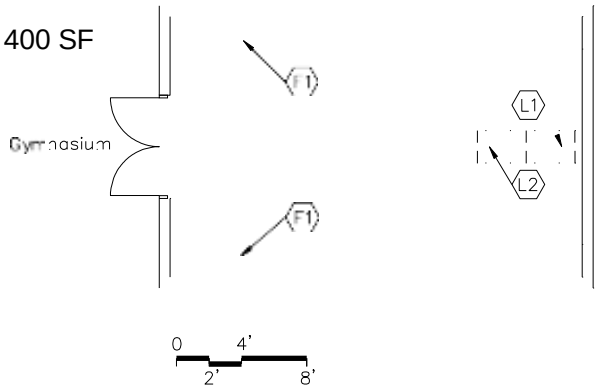
FINISHES[1]:	Spec. Ref.#
Flooring:	
Restroom: Vinyl, rubber sheet	096500
flooring, rubber tile, or	093000
resinous flooring	096723
Shower: Ceramic mosaic tile, porcelain tile, or resinous flooring	
Base:	
Restroom: Resilient base,	096500
resinous flooring, or	093000
integral vinyl cove base	096723
Shower: Ceramic mosaic tile base, porcelain tile base, resinous flooring, or integral vinyl cove base	
Ceiling:	
Restroom: Suspended, acoustical with high-impact & hold-down clips	095113
Shower: Painted portland cement plaster	092400/099100
or interior finish system	092513
Walls:	
Epoxy-painted concrete masonry units	042000/099100
or ceramic wall tile in showers	093000
and latex paint in restroom	099100
LOOSE FURNISHINGS:	
Wastebaskets	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispensers	102813
F2 24" by 60" mirror	102813
F3 Toilet tissue holders	102813
F4 36" and 42" grab bars	102813
F5 Soap dispensers	102813
F6 Towel hooks	102813
F7 Shower curtain and rod	102813
F8 Toilet partitions	102813
F9 ADA shower accessories	102813
F10 16" x 24" mirrors with shelves	102813
F11 Sanitary product dispensers[2]	102813
F12 Sanitary product receptacles[2]	102813
F13 Modesty shower partitions[2]	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closets	224000
Wall-mounted lavatories or wash fountains	224000
Wall-mounted urinals	224000
ADA shower controls and head	224000
Shower fixtures	224000
HVAC:	
Supply/return air system	Div. 23
Exhaust air system	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Single level switching	262726
1 duplex receptacle	262726
Emergency lighting	265100
Means of egress lighting per code	265100
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

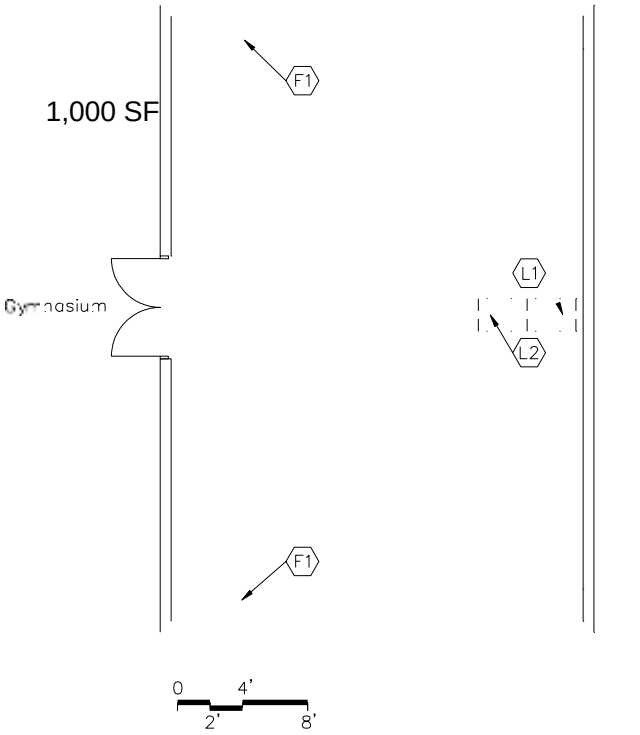
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Toilet accessories and shower partitions for female locker rooms.
3. Optional: electric hand dryers

400 SF



1,000 SF



PROGRAM ACTIVITIES:
- Storage for physical education equipment

SPATIAL RELATIONSHIPS:
- Adjacent to gymnasium
- Near P.E./athletic office

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	400 – 1,000 SF
ANCILLARY SPACES:	Gymnasium H-PE-1

NOTES:

PHYSICAL EDUCATION STORAGE
H-PE-5

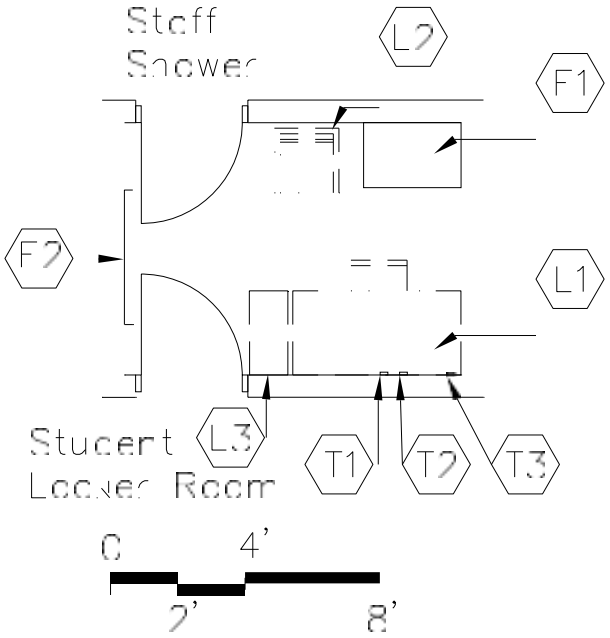
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	
Option: Rated gypsum wallboard	092113
Walls:	
Unpainted concrete masonry units	042000

LOOSE FURNISHINGS:
L1 Tumbling mats on carts
L2 Ball carts

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 20' - 48' of open shelving, depths may vary (fixed or loose)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the largest and smallest possible room size.



PROGRAM ACTIVITIES:
- Teacher office for planning, grading, conferences, and scheduling

SPATIAL RELATIONSHIPS:
- Adjacent to student locker room
- Adjacent to staff shower

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control - wall minimum STC 45 ceiling minimum STC 35, NRC 0.70

CAPACITY:	1 teacher
SIZE:	75 SF
ANCILLARY SPACES:	Student Locker Room H-PE-3 Staff Shower H-PE-7

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

P. E. / ATHLETIC OFFICE
H-PE-6

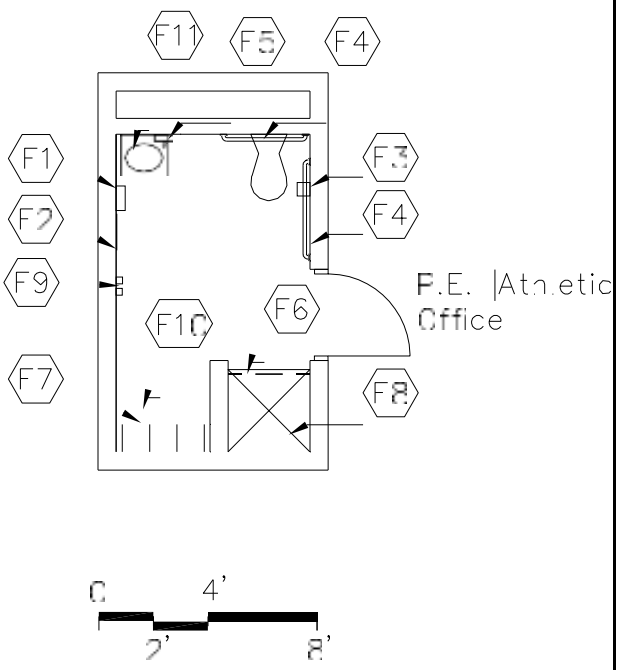
FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096500
ET, sheet vinyl, or rubber	096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Teacher desk and chair
L2 Visitor chair
L3 File cabinet
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe	123550
F2 4' of tack board	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near teacher workstation	271513 T3
1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior windows (optional)	081113/088000

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Personal and health care needs for physical education teacher

SPATIAL RELATIONSHIPS:
- Adjacent to P.E./athletic office

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  walls minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

CAPACITY:	1 person
SIZE:	75 SF
ANCILLARY SPACES:	P.E./Athletic Office H-PE-6

NOTES:

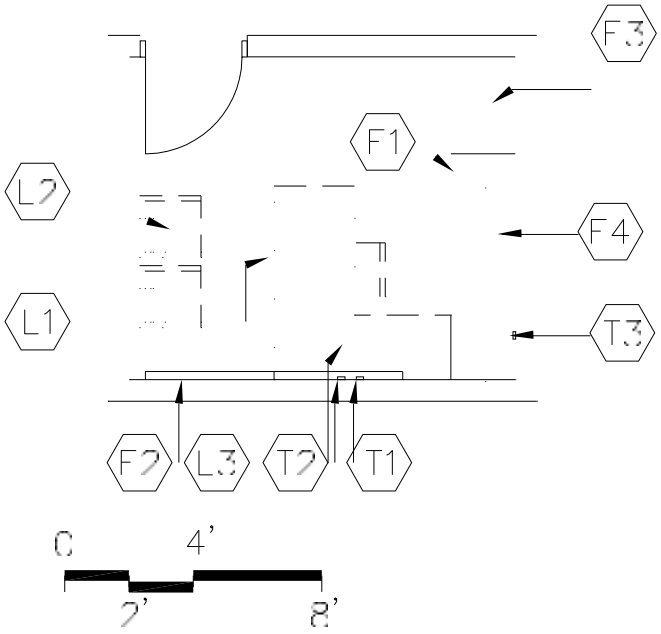
STAFF SHOWER
H-PE-7

FINISHES[1]:	Spec. Ref.#
Flooring:	
Restroom: ET,	096500
sheet vinyl, ***or***	096516
resinous flooring	093000
Shower: Ceramic mosaic tile,	096723
porcelain tile, or resinous flooring	
Base:	
Restroom: Resilient base,	096500
resinous flooring, or	093000
integral vinyl cove base	096723
Shower: Ceramic mosaic tile base, porcelain tile base, resinous flooring, or integral vinyl cove base	
Ceiling:	
Restroom: Suspended, acoustical	095113
Shower: Painted portland cement plaster	092400/099100
or interior finish system	092513
Walls:	
Epoxy painted concrete masonry units	042000/099100
or ceramic wall tile in shower	093000
and latex paint in restroom	099100
LOOSE FURNISHINGS:	
Wastebasket	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 24" x 60" mirror	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Shower curtain and rod	102813
F7 3 athletic lockers	105113
F8 ADA Shower accessories	102813
F9 Towel hooks	102813
F10 Built-in bench (optional)	102813
F11 Mirror over sink with shelf (optional)	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
ADA shower controls and head	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Space for planning and scheduling

SPATIAL RELATIONSHIPS:
- Near gymnasium

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: 1 - 3 persons
SIZE: 120 SF
ANCILLARY SPACES:

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

ATHLETIC DIRECTOR'S OFFICE
H-PE-8

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile	096816
Option: Linoleum, ET, or sheet vinyl	096813 096516 096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

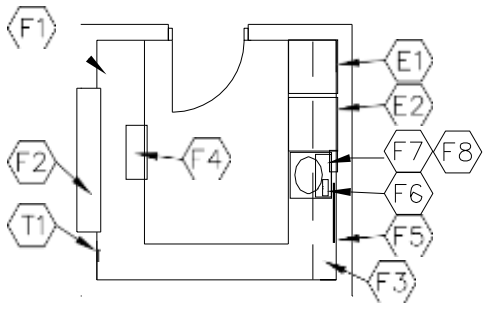
LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board or marker board tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets above work surface	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

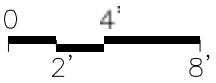
NOTES:

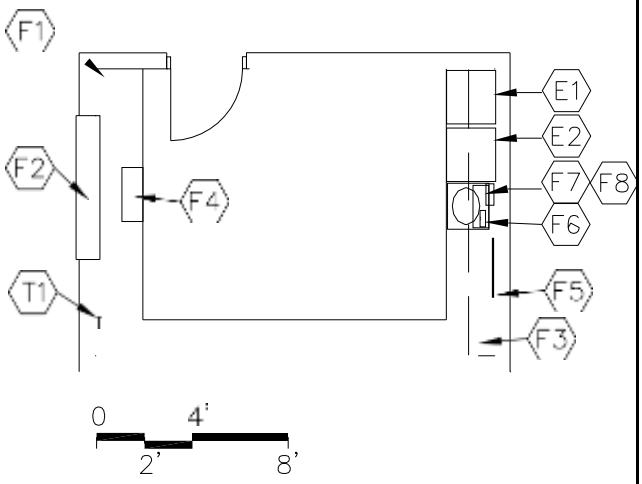
1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.

100 SF



200 SF





CAPACITY: 1 - 5 people
SIZE: 100 - 500 SF

PROGRAM ACTIVITIES:
- Space for ticket sales
- Space for concession sales

SPATIAL RELATIONSHIPS:
- Near gymnasium

ENVIRONMENTAL CONSIDERATIONS:
- Adequate ventilation

NOTES:

LOBBY SERVICES

H-PE-9

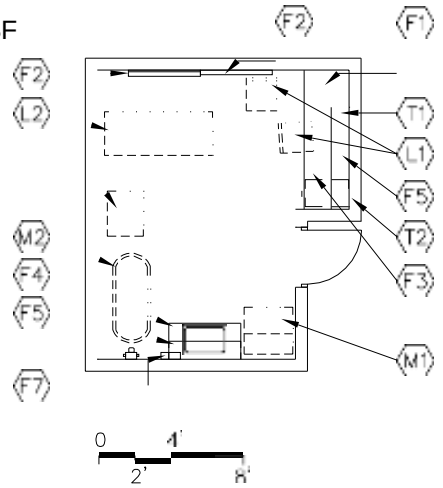
FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096516
ET, sheet vinyl, or rubber	096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Stool	
EQUIPMENT:	
E1 Washer	
E2 Dryer	

FEATURES:	Spec. Ref.#
Fixed Items:	
F1 10' - 40' of base cabinets	123550
F2 Coiling door	083320
F3 Wall cabinets	123550
F4 Money drawer	
F5 4' of tack board	101100
F6 Soap dispenser	102813
F7 Shelf above sink (optional)	102813
F8 Towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Washer connection	224000
Sink in cabinet	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Dryer vent connection	Div. 23
Electrical:	
8 duplex receptacles	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***9***	
Single level switching	265100
Receptacles for concession equipment	262726
Communications:	
T1 data port for cash register	271523
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

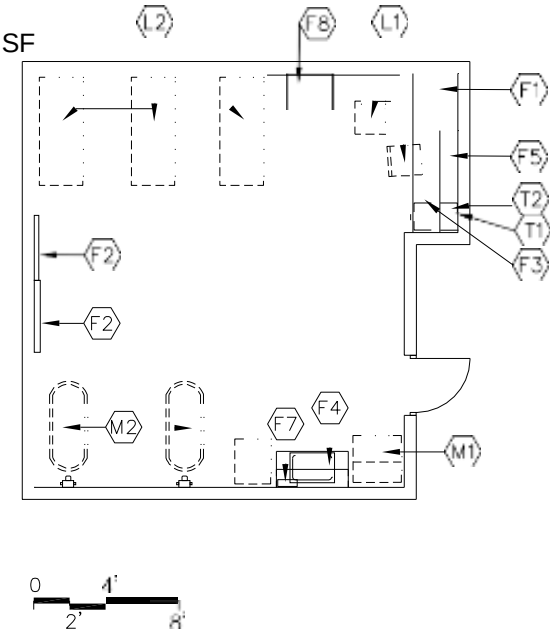
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

200 SF



500 SF



CAPACITY: 3 – 7 persons
SIZE: 200 - 900 SF

PROGRAM ACTIVITIES:
- Injury rehabilitation
- Injury prevention
- Injury management
- Treatments such as hydro therapy, stretching, and taping

SPATIAL RELATIONSHIPS:
- ☐ Near multi-use P.E. room
- ☐ Near physical health classroom
- ☐ Near gymnasium
- ☐ Near student locker rooms

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control - wall minimum STC 40 ceiling minimum CAC 35**,** NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

TRAINING ROOM
H-PE-10

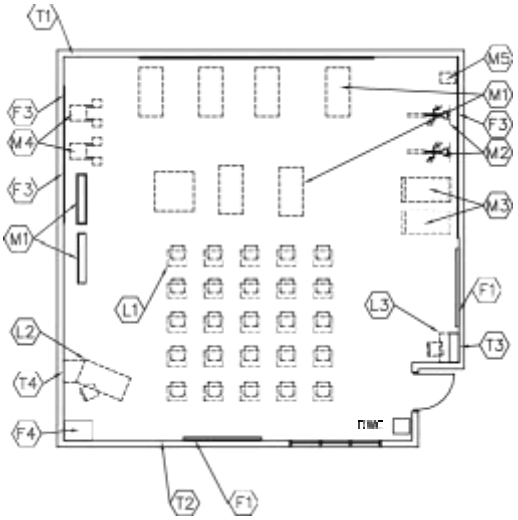
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sheet vinyl, rubber, or rubber tile	096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Chairs
L2 Taping tables
Wastebasket

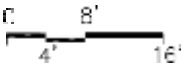
FEATURES[1]:		Spec. Ref.#
Fixed Items:		
F1	***T***all wardrobe with files	123550
F2	***8'-12' combination chalk/marker board, tack board, tackable wall surface***	101100
F3	Work surface with file drawers	123550
F4	3' sink base cabinet	123550
F5	Wall cabinets	123550
F6	***Reserved***	
F7	Towel dispenser	102813
F8	About 3' tall storage cabinet	123550
Fire Suppression:		
	Fire suppression system	211000
Plumbing:		
	Plumbing connections	224000/221116/221119
	Whirlpool, sink, and washer/dryer	Div. 23
HVAC:		
	Supply/return air system	Div. 23
	Independent temperature control	230923
Electrical:		
	Fluorescent lighting:	265100
	Illumination level: See Table 8600-***6***	
	Single level switching	262726
	2 duplex receptacles	262726
	Double duplex receptacle adjacent to each data port	262726
	Electrical power for ice machine and whirlpool	262726
Communications:		
T1	1 data port near trainer workstation	271513
T2	1 voice port and phone	271513/***273123***
	Clock	275313
	Central sound system	275123
Electronic Safety and Security:		
	Life safety devices per code	283111
Miscellaneous:		
The following items are to be funded by the school district:		
M1	Ice Machine	
M2	Whirlpool	

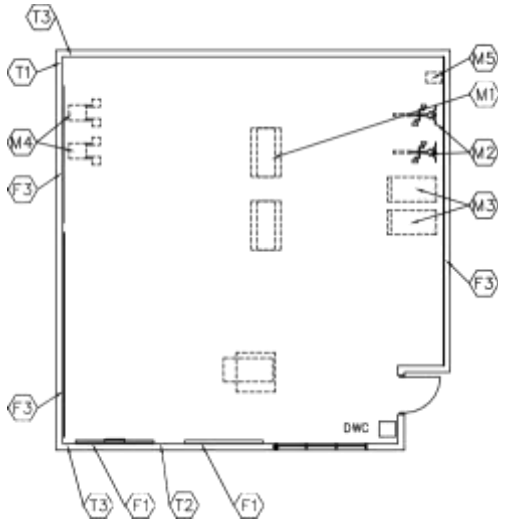
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



2,000 SF





CAPACITY: 15 - 25 students
SIZE: 1,500 SF

PROGRAM ACTIVITIES:
- Weight lifting
- Exercise on a variety of devices including stairclimbers, exercise bikes, and treadmills
- Instructional space for health, safety, first-aid, and other physical education classes
- Group and individual work
- Demonstrations

SPATIAL RELATIONSHIPS:
- ☐ Near training room
- ☐ Near gymnasium
- ☐ Near locker rooms

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall ***only*** minimum STC ***45***
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

PHYSICAL HEALTH CLASSROOM
H-PE-11

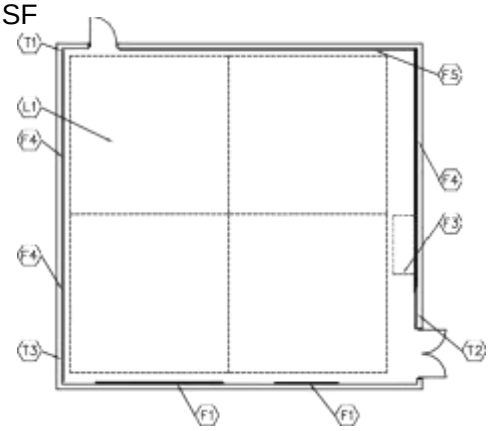
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sheet vinyl, rubber, or rubber tile	096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

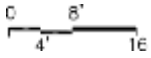
LOOSE FURNISHINGS:
- L1 Student desks and chairs(if applicable)
- L2 Teacher workstation and chair
- L3 Computer workstation
  - File drawer
  - Wastebasket

FEATURES[1]:		Spec. Ref.#
Fixed Items:		
F1	8'-16' combination marker board, tack board, and tackable wall surface	101100
F2	Reserved	
F3	5' high mirror mounted 12" above floor	088300
F4	Tall wardrobe (optional)	123550
Fire Suppression:		
	Fire suppression system	211000
Plumbing:		
	Plumbing connections	224000/221116/221119
	Drinking water cooler	224000
HVAC:		
	Supply/return air system	Div. 23
	Independent temperature control	230923
Electrical:		
	Fluorescent lighting: Illumination level: See Table 8600-5	265100
	Multilevel switching	262726
	8 – 10 duplex receptacles	262726
	Double duplex receptacle adjacent to each data port	262726
Communications:		
T1	1 ***projector*** video port and video display device	271543/274119
T2	1 voice port and phone	271513/273123
T3	1 data port	271513
T4	1 data port near teacher workstation	271513
	Clock	275313
	Central sound system	275123
Electronic Safety and Security:		
	Life safety devices per code	283111
Miscellaneous:		
The following items are to be funded by the school district:		
M1	Weight lifting equipment	
M2	Stationary bikes	
M3	Treadmills	
M4	Stairclimbers	
M5	Digital weight scale	

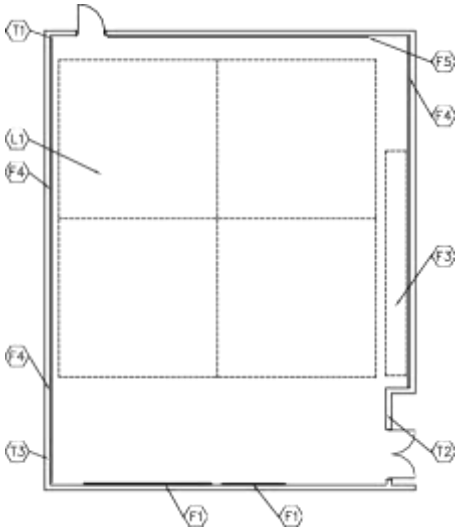
NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.

1,600 SF





3,000 SF



CAPACITY: 22-25 students
SIZE: 1,400 – 2,400 SF

PROGRAM ACTIVITIES:
- Auxiliary space for wrestling in physical education classes
- Dance
- Aerobics
- Gymnastics

SPATIAL RELATIONSHIPS:
- Near gymnasium
- Near locker rooms

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall ***only*** minimum STC ***45***
  ceiling minimum CAC 35, NRC 0.70
- Flexibility of space

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

MULTI-USE P.E. ROOM
H-PE-12

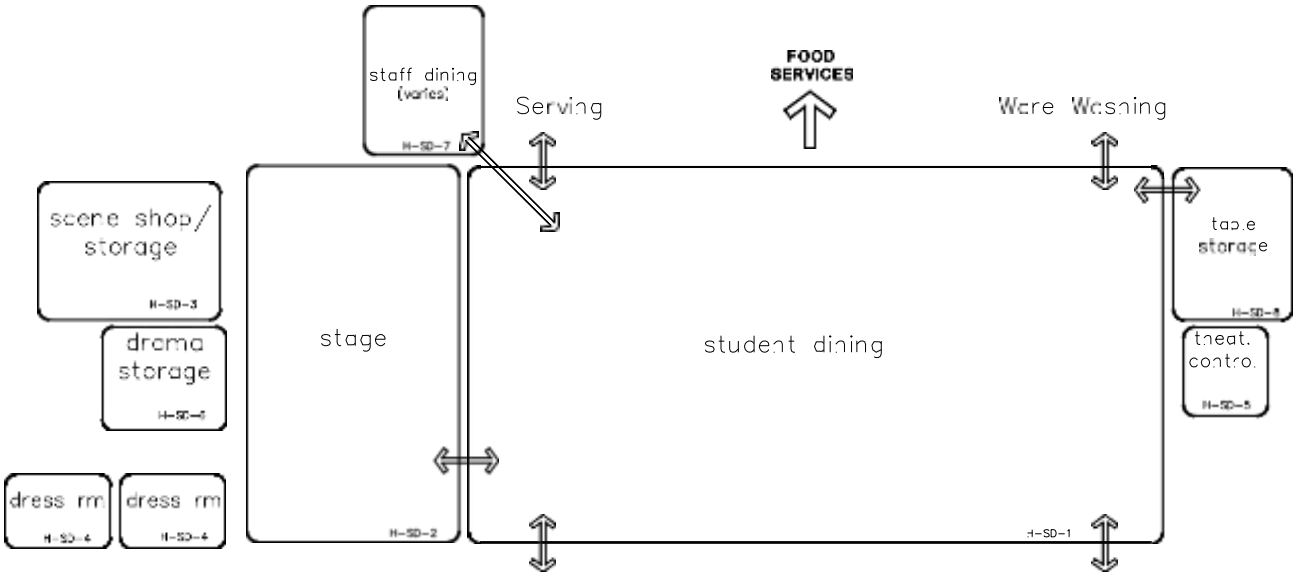
FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096516
ET, sheet vinyl, rubber, or	096500
fluid-applied athletic flooring	096766
Base:	
Resilient base	096500
Ceiling:	
Painted exposed structure	099100
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Wrestling mat

FEATURES:	Spec. Ref.#
Fixed Items:	
F1 8'-24' combination marker board, tack board, and tackable wall surface	101100
F2 Reserved	
F3 Mat hoist (optional)	116623
F4 Safety wall wainscot	116623
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
High intensity discharge lighting: or fluorescent lighting	265100
Illumination level: See Table	8600-5
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Means of egress lighting	265100
Emergency lighting per code	265100
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port	271513/273113
T3 1 data port	271513
Clock with wire guards	275313
Central sound system horns	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



NOTES:

This is an example of how the student dining spaces in a high school could be arranged. This is meant only to demonstrate the relationships between various areas of the building.

Following are the Student Dining space plates:

H-SD-1 Student Dining
H-SD-2 Stage
H-SD-3 Scene Shop/Storage
H-SD-4 Make-up/Dressing Room
H-SD-5 Theatrical Control Room
H-SD-6 Drama Storage
H-SD-7 Staff Dining
H-SD-8 Table Storage
H-SD-9 Family Restroom

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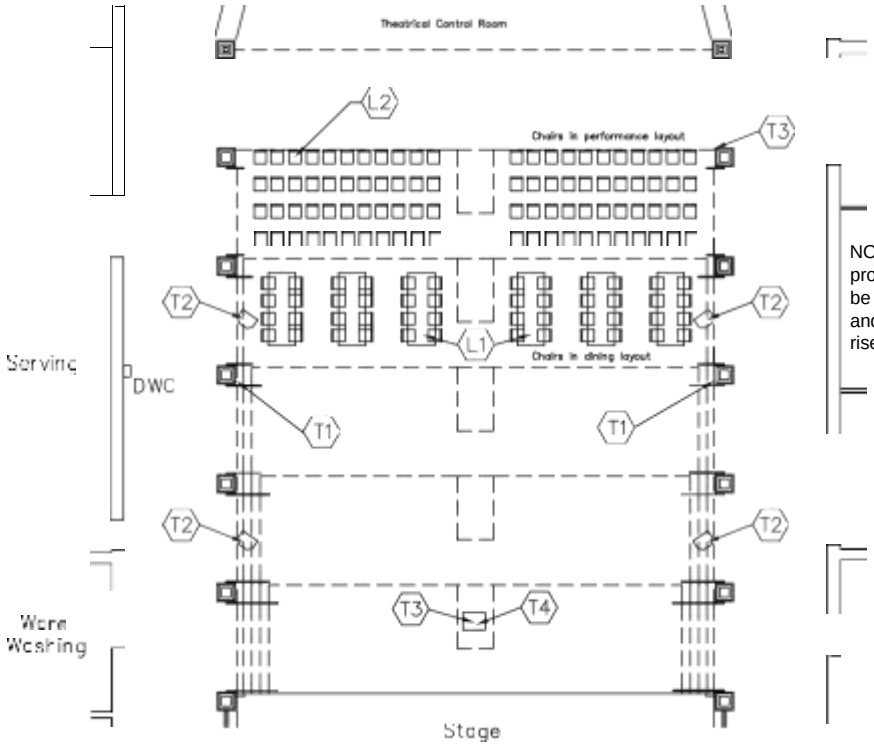


CAPACITY: 1/3 of student capacity

SIZE: 1/3 of student capacity multiplied by 17.5 SF per student or 3,000 SF whichever is greater

ANCILLARY SPACES: Kitchen, H-FS-1
Stage, H-SD-2
Theatrical Control Room, H-SD-5

PROGRAM ACTIVITIES:
- Student dining
- Large group instruction, meetings and banquets
- Watching performances
- Special activities
- Refreshment area for school activities

SPATIAL RELATIONSHIPS:
- Adjacent to stage
- Adjacent to kitchen
- Adjacent to theatrical control room

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control - walls and ceiling to be designed for auditorium-type acoustics sound system, theatrical lighting
- Flexibility of space
- Access capability
- Environmental sound control wall minimum STC 60

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

STUDENT DINING
H-SD-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber, ET,	096500
sheet vinyl, porcelain tile,	096516
resinous flooring,	096723
polished concrete finishing,	033510
or colored concrete finishing	033519
Base:	
Resilient base	096500
Option: Porcelain tile base	093000
Ceiling[3]:	
Suspended, acoustical	095113
Painted exposed structure	099100
Reflector panels	098000
Walls:	
Painted concrete masonry units	042000/099100
Diffusing block on 2 walls (minimum) or	042000
Acoustic treatment (varies with geometry of room)	098000

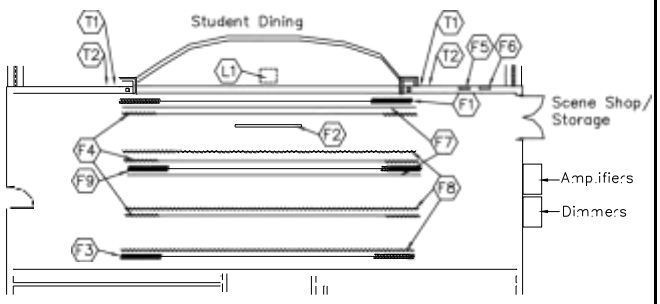
LOOSE FURNISHINGS:

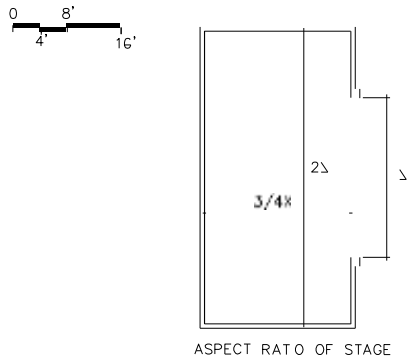
L1 Tables
L2 Folding or high-density stack chairs for large assembly use
Waste receptacles
Recycling bins
Carts for chairs

Note: Cafeteria tables with attached stools shall be securely anchored to walls when not in use, or be kept in a secure storage area when not in use.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Drinking water cooler	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
High intensity discharge lighting or fluorescent lighting	265100
Dimmable quartz lighting	265100
Theatrical lighting	265561
Illumination level: see table 8600-6	
Multilevel switching with dimming	262726 6
duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Telecommunications Grounding	270526/260526
Communications:	
T1 2 voice ports	271513/273123
T2 2 ***projector*** video ports	271543
T3 2 data ports (minimum)	271513
Clocks	275313
Central sound system	275123
Student dining/auditeria sound system	275121
T4 ***Ultra-short throw interactive*** projector	274119
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Windows with interior blinds or	081113 /
Windows with shading devices (optional)	088000

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Other types of ceiling may be appropriate based on the actual facility design. High ceilings are appropriate for auditorium-type of acoustics.





Proportions are recommended – not mandatory.

CAPACITY: N/A

SIZE: Based on student capacity
x = proscenium opening
See diagram for dimension

ANCILLARY SPACES:

Student Dining, H-SD-1
Scene Shop and Storage, H-SD-3

PROGRAM ACTIVITIES:

- Stage acting
- Musical performances
- Presentations

SPATIAL RELATIONSHIPS:

- Near make-up/dressing rooms
- Adjacent to student dining
- Adjacent to scene shop storage

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control - walls and structure above to be designed for performance
- Stage set and rigging
- Access capability
- Auditorium-type acoustics and sound system, as well as theatrical lighting

NOTES:

STAGE
H-SD-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Stage: Softwood or combination hardwood and softwood	096400
Stairs: Carpet, carpet tile,	096816
rubber, or wood	096813
Base:	
Ventilated resilient base	096400
Ceiling:	
Painted exposed structure	099100
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:

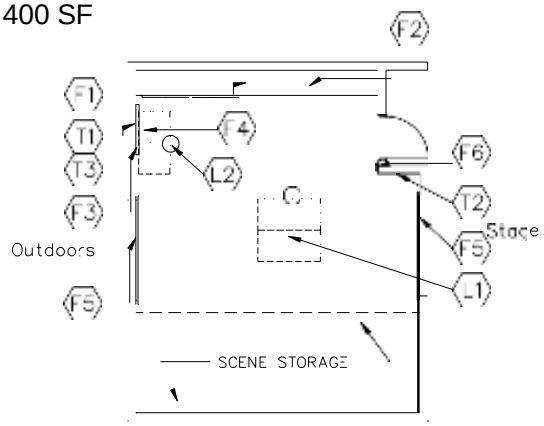
L1	Podium	

FEATURES[1]:		Spec. Ref.#
Fixed Items:		
F1	Front curtain, track, and valance or grand border	116143
F2	Projection screen	116143
F3	Rear curtain with track	116143
F4	Leg curtains, tracks, and/or pivots	116143
F5	Sound control console receptacle	275121
F6	Lighting control console receptacle	265100
F7	Light pipe	116143
F8	Border curtains	116143
F9	Mid-stage traveler	116143
Fire Suppression:		
	Fire suppression system	211000
Plumbing:		
	N/A	
HVAC:		
	Supply/return air system	Div. 23
	Independent temperature control	230923
Electrical:		
	Fluorescent lighting:	265100
	Illumination level: See Table 8600-10	
	Single level switching	262726
	Stage dimming system	265561
	Theatrical lighting	265561
	Illumination level: see table 8600-6	
	6 duplex receptacles	262726
	Double duplex receptacle adjacent to each data and video port	262726
	Emergency lighting per code	265100
	Means of egress lighting per code	265100
	Telecommunications Grounding	270526/260526
Communications:		
T1	2 ***projector*** video ports (1 on each side of proscenium opening)	271543
T2	2 data ports (1 on each side of proscenium opening)	271523
	Student dining/auditeria sound system[2]	275121
	Central sound system	275123
Electronic Safety and Security:		
	Life safety devices per code	283111
Miscellaneous:		
	N/A	

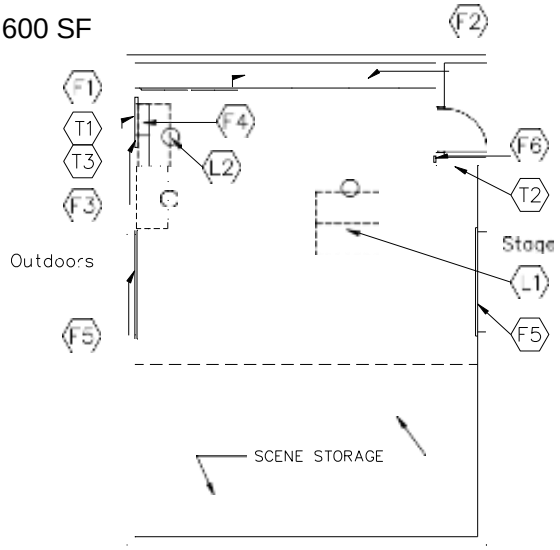
NOTES:

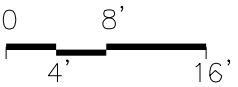
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Auditeria sound system is to be used in conjunction with the auditeria/student dining area.
3. Provide a reflective strip on floor at edge of stage.

400 SF



600 SF





CAPACITY: N/A
SIZE: 400 - 1000 SF
ANCILLARY SPACES: Stage, H-SD-2
Auditeria/Student Dining, H-SD-1

PROGRAM ACTIVITIES:

- Construction of sets, flats, and scenery for fine arts performances
- Painting
- Cutting wood
- Assembling
- Gluing
- Storage of tools and materials
- Storage of sets, flats, and scenery

SPATIAL RELATIONSHIPS:

- Near stage
- Near drama storage
- Near auditeria/student dining
- Convenient to outside and materials delivery

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 40
  ceiling minimum CAC 35**,** NRC 0.70
- 12’ clear height to nearest obstruction

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

SCENE SHOP AND STORAGE
H-SD-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
Resilient base	096500
Ceiling:	
Painted exposed structure	099100
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Work tables
L2 Work bench stools
Waste receptacle

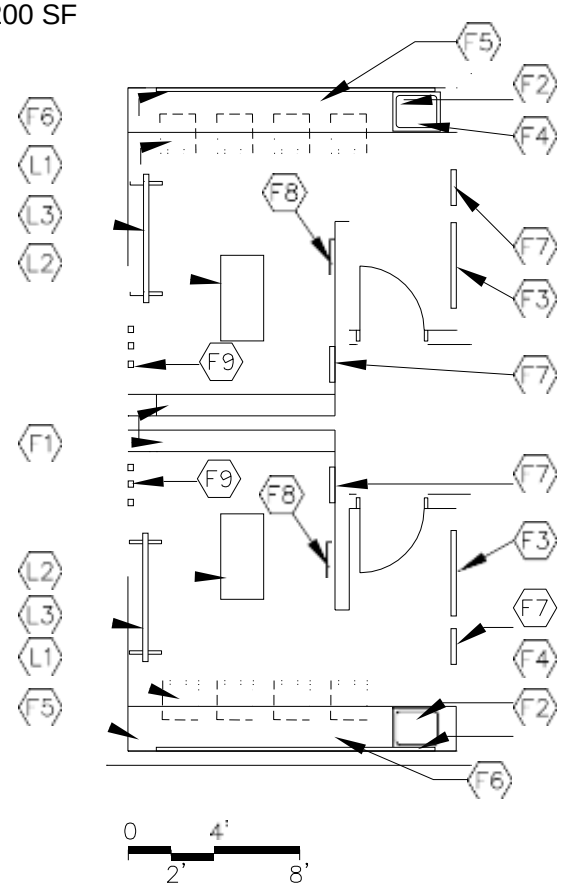
FEATURES:	Spec. Ref.#
Fixed Items[2]:	
F1 9'-22' of tall storage cabinets	123550
F2 5'-10' of wall cabinets (optional)	123550 F3
4' of tack board	101100
F4 5'-10' base cabinet with work counter	123550
F5 (2) 8' wide x 10' high overhead door	083613
F6 Pencil sharpener support (optional)	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Manual exhaust	Div. 23
Electrical:	
Fluorescent lighting:	265100
Illumination level: see table 8600-6	
Single level switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port	271513/273113
T3 1 data port	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
Shop equipment by school district
Pencil sharpener (optional)

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room sizes.

200 SF



PROGRAM ACTIVITIES:
- Dressing for stage productions
- Application of make-up for stage productions

SPATIAL RELATIONSHIPS:
- Near stage
- Near restrooms

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall ***only*** minimum STC ***45***
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: 20 students
SIZE: 200 - 400 SF each male/female

NOTES:
1 Loose furnishings shown represent one of many possible arrangements.

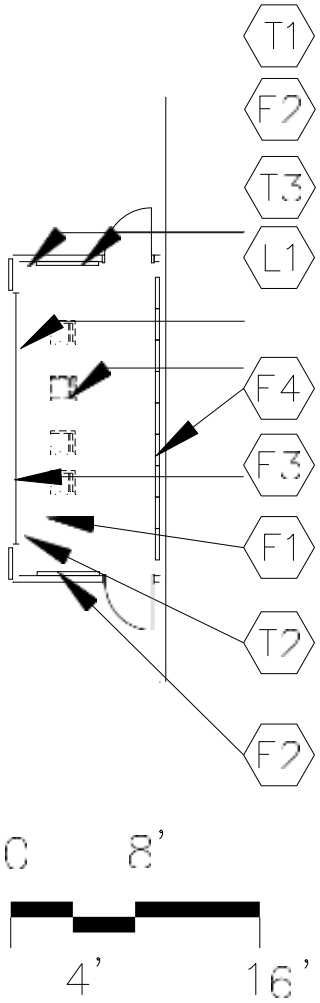
MAKEUP/DRESSING ROOMS
H-SD-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096516
ET, sheet vinyl, rubber,	096500
resinous flooring,	096723
polished concrete flooring, or	033510
or colored concrete finishing	033519
Base:	
Resilient base, or	096500
integral vinyl cove base	
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	
099100	

LOOSE FURNISHINGS:
L1 Chairs
L2 Bench
L3 Mobile costume rack
Wastebasket

FEATURES:	Spec. Ref.#
Fixed Items:	
F1 6’-16' of costume storage cabinets	123550
F2 Towel dispenser (optional)	102813
F3 4’-8' of tack board	101100
F4 3’ sink base cabinet	123550
F5 8’-13' of work surface	123550
F6 48" high makeup mirrors - full length of work surface	088300
F7 2 minimum 20" wide x 60" high dressing mirrors	088300
F8 Shallow wall cabinet for makeup (optional)	123550
F9 Coat hooks	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting: overhead	265100
Fluorescent or LED lighting: over makeup mirrors	265100
Illumination level: See Table 8600-6	
Single level switching	262726
2 duplex receptacles	262726
Duplex receptacle at each makeup station under mirror	262726
Telecommunications Grounding	270526/260526
Communications:	
Clock	275313
Student Dining/Auditeria sound system	275121
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.



CAPACITY: 5 persons
SIZE: 200 SF
ANCILLARY SPACES: Auditeria/Student Dining H-SD-1

PROGRAM ACTIVITIES:
- Lighting and sound control for auditeria/student dining
- Slide, movie, and video projection
- Communications with stage

SPATIAL RELATIONSHIPS:
- Adjacent to auditeria/student dining
- Close proximity to stage

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control
- HVAC requirements based on high density of electronic equipment and people

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

THEATRICAL CONTROL ROOM
H-SD-5

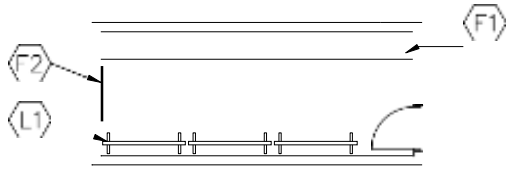
FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096516
ET, sheet vinyl, rubber,	096500
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard	042000/099100
Acoustical wall treatment	098000

LOOSE FURNISHINGS:
L1 Chairs
Wastebasket

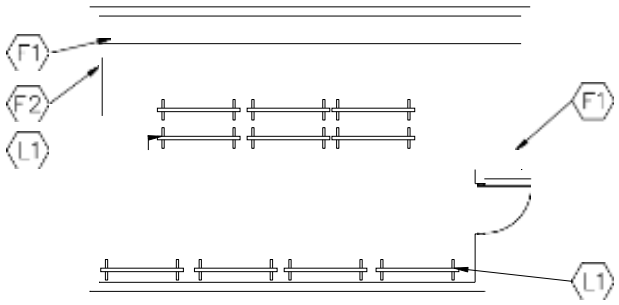
FEATURES:	Spec. Ref.#
Fixed Items:	
F1 10’-20' of equipment/work surface	123550
F2 4’-8' of tack board	101100
F3 Operable window (optional)	085113
F4 Acoustic wall treatment (optional)	098000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting: overhead	265100
Illumination level: See Table 8600-6	
Dimmable task lighting on work surface	265100
Single level switching	262726
Student dining/auditeria lighting wired through stage dimmer panel	265561
4 duplex receptacles	262726
Provisions for hard-wired equipment	260519/260533
Empty communications conduit with pull cable from stage for future video projection control	Div. 26
Stage dimming system control panel	265561
Telecommunications Grounding	270526/260526
Communications:	
T1 1 voice port and phone	271513/273123
T2 1 projector video port	271543
T3 2 data ports	271513
Student Dining/Auditeria sound system control panel	275121
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

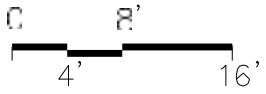
NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

200 SF



600 SF





CAPACITY: N/A
SIZE: 200 – 1,000 SF

PROGRAM ACTIVITIES:
- Long- and short-term storage of drama department costumes
- Costume organization and inventory
- Costume distribution

SPATIAL RELATIONSHIPS:
- Near scene shop/storage
- Near stage
- Near auditeria/student dining

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

DRAMA STORAGE
H-SD-6

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete, polished concrete finishing, or colored concrete finishing	***033000*** 033510 033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

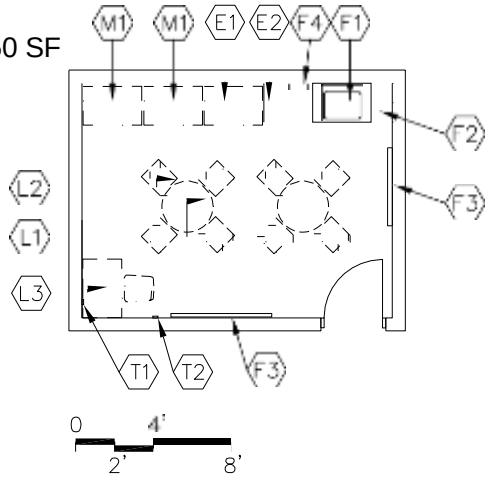
LOOSE FURNISHINGS:
L1 Mobile clothes racks

FEATURES:	Spec. Ref.#
Fixed Items:	
F1 10’-22' of costume storage cabinets	123550
F2 4' of tack board (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplementary heat as required	Div. 23
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

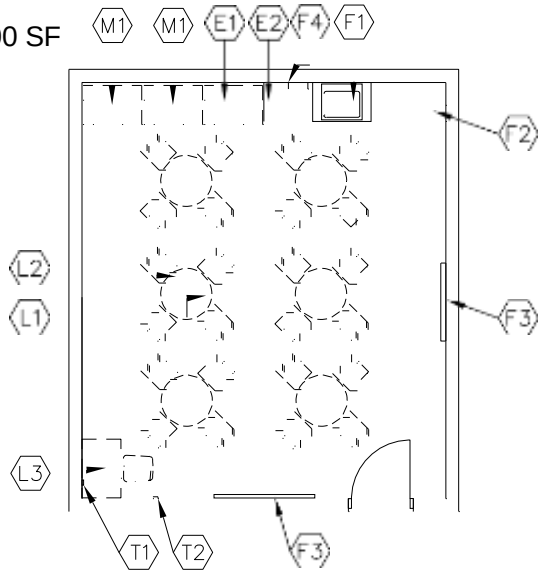
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

450 SF



900 SF



CAPACITY: 8 – 24 staff
SIZE: 450 – 1,200 SF
ANCILLARY SPACES: Student Dining H-SD-1

PROGRAM ACTIVITIES:
- Space for staff dining

SPATIAL RELATIONSHIPS:
- Near student dining
- Near food services

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  walls ***only*** minimum STC ***45***
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

STAFF DINING
H-SD-7

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber, ET,	096500
sheet vinyl, or porcelain tile	096516
resinous flooring	093000
	096723
Base:	
Resilient base	096500
Optional: porcelain tile base	093000
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted, concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Tables
L2 Chairs
L3 Computer workstation
Waste receptacle

EQUIPMENT:
E1 Refrigerator with icemaker
E2 Microwave

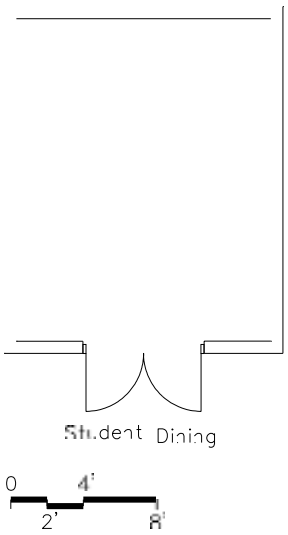
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 3' sink base cabinet with wall cabinet	123550
F2 About 8' of base and wall cabinets	123550
F3 8'-10' combination marker board,	101100
tack board, and tackable wall surface	
F4 Towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each video port	262726
Receptacles for vending machines, refrigerator, and microwave	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
The following items are to be funded by the school district:
M1 Vending machines

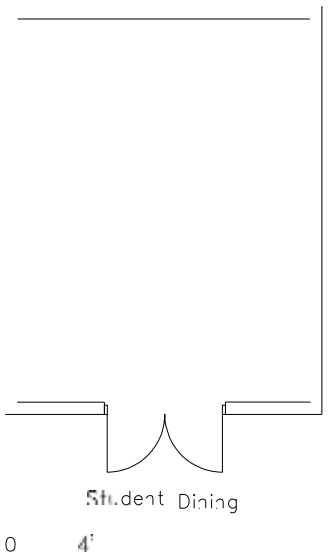
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

400 SF



700 SF



CAPACITY: N/A
SIZE: 400 - 700 SF
ANCILLARY SPACES: Student Dining
H-SD-1

PROGRAM ACTIVITIES:
- Storage for tables and chairs

SPATIAL RELATIONSHIPS:
- Adjacent to student dining
- Near food services

ENVIRONMENTAL CONSIDERATIONS:

NOTES:

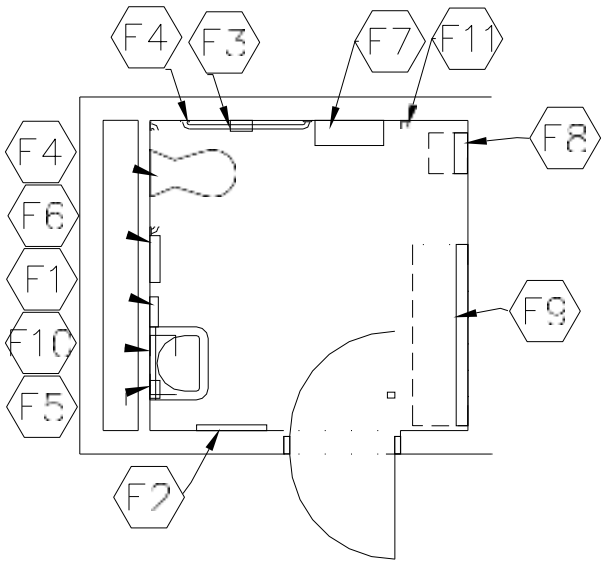
TABLE STORAGE
H-SD-8

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	093000
Base:	
No base	
Ceiling:	
Exposed structure	
Option: Rated gypsum wallboard	092116
Walls:	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:

- Personal, health, and handicap needs for all building occupants

SPATIAL RELATIONSHIPS:

- Located where best accessible to all building occupants and the public

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

CAPACITY:	2 people
SIZE:	80 SF

NOTES:

FAMILY RESTROOM
H-SD-9

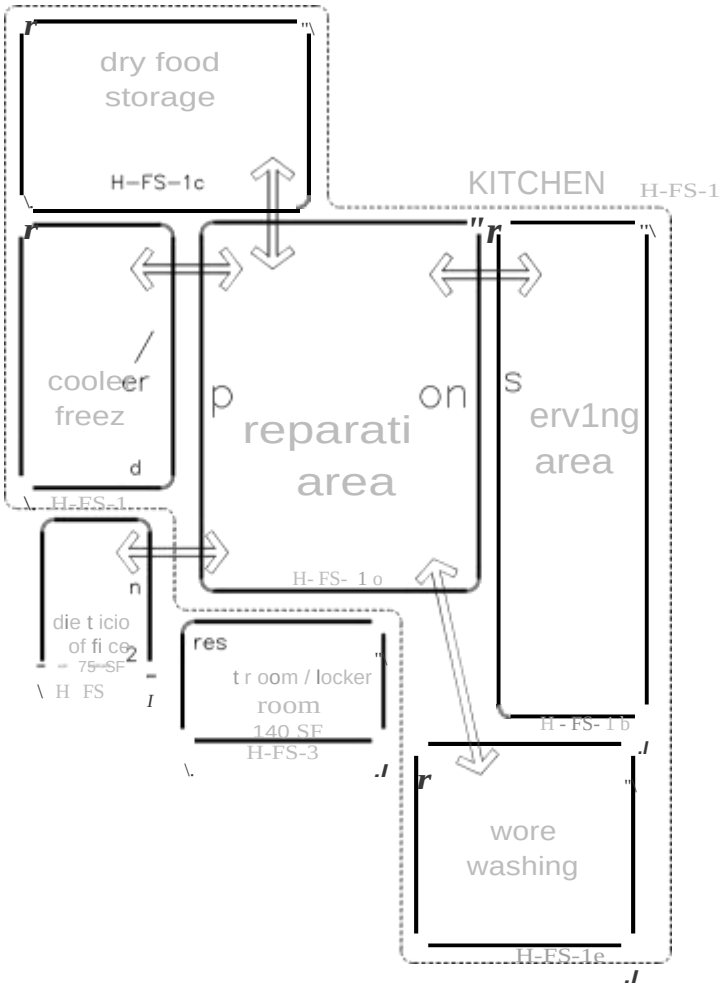
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sheet vinyl,	096516
ceramic mosaic tile, or ET	096500
Optional: Ceramic mosaic tile,	093000
porcelain tile, or	096723
resinous flooring	
Base:	
Resilient base	096500
Optional: Ceramic mosaic tile, porcelain tile, resinous flooring flooring, or integral vinyl cove base	093000 096723
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 24" x 60" mirror	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Sanitary napkin dispenser/disposal	102813
F7 Folding utility shelf	102813
F8 Mounted child seat	102813
F9 Adult/child changing station	102813
F10 16” x 24” mirror with shelf	102813
F11 Coat hooks	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



NOTES:

This is an example of how the food service spaces in a high school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

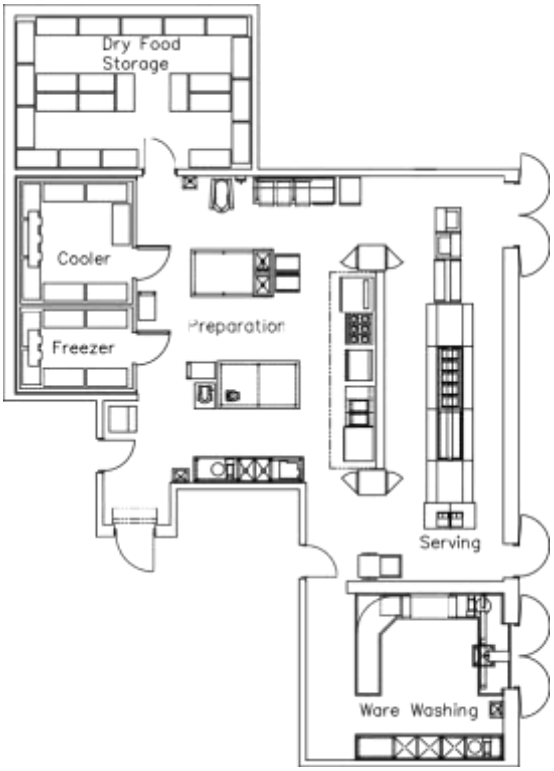
Following are the Food Service space plates:

H-FS-0	Warming Kitchen
H-FS-1	Kitchen
H-FS-1a	Preparation Area
H-FS-1b	Serving Area
H-FS-1c	Dry Food Storage
H-FS-1d	Cooler/Freezer
H-FS-1e	Ware Washing
H-FS-2	Custodial Closet
H-FS-3	Dietician Office
H-FS-4	***Restroom/Locker Room***

KITCHEN
H-FS-1

This space consists of various areas:
- Preparation Area
- Serving Area
- Dry Food Storage
- Cooler/Freezer
- Ware Washing

A space plate follows for each of these areas.



CAPACITY: 3 – 10 persons
SIZE: Student capacity multiplied by 3.5 SF per student
ANCILLARY SPACES: Student Dining H-SD-1
Loading/Receiving Area H-BS-9

PROGRAM ACTIVITIES:
- Space for the planning, ordering, preparation, and serving of the meals, and for providing meals for the students and staff

SPATIAL RELATIONSHIPS:
- Adjacent to student dining
- Near staff dining
- Near table storage
- Adjacent to loading/receiving area

ENVIRONMENTAL CONSIDERATIONS:
- Compliance with State Board of Health requirements

MISCELLANEOUS:
- The sizing of the kitchen area assumes: Type “A” meal service only at 80% of the student capacity and 3, 30-minute serving periods.

NOTES:

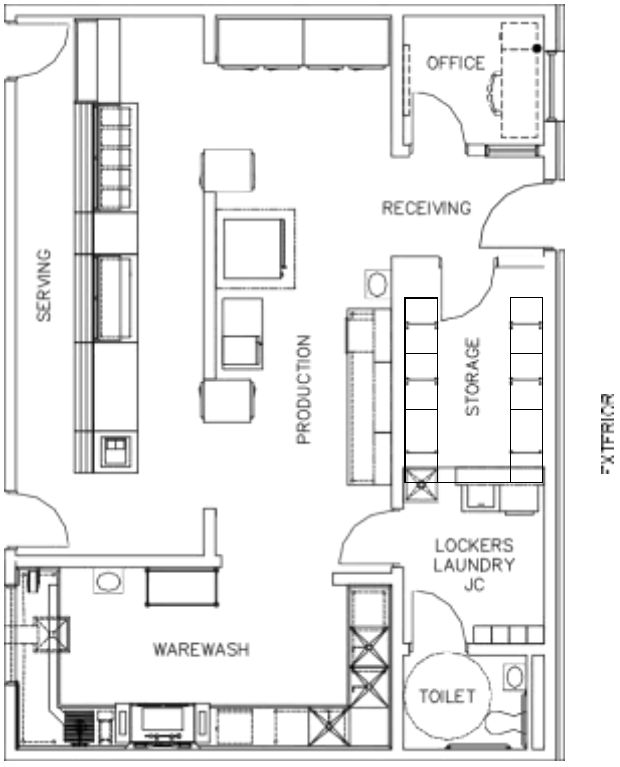
This kitchen layout is to be used only for a central kitchen operation.

This space consists of various areas:

Production Area	25%
Serving Area	35%
Warewash	25%
Storage	10%
Receiving	5%

Additional areas to be added:

Office	75 SF
Toilet	50 SF
Lockers/Laundry/Janitorial Closet	125 SF



CAPACITY: 3 - 7 persons
SIZE: Student capacity multiplied by 2.0 SF per student
ANCILLARY SPACES: Student Dining H-SD-1
Loading/Receiving Area H-BS-1

PROGRAM ACTIVITIES:

- Space for receiving, organizing, and serving of the meals prepared in the central kitchen.

SPATIAL RELATIONSHIPS:

- Adjacent to student dining
- Near staff dining
- Near table storage
- Adjacent to loading/receiving area

ENVIRONMENTAL CONSIDERATIONS:

- Compliance with State Board of Health requirements

MISCELLANEOUS:

- Kitchen area must be located adjacent to exterior loading dock area to receive transported food from central kitchen.

NOTES:

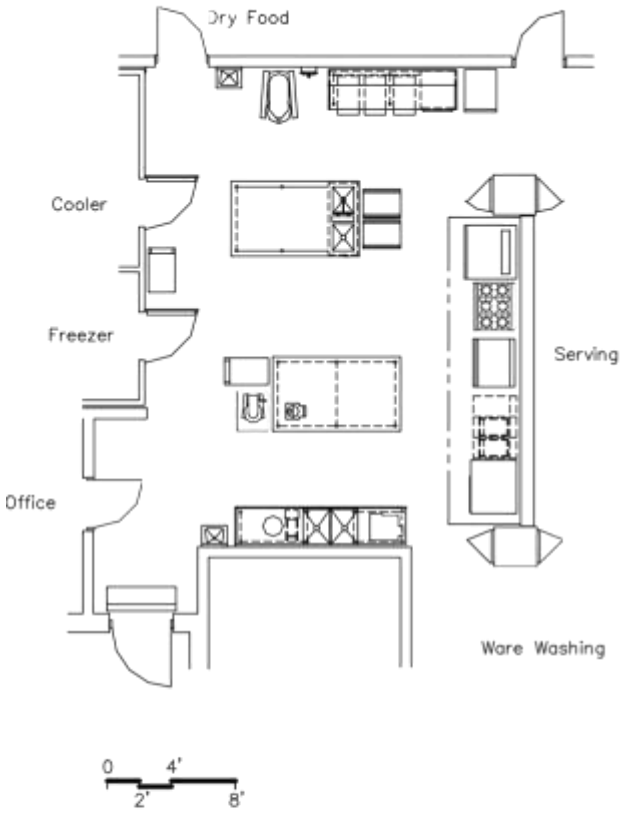
WARMING KITCHEN
H-FS-0

FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile or	093000
resinous flooring	***096723***
Base:	
Quarry tile base or ***integral base***	093000
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Option: Ceramic wall tile or	093000
latex paint	099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Connections to food service eqpt.	224000
Plumbing connections	224000/221116/221119
Hand washing lavatory	224000
Gas connections	226313
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Kitchen canopy exhaust system	233800
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
10 duplex receptacles	262726
Duplex receptacle at each cash register	262726
Emergency lighting	265100
Connections to food service eqpt.	262726
Means of egress lighting per code	265100
Communications:	
1 voice port and phone	271513/***273123*** 1
data port at cash register(s)	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.



CAPACITY: 3 – 10 persons
SIZE: Based on 36% of the kitchen area
ANCILLARY SPACES: Part of the kitchen

PROGRAM ACTIVITIES:
- Space and equipment for the preparation of food for students and staff

SPATIAL RELATIONSHIPS:
- Adjacent to the serving area
- Near the cooler/freezer
- Near the dry food storage

ENVIRONMENTAL CONSIDERATIONS:
- Proper ventilation of space to remove cooking odors
- Cleanable building surfaces

NOTES:

1. This is an example of a preparation area. Food service equipment will vary from school district to school district.

KITCHEN - Preparation Area
H-FS-1a

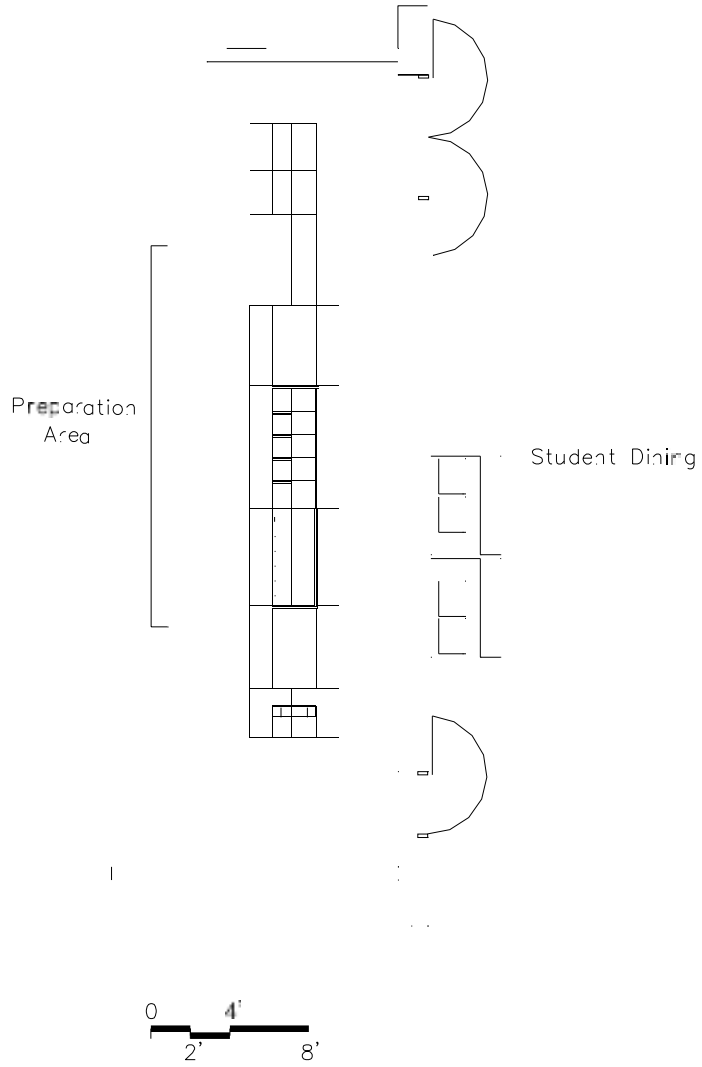
FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile or ***resinous flooring***	093000 ***096723***
Base:	
Quarry tile base or ***integral base***	093000
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Option: ceramic wall tile or latex paint	093000 099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Connections to food service equipment	224000
Plumbing connections	224000/221116/221119
Hand washing lavatory	224000
Gas connections	226313
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Kitchen canopy exhaust system	233800
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
4 duplex receptacles	262726
Emergency lighting	265100
Connections to food service equipment	262726
Means of egress lighting per code	265100
Communications:	
1 voice port and phone	271513/***273123***
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.



CAPACITY: N/A
SIZE: Based on 34% of the kitchen area
ANCILLARY SPACES: Part of the kitchen

PROGRAM ACTIVITIES:
- Space for serving of food

SPATIAL RELATIONSHIPS:
- Adjacent to student dining
- Adjacent to preparation area

ENVIRONMENTAL CONSIDERATIONS:
- Cleanable building services

NOTES:

1. This is an example of a serving area. Food service equipment will vary from school district to school district.

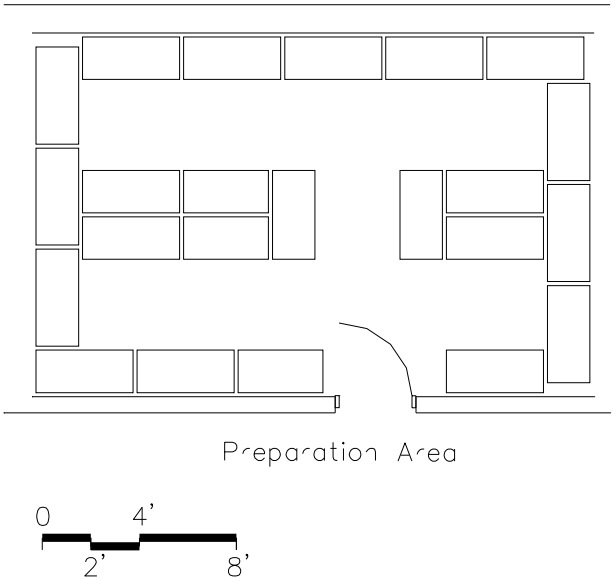
KITCHEN - Serving Area
H-FS-1b

FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile	093000
Optional: porcelain tile ***or resinous flooring***	***096723***
Base:	
Quarry tile base	093000
Optional: porcelain tile base, ***integral base***	
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Ceramic wall tile	093000
or latex paint	099100
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Equipment:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Connections to food service equipment	224000
HVAC:	
Supply/return air system	Div. 23
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
4 duplex receptacles	262726
Connections to food service equipment	262726
Emergency lighting	265100
Means of egress lighting per code	265100
Duplex receptacle at each cash register	262726
Communications::	
Data port(s) at cash register(s)	271513
Clock	275313
Central sound system	275123
1 voice port and phone	271513/***273123***
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.



PROGRAM ACTIVITIES:
- Lockable space to store dry food products and government commodities for 15 to 30 days

SPATIAL RELATIONSHIPS:
- Near the food preparation area
- Access to the loading/receiving area

ENVIRONMENTAL CONSIDERATIONS:
- Continuous conditioning of air
- Cleanable building surfaces

CAPACITY: N/A
SIZE: Based on 11% of the kitchen area
ANCILLARY SPACES: Part of the kitchen

NOTES:

1. This is an example of a dry food storage area. Food service equipment will vary from school district to school district.

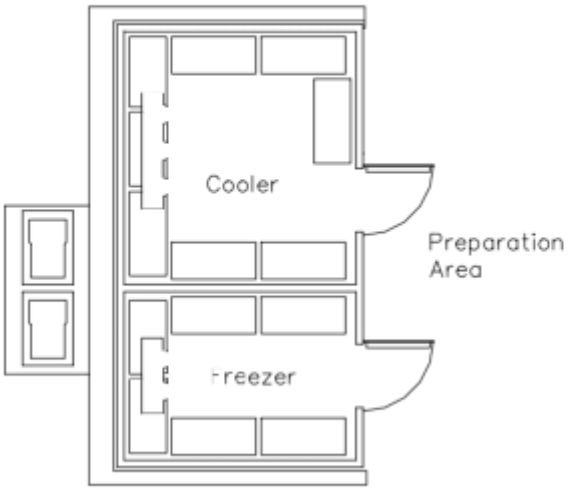
KITCHEN - Dry Food Storage
H-FS-1c

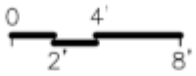
FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, ET, or sheet vinyl	096500
Option: Quarry tile or ***resinous flooring***	093000 096516 ***096723***
Base:	
Resilient base	096500
Option: Quarry tile	093000
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Option: Ceramic wall tile or latex paint	093000 099100
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supply/return air system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.





CAPACITY: N/A
SIZE: Based on 10% of the kitchen area
ANCILLARY SPACES: Part of the Kitchen

PROGRAM ACTIVITIES:
- Space for refrigerated storage of perishable products

SPATIAL RELATIONSHIPS:
- Adjacent to food preparation area
- Access to the loading/receiving area

ENVIRONMENTAL CONSIDERATIONS:
- Ventilation for refrigeration machinery
- Cleanable building surfaces
- Floor to be flush with adjacent kitchen floor

NOTES:

1. This is an example of a cooler/freezer. Food service equipment will vary from school district to school district.

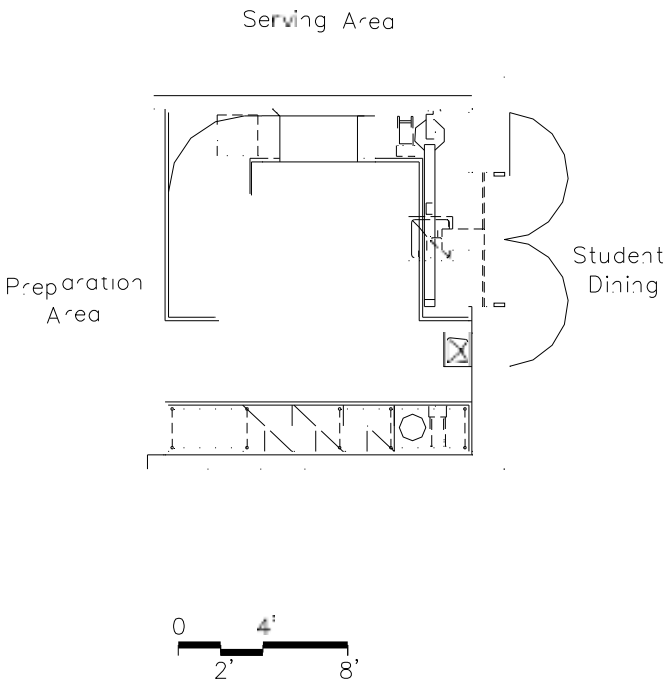
KITCHEN - Cooler/Freezer
H-FS-1d

FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile or resinous flooring	093000 096723
Base:	
Quarry tile base or integral base	093000
Ceiling:	
Manufactured insulated panel	114000
Walls:	
Manufactured insulated panel	114000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system for compressors	Div. 23
Electrical:	
Single level switching	262726
Fluorescent or LED lighting	265100
Illumination level: See Table 8600-6	
Electrical connections to freezer/cooler refrigeration equipment	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.



PROGRAM ACTIVITIES:
- Space and equipment to scrape, wash, air dry, and store serving trays and utensils

SPATIAL RELATIONSHIPS:
- Adjacent to student dining

ENVIRONMENTAL CONSIDERATIONS:
- Proper ventilation of space to remove steam and condensation
- Cleanable building surfaces

CAPACITY: N/A
SIZE: Based on 9% of the kitchen area
ANCILLARY SPACES: Part of the kitchen

NOTES:

1. This is an example of a ware washing area. Food service equipment will vary from school district to school district.

KITCHEN - Ware Washing
H-FS-1e

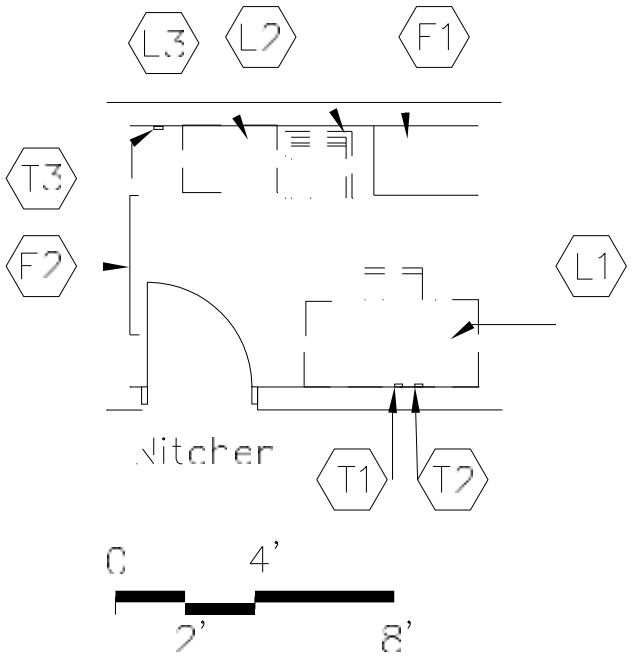
FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile or ***resinous flooring***	093000 ***096723***
Base:	
Quarry tile base or ***integral base***	093000
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Option: Ceramic wall tile or latex paint	093000 099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Lavatory	224000
Connections to food service equipment	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Exhaust hood system	Div. 23
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Connections to food service equipment	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.



PROGRAM ACTIVITIES:
- Space for the dietician to plan menus and meet with various vendors

SPATIAL RELATIONSHIPS:
- Adjacent to kitchen

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blind

CAPACITY:	1 - 2 persons
SIZE:	75 SF
ANCILLARY SPACES:	Kitchen H-FS-1

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

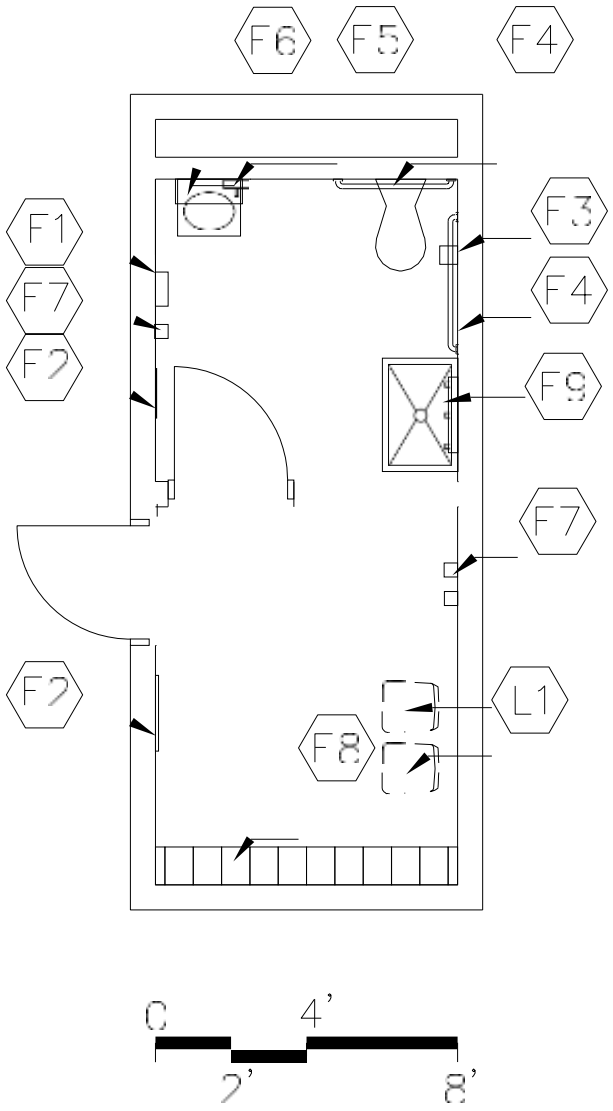
DIETICIAN'S OFFICE
H-FS-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, ET, or sheet vinyl	096500 096516
Option: Quarry tile or resinous flooring	093000 096723
Base:	
Resilient base	096500
Option: Quarry tile	093000
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chair
L3 File cabinet
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe (optional)	123550
F2 4' of tack board	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window (optional)	081113/088000

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed equipment or loose furnishings can also be all fixed or all loose.



CAPACITY: 2 persons
SIZE: 140 SF
ANCILLARY SPACES:

PROGRAM ACTIVITIES:
- Personal and health needs for food service staff

SPATIAL RELATIONSHIPS:
- Adjacent to kitchen

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

NOTES:

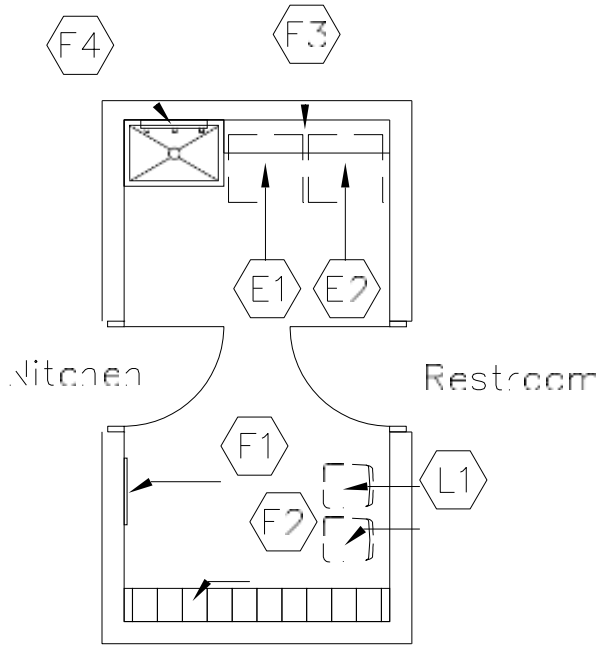
RESTROOM / LOCKER ROOM
H-FS-3

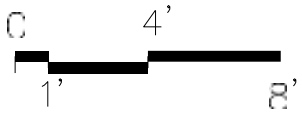
FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, sheet vinyl,	096516 096500
Optional: quarry tile***, resinous flooring***	093000 ***096723***
Base:	
Resilient base	096500
Optional: quarry tile, or integral vinyl cove base, ***integral resinous***	093000 ***096723***
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Chairs
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 ***2,*** 24" x 60" mirrors	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Mirror with shelf above sink(optional)	102813
F7 Coat hook***s***	102813
F8 Lockers 12” x 12” x 60”	105113
F9 Mop holder	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Floor service sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
2 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.





CAPACITY: 2 persons
SIZE: 125 SF
ANCILLARY SPACES: Kitchen, H-FS-1
Restroom, H-FS-3

PROGRAM ACTIVITIES:

- Space for the food service staff to store their personal belongings and to change their clothing
- Space for the washing, drying, and storage of towels, aprons, etc.
- ***This space could replace H-FS-3***

SPATIAL RELATIONSHIPS:

- Adjacent to kitchen
- Adjacent to restroom

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

LOCKER ROOM
H-FS-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sheet vinyl, rubber, rubber tile, or resinous flooring	096500 096723
Base:	
Resilient base, resinous flooring, or integral vinyl cove base	096500 096723
Ceiling:	
Suspended, acoustical with high-impact, hold-down clips	095113
Option: exposed, painted pre-cast units	099100
Walls:	
Painted concrete masonry units	042000/099100

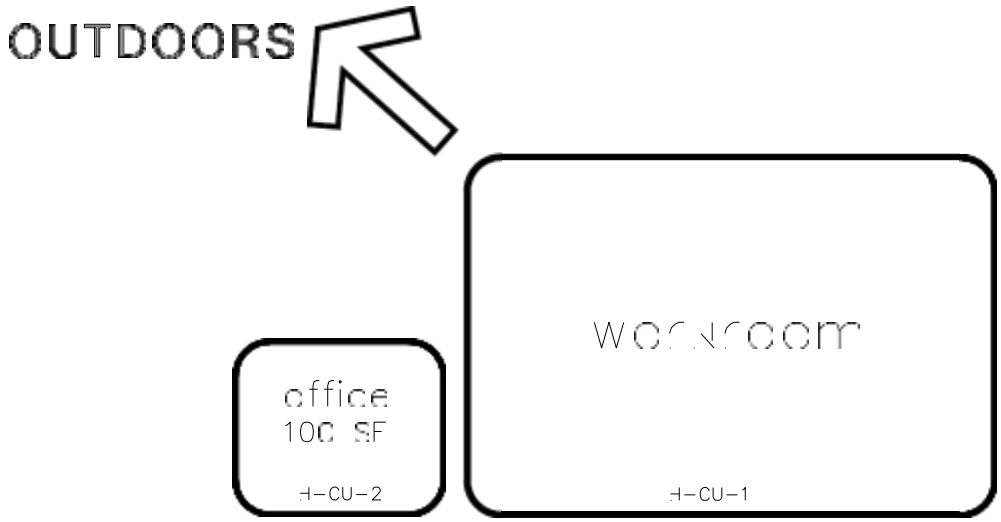
LOOSE FURNISHINGS:
L1 Chairs
Wastebasket

EQUIPMENT:
E1 Washer
E2 Dryer

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 24" x 60" mirror (optional)	102813
F2 Lockers 12" x 12" x 60"	105113
F3 6’ of wall cabinets or shelf (optional)	123550
F4 Mop holder	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	224000/221116/221119
Floor service sink	224000
Washer connection	224000
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Dryer vent system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Connections for washer and dryer	262726
Communications:	
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Provide storage cabinet for supplies if required by governing agency.	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



NOTES:

This is an example of how the custodial spaces in a high school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Custodial space plates:

H-CU-1	Workroom
H-CU-2	Custodial Office

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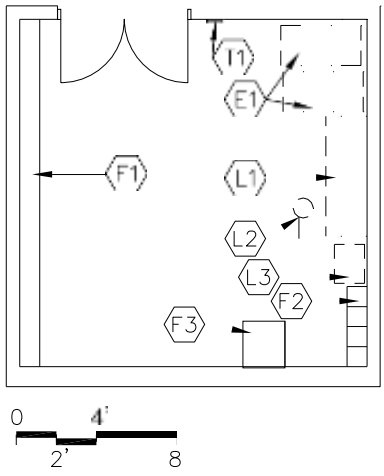
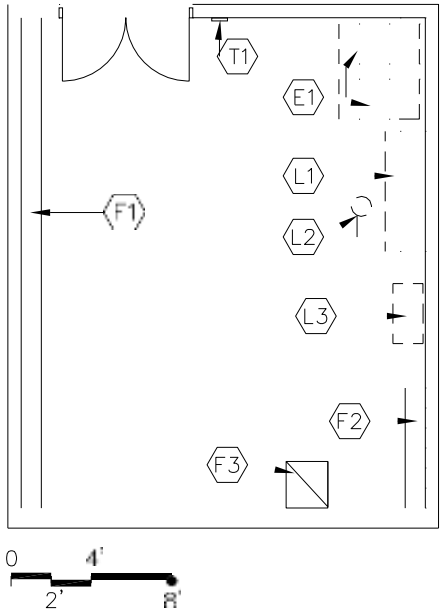
200 SF



400 SF



CAPACITY: N/A
SIZE: 200 - 800 SF

PROGRAM ACTIVITIES:
- Space for storage of custodial equipment needed to maintain the building
- Space for equipment repair

SPATIAL RELATIONSHIPS:
- Near central storage area
- Near custodial office

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

WORKROOM
H-CU-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete,	***033000***
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Workbench
L2 Stool
L3 Tool cabinet
Waste receptacles

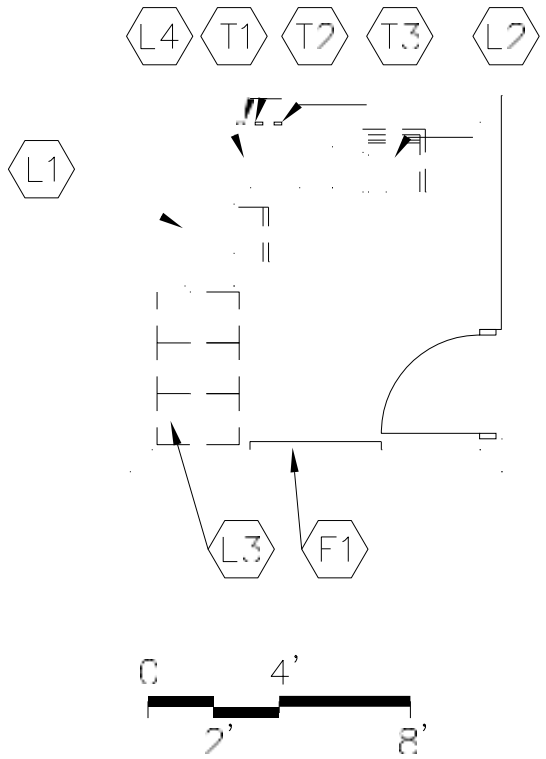
EQUIPMENT:
E1 Recycling bins

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 10' - 24' of open shelving, depths can vary (fixed or loose)	123550
F2 4 - 6 lockers	105113
F3 Mop holder	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Floor service sink	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Single level switching	262726
4 duplex receptacles (minimum)	262726
Electrical receptacles for custodial equipment	262726
Communications:	
T1 1 voice port and phone	271513/***273123***
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.

100 SF



PROGRAM ACTIVITIES:
- Office for the custodian for scheduling, ordering, and inventory

SPATIAL RELATIONSHIPS:
- Near custodial workroom

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control - wall minimum STC 45 ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blind

CAPACITY: N/A
SIZE: 100 - 400 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

CUSTODIAL OFFICE
H-CU-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096516
ET, sheet vinyl, or	096500
resinous flooring,	***096723***
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

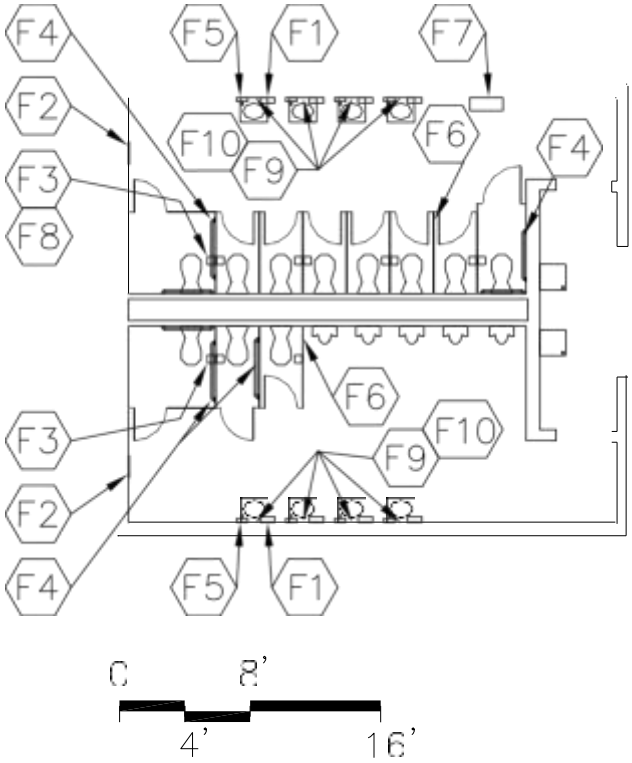
LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chair
L3 File cabinets
L4 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 4' of tack board (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and modem port	262726
Communications:	
T1 Modem port for temperature controls computer	271523
T2 1 voice port and phone	271513/***273123***
T3 1 data port near workstation	271513
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window (optional)	081113/088000

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.

Spaces to be determined by Design Professional based on the number of fixtures required.



CAPACITY: Based on size of program area
SIZE: Based on the sum of the program areas excluding building services, multiplied by 3.5%

PROGRAM ACTIVITIES

- Personal and health needs for the general public

SPATIAL RELATIONSHIPS:

- Near student dining area
- Near public use areas, such as media center and gymnasium
- Near academic core area
- Groups of restrooms should be located in several areas throughout the building

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control
  wall minimum STC 53
  ceiling minimum CAC 35, NRC 0.70

NOTES:

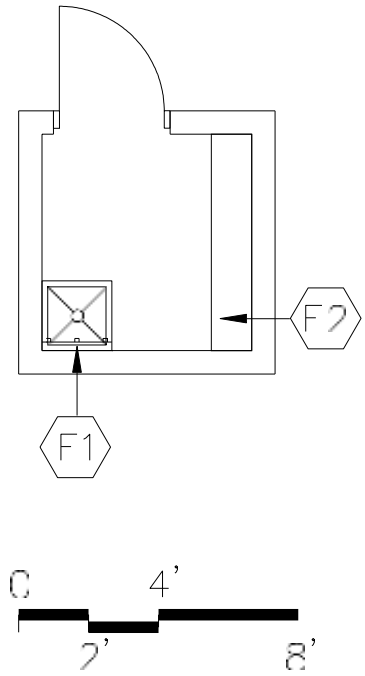
1. Where individual restrooms are provided in lieu of large group restrooms, refer to H-BS-10.

LARGE GROUP RESTROOMS
H-BS-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Ceramic mosaic tile	093000
Optional: porcelain tile,	093000
rubber, resinous flooring,	096723
or unbacked sheet vinyl	***096500 with***
welded seams	
Base:	
Ceramic mosaic tile base	093000
Optional: structural glazed tile,	096616
porcelain tile base,	093000
resinous flooring, or	096723
integral vinyl base	***096500***
Ceiling:	
Suspended, acoustical	095113
Option: Abuse resistant gypsum wallboard	092116
Walls:	
Painted concrete masonry unit	042000/099100
LOOSE FURNISHINGS:	
Waste Receptacles	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispensers	102813
F2 24" x 60" mirror	102813
F3 Toilet tissue holders	102813
F4 36" and 42" grab bar	102813
F5 Soap dispensers	102813
F6 Toilet partitions	102113
F7 Sanitary product dispenser	102813
F8 Sanitary product receptacles	102813
F9 16" x 24" mirrors with shelf (optional)	102813
F10 Shelves (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closets	224000
Wall-mounted urinals	224000
Wall-mounted lavatories or wash fountains	224000
Wall hydrants	224000
Plumbing connections	224000/221116/221119
Floor drains	Div. 22
Drinking water cooler	224000
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Emergency lighting	265100
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Optional: electric hand dryers



PROGRAM ACTIVITIES:
- Space for storage of custodial supplies throughout the building

SPATIAL RELATIONSHIPS:
- Near large group restrooms

ENVIRONMENTAL CONSIDERATIONS:

CAPACITY:	N/A
SIZE:	50 SF

NOTES:

CUSTODIAL CLOSET
H-BS-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
Resilient base	096500
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
Shelving (optional)

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Mop holder	102813
F2 Fixed or loose shelving (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Service sink or floor drain sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726

Communications:
N/A

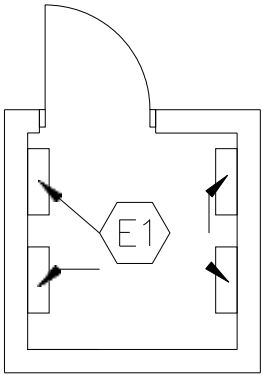
Electronic Safety and Security:
N/A

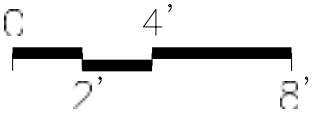
Miscellaneous:
N/A

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

Space to be determined by Design Professional.





PROGRAM ACTIVITIES:
- Space for electrical wiring and panels

SPATIAL RELATIONSHIPS:
N/A

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	50 SF

NOTES:

ELECTRICAL CLOSET
H-BS-3

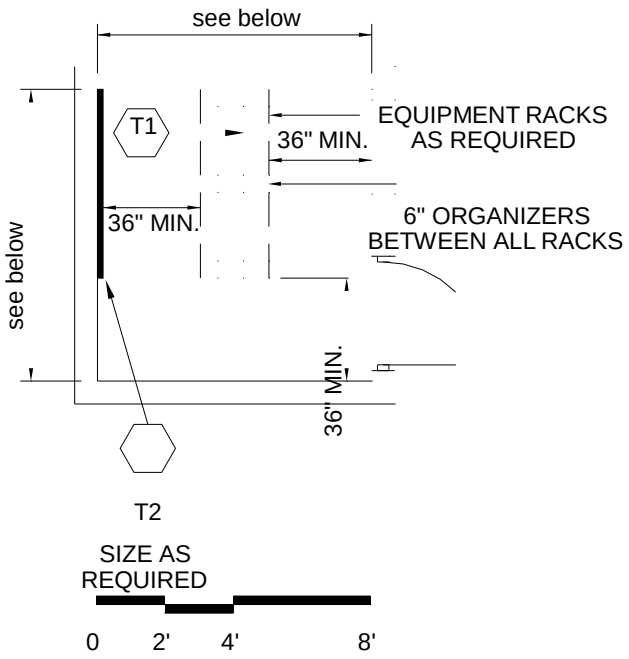
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls:	
Unpainted concrete masonry units	042000

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
E1 Electrical switchboard	262413/262416
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Space for technology needs

SPATIAL RELATIONSHIPS:
N/A

ENVIRONMENTAL CONSIDERATIONS:

CAPACITY: N/A

SIZE:

TR Serving Zone > 188 ports:
minimum 10 ft. x 12 ft.
TR Serving Zone of 96-188 ports:
minimum 8 ft. x 10 ft.
TR Serving Zone of < 96 ports:
minimum 8 ft. x 8 ft.

NOTES:
1. This is an example of a telecommunications room. The equipment and layout will vary from school district to school district.
2. ***Verify and coordinate TR quantity, size and location with technology designer during programming phase.***

3. Multiple TR's may be required.

TELECOMMUNICATIONS ROOM
H-BS-4

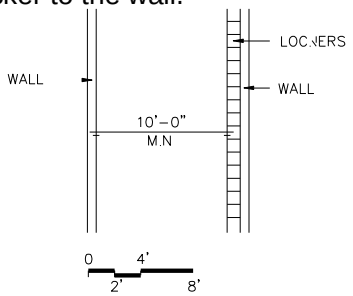
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete,	033000
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls:	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Cooling and Exhaust air system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
1 duplex receptacle	262726
Receptacles for data equipment	262726
Telecommunications Grounding	270526/260526
Standby power	263213/263600
Communications:	
T1 Technology equipment	
Central sound system	275123
Telephone Wiring	271313/271513
Integrated Telephone System	273123
Video Wiring	271543
Digital on Demand Delivery System	274125
Local Area Network Wiring	271513/271323
Local Area Network Electronics	272100/273123
Grounding & Infrastructure Equipment	270526/271100
T2 ***3/4***" plywood back board	271313
Electronic Safety and Security:	
Security System	281300/281600/282300
Miscellaneous:	
N/A	

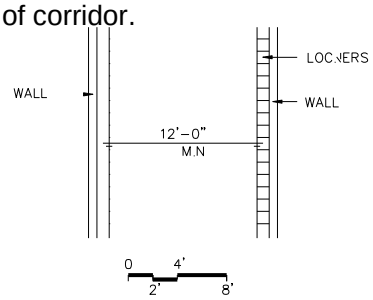
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

- Corridors shall be a minimum of 8 feet wide if no lockers are located in the corridor.
- Corridors shall be a minimum of 10 feet wide if lockers are located on one side of the corridor. The corridor width is from the face of the locker to the wall.



- Corridors shall be a minimum of 12 feet wide if lockers are located on each side of the corridor. The corridor width is from the face of the locker to the face of locker on opposite side of corridor.



- Instructional and activity areas shall be accessible by corridors without passing through another instructional or activity area.
- The corridors are to meet the existing requirements of applicable codes
- Stairs, ramps, and elevators are included under the corridor category.
- It is recommended that stairs in multi-story buildings not be enclosed unless required by code.

CAPACITY: Based on size of program area
SIZE: Based on the sum of the program areas excluding building services, multiplied by 20%

PROGRAM ACTIVITIES:
- Circulation space

SPATIAL RELATIONSHIPS:
N/A

ENVIRONMENTAL CONSIDERATIONS:

VESTIBULES
- Area of vestibules to be included within area allotted for corridors.
- Width of vestibules can be no less than minimum width of adjacent corridor.
- Minimum corridor length to be 8'-0" between doors.
- Vestibules are to be provided at major entrances/exits and may be eliminated at minor entrances/exits as determined by the Design Professional.
- Provide automatic door operator on one leaf of main entrance/exit door and related vestibule door.
- Provide a five-step or fifteen foot walk off mat extending from main outside entry doors into the building and as wide as the entry doors.
- Option – entrance floor grilles. See Chapter 9, Section 124816.
- ***Lockers are not part of the construction factor, but are a part of the circulation/corridor factor.***

NOTES:

CORRIDORS
H-BS-5

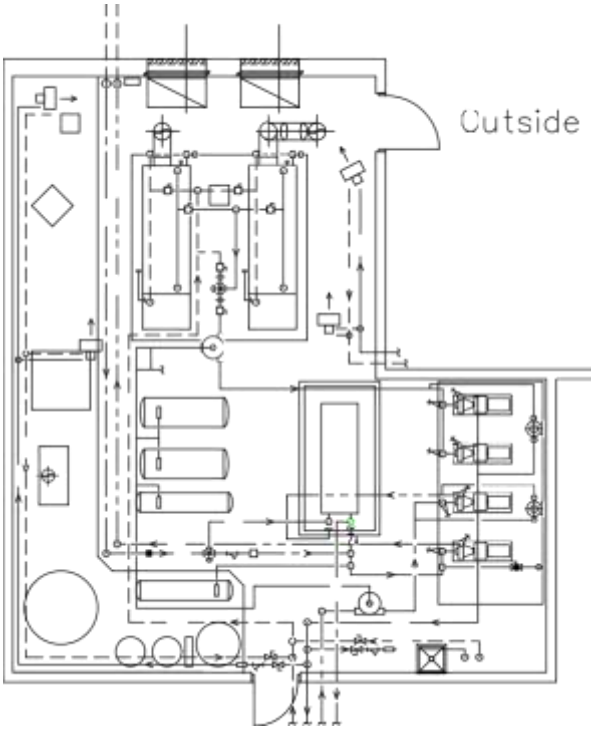
FINISHES[1]:	Spec. Ref.#
Flooring[2]:	
Linoleum, ET, sheet vinyl,	096516
Carpet, carpet tile, rubber,	096500
polished concrete finishing,	096816
or colored concrete finishing	096813
	033510
	033519
Base:	
Resilient base	096500
Optional: structural glazed tile	042000
Ceiling:	
Suspended, acoustical	095113
Option in vestibules: Abuse resistant gypsum wallboard	092116
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Recycling bins and waste receptacles	
Fixed or loose benches	

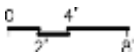
NOTE: At entries adjacent to dining/ commons area, match dining/commons flooring.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Corridor lockers	105113
Fire extinguishers and cabinets	104400
Recessed vinyl floor mats or surface mats	124813
Tack board or tackable wall surface	101100
Fire Suppression:	
N/A	
Plumbing:	
Drinking water coolers	224000
HVAC:	
Supply/return air system	Div. 23
Temperature control from adjacent instructional spaces	230923
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Duplex receptacles	262726
Double duplex receptacle adjacent to each video port	262726
Means of egress lighting per code	265100
Emergency lighting	265100
Communications:	
Video ports	271543
Data ports	271523
Pay phone terminals	271513/273113
Central sound system	275123
Clocks	275313
Wireless access points	271523/272100/272133
Electronic Safety and Security:	
Life safety devices per code	283111
Security System	281300/281600/282300
Miscellaneous:	
Display cases and Directory	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Linoleum, VET, or sheet vinyl is to be used in vestibules, stairwells, and elsewhere as appropriate. Porcelain tile is optional in lobbies, with resilient or structural glazed tile base.

Space to be determined by Design Professional.





CAPACITY: Based on size of program area

SIZE: Based on the sum of the program areas excluding building services, multiplied by 6.9%

PROGRAM ACTIVITIES:

- Space for mechanical and electrical equipment

SPATIAL RELATIONSHIPS:

- Accessible for maintenance and repair
- Access to outside
- Isolate from main area of building
- Near loading/receiving area
- Near custodial area

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control –
  wall minimum STC 60
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. This is an example of a mechanical room. The equipment and layout will vary depending upon the heating, ventilating, and air conditioning system used.
2. A penthouse is considered a mechanical room.

MECHANICAL/ELECTRICAL SPACE/DECKS

H-BS-6

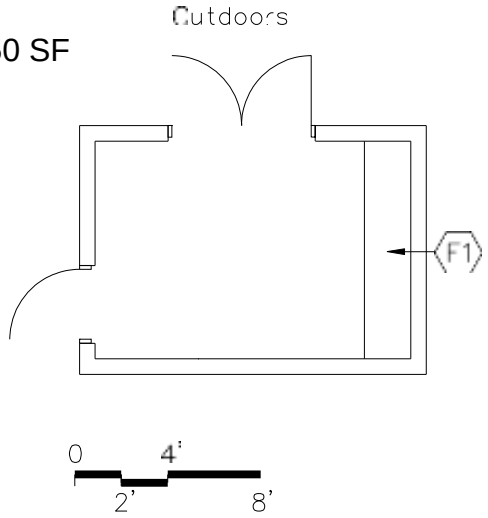
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls: (note 2)	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
To be determined by Design Professional	
Fire Suppression:	
To be determined by Design Professional	
Plumbing:	
To be determined by Design Professional	
HVAC:	
To be determined by Design Professional	
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Others as determined by Design Professional	
Communications:	
Central sound system	275123
Voice port and phone	271513/***273123***
Electronic Safety and Security:	
To be determined by Design Professional	
Miscellaneous:	
N/A	

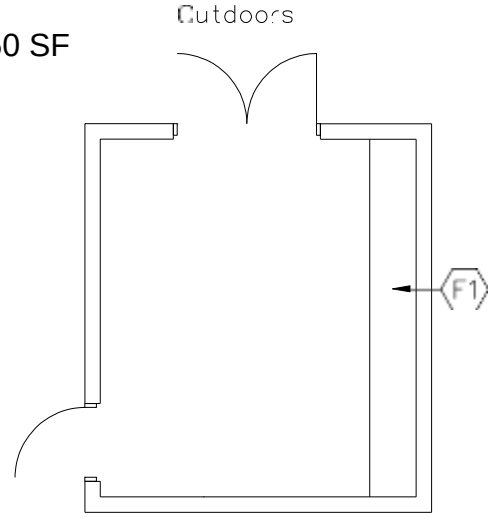
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Option for penthouse to use metal panel on concrete masonry or metal panel on metal framing wall systems.

150 SF



250 SF



CAPACITY: N/A
SIZE: 150 - 500 SF

PROGRAM ACTIVITIES:
- Space for storage of outdoor custodial equipment

SPATIAL RELATIONSHIPS:
- Near custodial office
- Near custodial workroom
- Direct access to outdoors

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

STORAGE AREA
H-BS-7

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls:	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS	
N/A	

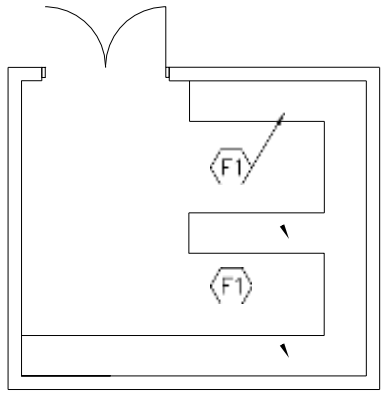
FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 8'-20' of open shelving , depths may vary (fixed or loose)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

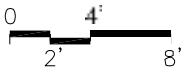
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.

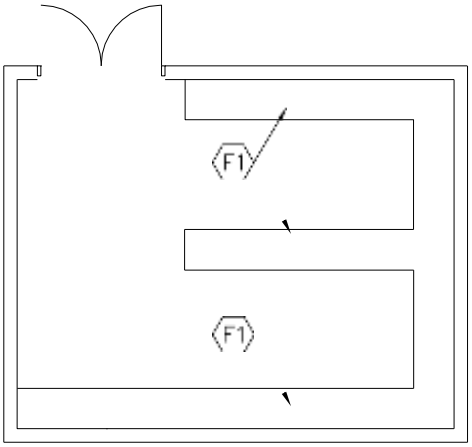
Space to be determined by Design Professional.

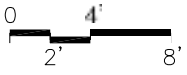
250 SF





400 SF





CAPACITY: N/A
SIZE: 250 - 800 SF

PROGRAM ACTIVITIES:

- Storage for paper products, utensils, supplies, etc., to be used throughout the entire building

SPATIAL RELATIONSHIPS:

- Near loading/receiving area
- Direct access to building circulation

ENVIRONMENTAL CONSIDERATIONS:

NOTES:

CENTRAL STORAGE AREA
H-BS-8

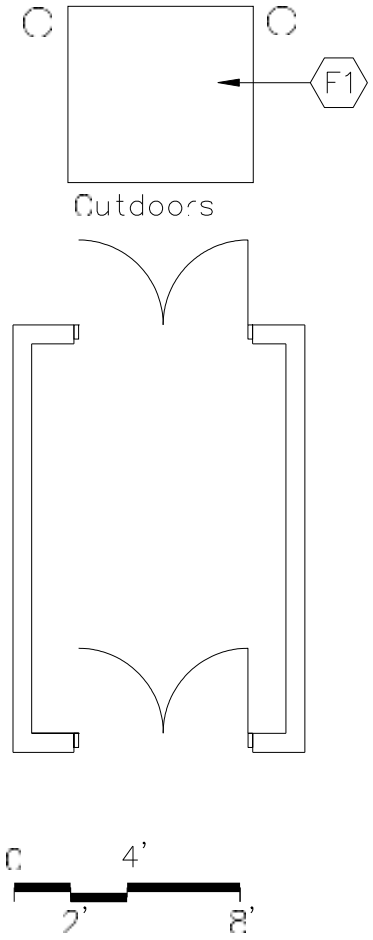
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls:	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 26' - 32' of open shelving (total), depths may vary (fixed or loose)	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.

Recycling space to be determined by Design Professional.



CAPACITY: N/A
SIZE: 120 SF

PROGRAM ACTIVITIES:
- Delivery of materials and goods to be used throughout the building

SPATIAL RELATIONSHIPS:
- Near food service spaces
- Near central storage area
- Near mechanical room
- Adjacent to loading dock

ENVIRONMENTAL CONSIDERATIONS:
N/A

MISCELLANEOUS:
- Refer to Chapter 3, Section 3201, for site vehicular circulation requirements

NOTES:

LOADING/RECEIVING AREA

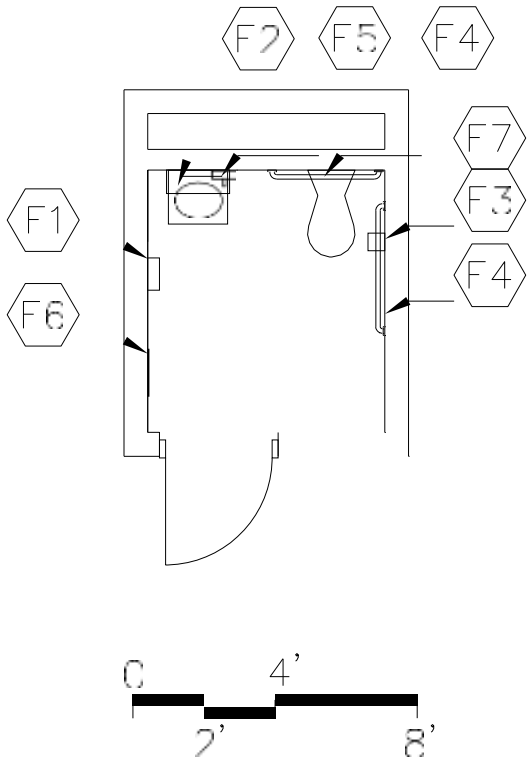
H-BS-9

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	
Walls:	
Epoxy-painted concrete masonry units	042000 / 099100
LOOSE FURNISHINGS	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Loading dock leveler and dock bumpers	111300
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Personal and health needs for the building occupants

SPATIAL RELATIONSHIPS:
- Near academic area

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

CAPACITY: 1 person
SIZE: ***60*** SF
ANCILLARY SPACES:

NOTES:

1. Separate restrooms must be provided for male and female students

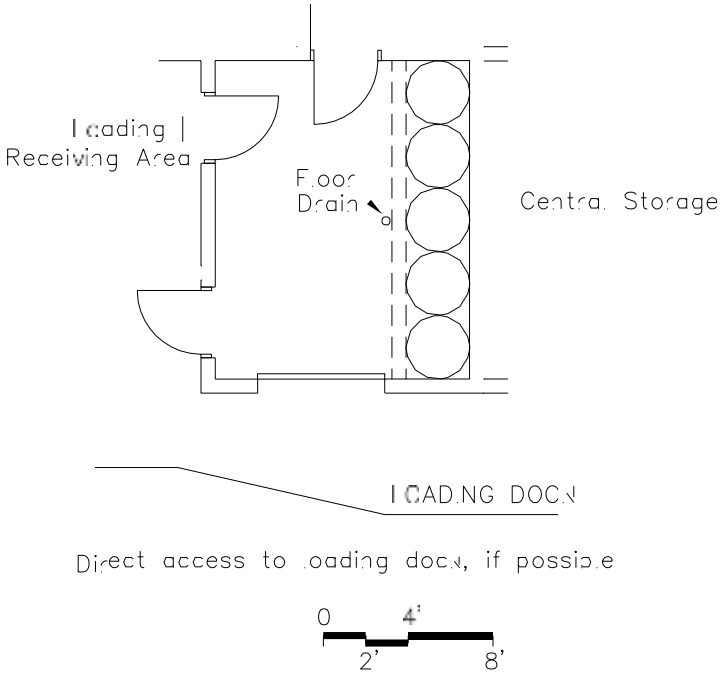
RESTROOM
H-BS-10

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, ***or*** sheet vinyl	096500
Optional: quarry tile, or	093000
resinous flooring	096723
Base:	
Resilient base	096500
Optional: quarry tile, resinous	093000
flooring, or integral vinyl cove base	096723
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Wastebasket	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 Mirror with shelf above sink(optional)	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Sanitary product dispenser	102813
F7 Sanitary product receptacle	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. F6 and F7 required for female restroom only.



PROGRAM ACTIVITIES:
- Provide recyclable collection for paper, cardboard, glass, plastics and metals.

SPATIAL RELATIONSHIPS:
- Near food service spaces
- Near central storage area
- Near mechanical room
- Adjacent to loading dock

ENVIRONMENTAL CONSIDERATIONS:
N/A

MISCELLANEOUS:
- Refer to Chapter 3, Section 3201, for site vehicular circulation requirements

CAPACITY:	N/A
SIZE:	80 - 160 SF

NOTES:

1. Contact local collection agency to see if co-mingling of materials is permitted. Design team should meet the LEED intent when designing the recycling area.

RECYCLING ROOM
H-BS-11

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	
Walls:	
Epoxy-painted concrete masonry units	042000 / 099100
LOOSE FURNISHINGS	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Floor drain	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

PURPOSE The purpose of this Chapter is to provide the Vocational School District and the Design Professional with the requirements and relationships for the Career-Technical School spaces identified in Chapter 2: Bracketing.

INTRODUCTION This Chapter begins with an overall building diagram showing how the various areas of a Career-Technical school could be arranged. The diagram is meant only to demonstrate the relationships between various parts of the building.

Along with the overall building diagram, there are various program area diagrams throughout this chapter which demonstrate how specific spaces may relate to each other within a particular program area.

NO SMOKING SIGNS As required by the Ohio Revised Code, post “No Smoking” signs at every entrance door into the building. If a door is for exit only, there is no need for a sign. Post the signs on entrance glass or other appropriate surface. Signs shall contain a telephone number for reporting violations. (866/559-6446)

DIAGRAM Diagrams of the space have been developed to show how some of the features and loose furnishings may be organized. The space is not required to be designed in the configuration shown.

PROGRAM ACTIVITIES Program activities indicate the type of activities that may occur in the space. These activities will vary from school district to school district depending on the educational program.

SPATIAL RELATIONSHIPS Relationships of a particular room to other spaces and activities have been identified to assist the Design Professional in the design of the facility.

ENVIRONMENTAL CONSIDERATIONS Environmental considerations are items that may affect the educational program. They are the basis of some the requirements of Finishes, Features, Plumbing, HVAC, Electrical, and Technology. ***Storage rooms shall not be required to be exhausted if there is no objectionable transfer (odors or hazardous gas) to adjacent spaces.***

FINISHES The finishes stated for the spaces have been developed based on the function of the room. The spaces adjacent to the room or a building system may change the finishes stated.

OPERABLE WINDOWS Operable windows are optional in exterior window fenestration.

AREA Square foot area given for the room is the required area. This area is given in net square feet – defined as the area within the walls of the room.

LOOSE EQUIPMENT Loose equipment, although shown in some space plates, is not generally purchased through the classroom facilities assistance program (CFAP). This is the responsibility of the Career-Technical School.

LOOSE FURNISHINGS

Loose furnishings are to be funded by the Ohio School Facilities Commission. The loose furnishings requirements are to be coordinated with the district's educational program. As an example, some spaces may require tables with student chairs and other spaces may require student desks with chairs.

* The intent of the loose furnishings shown on the space plates is not necessarily to be all-inclusive of furniture options or mandate items which may not be needed in a particular district, but rather to provide a general concept of how a particular space could be laid out. Some items listed as loose furnishings could be provided as fixed casework and items listed as fixed casework, if appropriate, could be provided as loose furnishings depending on the building design and types of technology used. Construction and loose furnishings budgets should be coordinated appropriately.

FIXED EQUIPMENT

Fixed equipment which is defined as being attached to and therefore becoming a part of the building structure and having a useful life of greater than five years is provided by CFAP.

FEATURES

Features identified on the space plates are recommended for these rooms. These features include Fixed Items, Plumbing, Heating, Ventilating and Air Conditioning, Electrical, and Technology systems as well as Miscellaneous Items. Exact sizes of items may need to be modified slightly to interface with the exact size and proportions of the actual space.

Casework and Visual Display Boards should reflect the needs of the district's educational program. The intent of this list is not to mandate casework or visual display boards that may not be needed by a particular district, but rather to be used as a guideline for items that are generally used in this type of space. Some items listed as "fixed casework" could also be provided by mobile casework or loose furnishings if appropriate. Construction and loose furnishings budgets should then be adjusted appropriately.

TECHNOLOGY

The location of projectors, in spaces where required, shall be carefully coordinated between the Design Professionals in relation to the projection surface and ADA requirements. Note that classroom projectors are required to be ultra-short throw interactive projectors (refer to Section 274119). Classroom instructor AV interfaces and AV equipment are to be comprised of digital systems. Coordination is required between the Design Professionals to accommodate the digital solution that is selected by the District. Refer to Section 271543 and Figure 1, within that section, for a general overview of classroom equipment and interconnectivity requirements. The District's Digital Media Management System requires Design Professionals coordination for adequate dedicated rooftop space for current and potential future system antennas for incorporation of digital broadcast media sources as selected by the District (refer to Section 274125). Design Professionals should especially note that the classroom's dedicated 4 student data

ports and associated work stations have been removed. A robust Wireless Local Area Network (WLAN), capable of supporting 1:1 and/or Bring Your Own Device (BYOD) throughout all educational areas is now required. Refer to Section 272133 for all of the new requirements for the District's WLAN.

OPTIONS

1. Some finishes and features have options noted on the space plates. Linoleum (spec.section 096516) or rubber sheet flooring is an option to resilient flooring or carpet. Steel stud and abuse-resistant wallboard partition is an option to concrete masonry between classrooms, labs, and other academic spaces.
2. The science lab layouts shown do not restrict or reflect the variety of arrangements available to the Design Professional.

LIGHTING

Interior lighting shall be controlled by occupancy sensors, automatic timed lighting controlled system or a combination of both to comply with ASHRAE 90.1. Exterior lighting shall be controlled by photosensor, astronomical time clock, or temperature control system to comply with ASHRAE 90.1. to automatically turn lighting off when sufficient daylight is available. Interior and exterior lighting allowable power densities shall be in compliance with ASHRAE 90.1.

ELECTRICAL

A room safety push-button (kill) switch capable of de-energizing room electrical power shall be provided in rooms where machines, tools, apparatus, etc. could cause physical harm to student. Button shall be connected to electrical circuits, panelboards, bus duct, etc. that serves such tools, apparatus, etc.

DESIGN CONSIDERATIONS

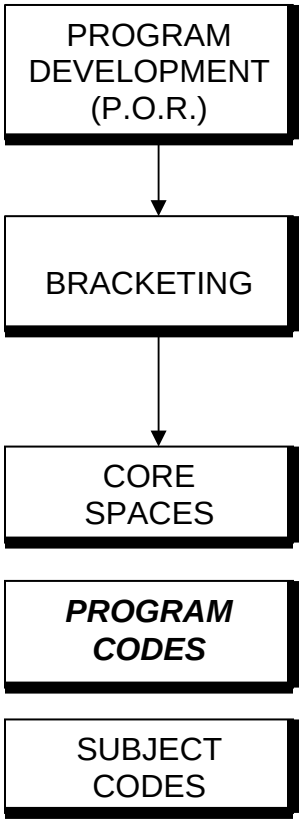
In order to accommodate school districts in meeting the unique requirements of it's Career-Technical students, the OFCC has provided spaces that accommodate instructional and support activities. The layout and organization of those spaces is critical to the educational success of the school. Therefore, during the planning and design of the career technical school, the district and design team should take into consideration some of the following factors.

Educational

- Current and future trends in Career-Technical Educational programs and services
- Ohio Department of Education Career-Technical Pathways
- Current and future programs being provided by the school district
- Type and number of students in each career pathway and program type
- It is important for the design team to understand how students receive career-technical and academic instruction. Some students attend their regular high school in the morning and come to a career-technical school in the afternoon. Others may stay at the career-technical school all day.

Layout and Organization

- Based on the programs provided by the district, select the laboratory spaces, related and support spaces needed to adequately deliver the curriculum
- Related spaces such as classrooms, storage, restrooms, and reference rooms should be arranged to allow for use by multiple programs. For example, CT Program Types 4-7 commonly share classrooms. Flexibility and adaptability should be considered during the planning and design phases.
- Consider current and future program changes and how instructional and support spaces can be designed to accommodate change. Look for commonalities in spaces that would allow multiple use of spaces.
- Consider providing Extended Learning Areas for use by individuals and small groups
- Consider providing common student gathering areas
- Movement of students, staff, supplies, and maintenance personnel is a primary consideration.
- Encourage members of the district and design team to research how new career-technical schools throughout the country are being designer



Determined previous to this chapter between school district and design professional. Building program can be core spaces, Career-Technical subject codes, or a combination of both.

Determined in Volume One, Chapter 2 of the Design Manual.

Once building program is determined, Chapter 6 can be utilized to develop individual spaces. Core spaces are located at the beginning of Chapter 6. These spaces include Academic Core, Special Education/Student Service, Administrative, Media Center, Student Dining, Food Service, Custodial, General Service, and Building Service spaces.

The remainder of Chapter 6 describes the seven Program Types in which all ODE recognized subject codes are placed.

Once the architect knows which Subject Code or CTE Program Code will be in the building program, these codes can be found in the index. An index of all Subject Codes, Program Type, CTE Program Code, and Program Name follows these instructions. As an example, the program name, "Cosmetology", is in Program Type 4. Turning to the appropriate tab, one will find a general description, a program example, lab example, lab descriptions, and plates for all support spaces.

Since a program consists of a lab, possible program specific rooms, and typical support space, the design professional must review the entire Program Type section. Lab descriptions are in alphabetical order and follow the Lab example plate. These summaries describe the contents and systems needed for each specific lab (and only the lab). Following these lab summaries are plates and descriptions for the remaining support spaces.

Certain Program Types (3, 4, 6, and 7) require the addition of program specific spaces. These are rooms needed in addition to the lab and typical support spaces. The descriptions of these spaces can be found directly after the summary of a particular lab.

With sizes and descriptions of all spaces within a particular subject code known, the design professional can proceed with the design of the subject code. Graphic plates of the labs are not provided due to the wide variety of teaching philosophies throughout the Career-Technical system within the State of Ohio. Each design professional is permitted to locate all listed items and equipment at their discretion after consultation with the school district.

The following tables, which are sorted by program name and number, relate the unique subject code for each specialized program and the Program Type space that would be most appropriate for that curriculum delivery. The page numbers locate the program space descriptions in this Design Manual Career-Technical Section.

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SUBJECT CODE	PROGRAM TYPE	CTE PROGRAM CODE	PROGRAM	PAGE NUMBER
14.0100	1	G0	Accounting	6311-7
14.0300	1	C0	Administrative and Professional Support	6311-8
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	7	***TA***	***Air Transportation***	***6317-7***
17.0401	7	T0	Aircraft Maintenance	6317-7
	2	***JM***	***Allied Health and Nursing***	***6312-16***
01.0901	7	A2	Animal Science and Management (Equine)	6317-11
01.0901	4	A2	Animal Science and Management (small animal)	6314-7
17.0301	6	T1	Auto Collision Repair	6316-10
17.0303	5	T2	Auto Specialization	6315-9
17.0302	6	T3	Auto Technology	6316-12
17.0370	1	R0	Automation and Robotics	6311-9
17.0400	1	T4	Aviation Occupations	6311-10
	2	***F0***	***Biomedical Science***	***6312-7***
01.2000	2	A3	***Biotechnology for Food, Plant & Animal Sciences***	6312-8
17.1004	5	D0	Brick, Block and Cement Masonry	6315-10
17.1011	5	D1	Building & Property Maintenance	6315-11
17.1017	5	D2	Building Technology	6315-11
14.0800	1	C1	Business Management	6311-11
17.2810	4	P0	Career Paths for the Law Profession	6314-14
17.1001	6	D3	Carpentry	6316-16
07.1100	4	J1	Clinical Health Care Services	6314-17
07.0906	2	J2	Community Health Aide	6312-10
17.1805	6	D4	Construction - Design/Build	6316-19
17.1806	6	D5	Construction - Management	6316-19
	6	***DF***	***Construction Design and Management***	***6316-21***
17.2602	4	M1	Cosmetology	6314-20
17.2802	4	P1	Criminal Justice	6314-14
17.2815	2	P2	Criminal Science Technology	6312-8
33.0005	4	L0	Culinary and Food Service Operations	6314-26
17.1100	5	D6	Custodial Services	6315-12
07.0101	4	J3	Dental Assistant	6314-29
07.0103	2	J4	Dental Laboratory Technology	6312-11
07.4820	4	J5	Diagnostic Pathway	6314-32
35.0201	3	E0	Early Childhood Education	6313-7
17.1002	5	D7	Electrical Trades	6315-13
17.1503	1	R1	Electronics	6311-9
17.2811	2	P3	Emergency Medical Technician - Secondary	6312-12
17.1600	2	P1	Energy Science	6312-7
	2	***F6***	***Engineering and Design***	***6312-7***
	2	***F2***	***Engineering Science***	***6312-7***
17.1810	6	F3	***Engineering Technology***	6316-21
04.4110	3	S1	Entrepreneurship	6313-15
17.0100	5	D8	Environmental Control Technologies	6315-14
07.0410	2	J6	***Exercise Science and Sports Medicine***	6312-13
14.0110	1	G1	Financial Services	6311-12
17.2801	4	P4	Fire Fighter Training	6314-34
	4	***P6***	***Firefighting and Emergency Medical Services***	***6314-34***
01.1001	6	A4	Food Science and Technology	6316-23
17.0408	3	T5	Ground Operations	6313-19

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SUBJECT CODE	PROGRAM TYPE	CTE PROGRAM CODE	PROGRAM	PAGE NUMBER
	6	***T9***	***Ground Transportation***	***6316-12***
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07.4840	2	J8	Health Support Pathway	6312-14
07.0913	2	J9	Health Unit Coordinator	6312-15
17.1003	5	D9	***Heavy Equipment Operations***	6315-15
07.0307	2	JA	Home Health	6312-10
01.0601	6	A5	Horticulture	6316-27
01.0201	6	A1	***Industrial Power Technology***	6316-7
14.0210	1	N0	Information Support & Services	6311-16
17.1012	5	R2	Integrated Systems Technology	6315-15
14.0240	1	N1	Interactive Media	6311-16
17.1005	5	DA	***Interior Design Applications***	6315-17
14.0310	1	C2	Legal Management and Support	6311-8
33.0010	3	L1	Lodging	6313-21
17.1300	5	R3	Manufacturing Design and Development	6315-18
	6	***R7***	***Manufacturing Operations***	***6316-33***
04.0800	3		Marketing	6313-39
04.0815	3	S3	Marketing Communications	6313-15
04.0810	3	S4	Marketing Management	6313-15
	6	***DE***	***Mechanical, Electrical and Plumbing***	***6316-21***
34.0015	4	B0	Media Arts	6314-36
07.0904	4	JB	Medical Assistant	6314-17
07.4850	2	J0	***Medical Bioscience***	6312-7
07.0203	2	JC	Medical Laboratory Technology	6312-8
14.0320	1	C3	Medical Management and Support	6311-13
17.1200	6	T7	Medium/Heavy Truck Technician	6316-29
01.0701	5	A6	Natural Resource Management	6315-19
14.0220	1	N2	Network Systems	6311-16
07.0303	4	JD	Nurse Assisting	6314-17
07.0603	4	JE	Optometric Occupations	6314-39
07.0994	4	JF	Patient Care Technician	6314-41
34.0020	4	B1	Performing Arts	6314-44
07.0912	2	JG	Pharmacy Technician	6312-7
17.1007	5	DB	Plumbing & Pipefitting	6315-20
17.3100	5	T8	Power Equipment Technology	6315-21
17.1402	5	F4	Power Transmission	6315-22
07.0302	2	JJ	Practical Nursing	6312-16
17.2302	6	R5	Precision Machining	6312-33
17.2808	4	P5	Private Security	6314-14
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	6	***DD***	***Structural Systems***	***6316-21***
04.1900	3	S0	Supply Chain Management	6313-15
07.0305	4	JK	Surgical Technology	6314-46
17.1504	1	F5	Telecommunications	6311-14
07.4830	2	JL	Therapeutic Pathway	6312-14
33.0020	1	L2	Travel and Tourism	6311-15
34.0005	1	B2	Visual Design and Imaging	6311-16
17.2306	5	R6	Welding & Cutting	6315-23
17.3601	6	DC	Wood Product Technologies	6316-36

** Subject Codes as Program Identifiers are being phased out. New programs are no longer associated with a Subject Code.

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SUBJECT CODE	PROGRAM TYPE	CTE PROGRAM CODE	PROGRAM	PAGE NUMBER
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01.0201	6	A1	***Industrial Power Technology***	6316-7
01.0901	7	A2	Animal Science and Management (Equine)	6317-11
01.0901	4	A2	Animal Science and Management (small animal)	6314-7
01.2000	2	A3	***Biotechnology for Food, Plant & Animal Sciences***	6312-8
01.1001	6	A4	Food Science and Technology	6316-23
01.0601	6	A5	Horticulture	6316-27
01.0701	5	A6	Natural Resource Management	6315-19
34.0015	4	B0	Media Arts	6314-36
34.0020	4	B1	Performing Arts	6314-44
34.0005	1	B2	Visual Design and Imaging	6311-16
14.0300	1	C0	Administrative and Professional Support	6311-8
14.0800	1	C1	Business Management	6311-11
14.0310	1	C2	Legal Management and Support	6311-8
14.0320	1	C3	Medical Management and Support	6311-13
17.1004	5	D0	Brick, Block and Cement Masonry	6315-10
17.1011	5	D1	Building & Property Maintenance	6315-11
17.1017	5	D2	Building Technology	6315-11
17.1001	6	D3	Carpentry	6316-16
17.1805	6	D4	Construction - Design/Build	6316-19
17.1806	6	D5	Construction - Management	6316-19
17.1100	5	D6	Custodial Services	6315-12
17.1002	5	D7	Electrical Trades	6315-13
17.0100	5	D8	Environmental Control Technologies	6315-14
17.1003	5	D9	***Heavy Equipment Operations***	6315-15
17.1005	5	DA	***Interior Design Applications***	6315-17
17.1007	5	DB	Plumbing & Pipefitting	6315-20
17.3601	6	DC	Wood Product Technologies	6316-36
	6	***DD***	***Structural Systems***	***6316-21***
	6	***DE***	***Mechanical, Electrical and Plumbing***	***6316-21***
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07.4850	2	J0	***Medical Bioscience***	6312-7
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07.0906	2	J2	Community Health Aide	6312-10
07.0101	4	J3	Dental Assistant	6314-29
07.0103	2	J4	Dental Laboratory Technology	6312-11
07.4820	4	J5	Diagnostic Pathway	6314-32
07.0410	2	J6	***Exercise Science and Sports Medicine***	6312-13
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07.0904	4	JB	Medical Assistant	6314-17
07.0203	2	JC	Medical Laboratory Technology	6312-8
07.0303	4	JD	Nurse Assisting	6314-17
07.0603	4	JE	Optometric Occupations	6314-39
07.0994	4	JF	Patient Care Technician	6314-41
07.0912	2	JG	Pharmacy Technician	6312-7
07.0302	2	JJ	Practical Nursing	6312-16
07.0305	4	JK	Surgical Technology	6314-46
07.4830	2	JL	Therapeutic Pathway	6312-14
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33.0005	4	L0	Culinary and Food Service Operations	6314-26
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33.0020	1	L2	Travel and Tourism	6311-15
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14.0210	1	N0	Information Support & Services	6311-16
14.0240	1	N1	Interactive Media	6311-16
14.0220	1	N2	Network Systems	6311-16
14.0230	1	N3	Programming & Software Development	6311-16
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17.2802	4	P1	Criminal Justice	6314-14
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17.2811	2	P3	Emergency Medical Technician - Secondary	6312-12
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	4	***P6***	***Firefighting and Emergency Medical Services***	***6314-34***
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** Subject Codes as Program Identifiers are being phased out. New programs are no longer associated with a Subject Code.

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14.0310	1	C2	Legal Management and Support	6311-8
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14.0210	1	N0	Information Support & Services	6311-16
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14.0220	1	N2	Network Systems	6311-16
14.0230	1	N3	Programming & Software Development	6311-16
17.0370	1	R0	Automation and Robotics	6311-9
17.1503	1	R1	Electronics	6311-9
17.0400	1	T4	Aviation Occupations	6311-10
01.2000	2	A3	***Biotechnology for Food, Plant & Animal Sciences***	6312-8
	2	***F0***	***Biomedical Science***	***6312-7***
17.1600	2	F1	Energy Science	6312-7
	2	***F2***	***Engineering Science***	***6312-7***
	2	***F6***	***Engineering and Design***	***6312-7***
07.4850	2	J0	***Medical Bioscience***	6312-7
07.0906	2	J2	Community Health Aide	6312-10
07.0103	2	J4	Dental Laboratory Technology	6312-11
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07.4840	2	J8	Health Support Pathway	6312-14
07.0913	2	J9	Health Unit Coordinator	6312-15
07.0307	2	JA	Home Health	6312-10
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	2	***JM***	***Allied Health and Nursing***	***6312-16***
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17.2602	4	M1	Cosmetology	6314-20
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	4	***P6***	***Firefighting and Emergency Medical Services***	***6314-34***
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01.0701	5	A6	Natural Resource Management	6315-19
17.1004	5	D0	Brick, Block and Cement Masonry	6315-10
17.1011	5	D1	Building & Property Maintenance	6315-11
17.1017	5	D2	Building Technology	6315-11
17.1100	5	D6	Custodial Services	6315-12
17.1002	5	D7	Electrical Trades	6315-13
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17.1005	5	DA	***Interior Design Applications***	6315-17
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17.1012	5	R2	Integrated Systems Technology	6315-15
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17.1806	6	D5	Construction - Management	6316-19
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** Subject Codes as Program Identifiers are being phased out. New programs are no longer associated with a Subject Code.

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** Subject Codes as Program Identifiers are being phased out. New programs are no longer associated with a Subject Code.

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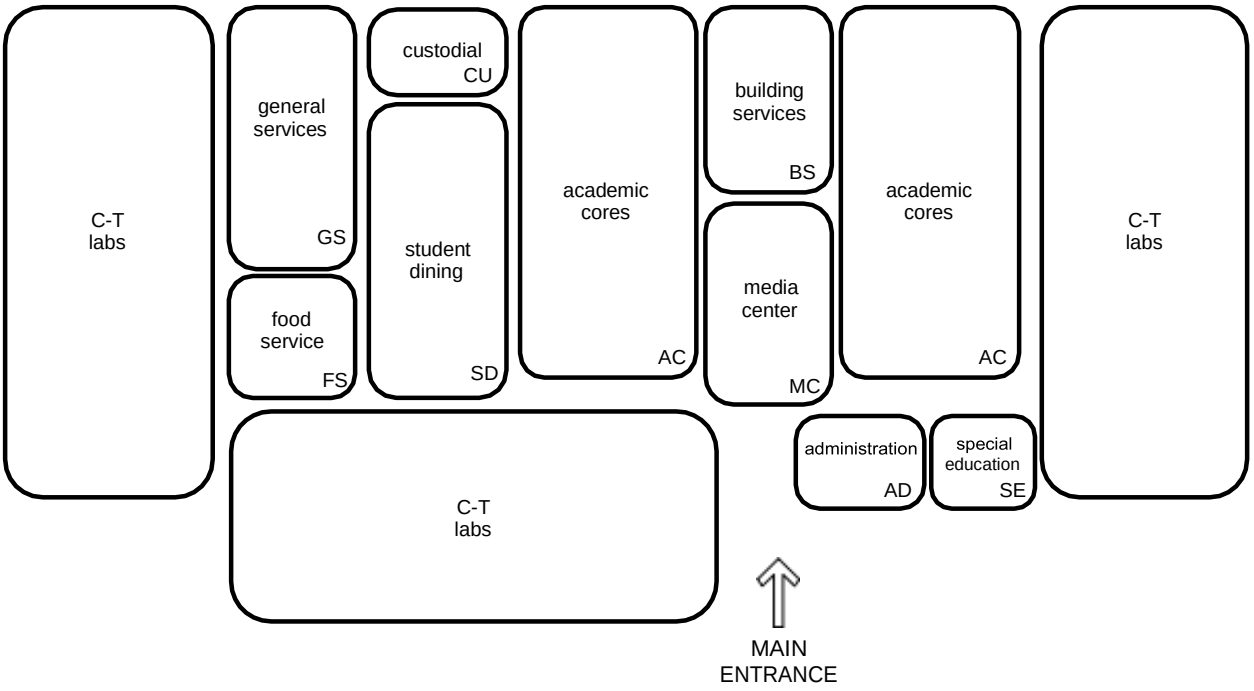

NOTES:

This is an example of how the spaces in a career-technical school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

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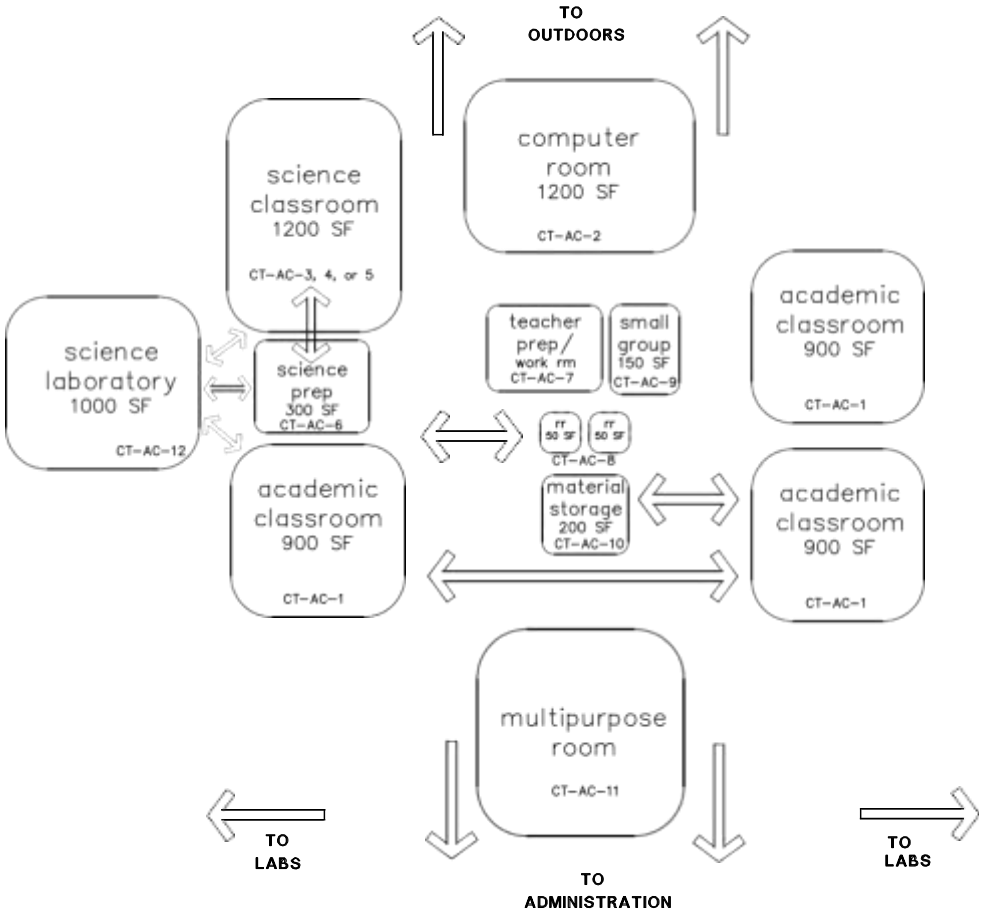

NOTE:

This is an example of how the academic spaces in a career-technical school could be arranged. This is only meant to demonstrate the relationships between various areas of the building.

Following are the Academic core space:

CT-AC-1 Academic Classroom
CT-AC-2 Computer Room
CT-AC-3 General Science / Physics
CT-AC-4 Biology
CT-AC-5 Chemistry
CT-AC-6 Science Prep
CT-AC-7 Teacher Prep / Workroom
CT-AC-8 Individual Restroom
CT-AC-9 Small Group Room
CT-AC-10 Material Storage
CT-AC-11 Multipurpose Room
CT-AC-12 Science Laboratory

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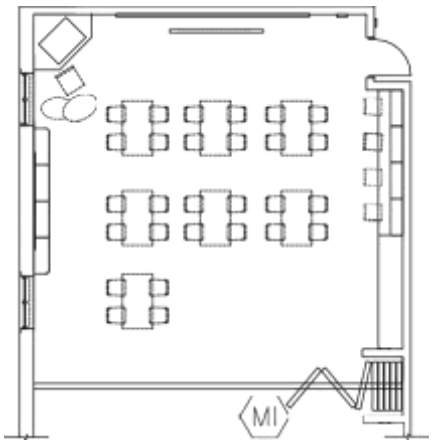
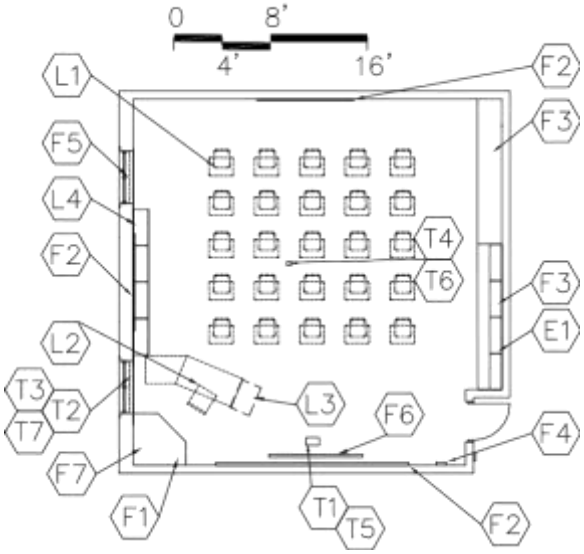


CLASSROOM WITH OPTIONAL FOLDING WALL



TYPICAL CLASSROOM

CAPACITY: 25 students
SIZE: 900 SF

PROGRAM ACTIVITIES:

- Large group, small group, and individual instruction
- Group and individual work
- Demonstrations
- Accommodates any of the core academic disciplines

SPATIAL RELATIONSHIPS:

- ☐ Near other academic core classrooms
- ☐ Proximity to large group restrooms
- ☐ Near teacher prep area/workroom
- ☐ Classrooms should be located in academic "zone" that is away from noisy or public activities
- ☐ Classrooms with access to media center and administrative services
- ☐ Flexibility of space

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be placed in this classroom or could be placed in a teacher prep area/workroom.

ACADEMIC CLASSROOM

CT-AC-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile	096816
Optional: ET, sheet vinyl,	096516
linoleum, or rubber	096500
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:

- L1 Student desks and chairs
- L2 Teacher desk or workstation/computer support and chair
- L3 File cabinet
- L4 9' of low bookcases (fixed or mobile)
- Wastebasket

Electronic Safety and Security:

- Life safety devices per code 283111

Miscellaneous:

- Pencil sharpener (optional)
- M1 Operable partitions between classrooms are optional 102226
- ***Duplex receptacle with dedicated circuit for wireless devices***

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123550
F2 20'-32' combination marker board, tack board and tackable wall surface	101100
F3 18'-24' combination base and wall cabinets	123550
F4 Pencil sharpener support (optional)	062000
F5 Windows with integral blinds	085113
F6 Projection screen (optional)	115213
F7 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000

Plumbing: N/A

HVAC:

Supply/return air system	Div. 23
Independent temperature control	230923

Electrical:

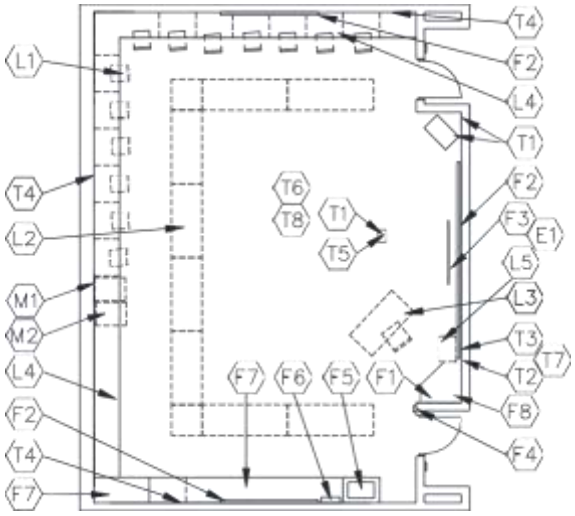
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726

Communications:

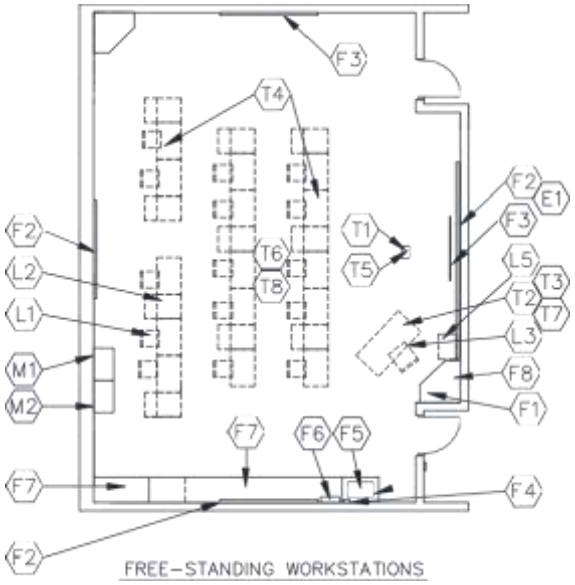
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 ***Wireless access point cable above ceiling***	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 ***Ultra-short throw interactive*** projector	274119
T6 Wireless access point (WAP) as determined by design – refer to Note 4	***272133***
T7 Classroom technology center videoport	***271543, 274116, 274119, 275127***

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Where appropriate, some casework may be mobile to add flexibility and become part of the loose furnishings.
4. ***Baseline includes WAP cable per classroom. WAP device quantity/placement per 272133 requirements.***



PERIMETER WORKSTATION LAYOUT



FREE–STANDING WORKSTATIONS

CAPACITY: 25 students
SIZE: 1,100 SF

PROGRAM ACTIVITIES:
- Individual computer instruction
- Group instruction
- Individual project work
- Media production
- Small group meetings

SPATIAL RELATIONSHIPS:
- ☐ Near academic core classrooms
- ☐ Near large group restrooms
- ☐ Near teacher prep area/workroom

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Flexibility of space

NOTES:

1. Loose furnishings shown represent two of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be placed in this classroom or could be placed in a teacher prep area/workroom.

COMPUTER ROOM

CT-AC-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile	096816
Optional: ET, sheet vinyl, linoleum, or rubber	096500 096516 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:

- L1 Student chairs
- L2 Work tables
- L3 Teacher desk or workstation/computer support and chair
- L4 Computer workstation furniture
- L5 File cabinet
- Wastebasket

L4 could be fixed casework.

Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	

The following items are to be funded by the school district:

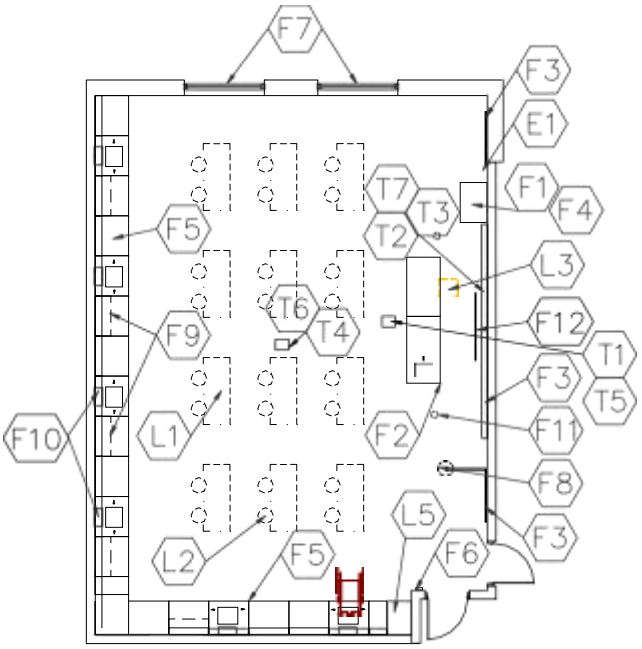
- M1 Classroom area network file server
- M2 Printer

- E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123550
F2 16'-32' combination marker board tack board & tackable wall surface	101100
F3 Projection screen (optional)	115213
F4 Pencil sharpener support (optional)	062000
F5 3' sink base cabinet (optional)	123550
F6 Towel dispenser (optional)	102813
F7 9'-20' combination base and tall cabinets	123550
F8 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting:	
computer aided lenses	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Classroom area network	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127
T8 Wireless access point cable above ceiling	271513

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



CAPACITY: 24 - 28 students
SIZE: 1,200 SF
ANCILLARY SPACES: Science Prep CT-AC-6

PROGRAM ACTIVITIES:

- Large group, small group, and individual instruction
- Group and individual work
- Laboratory experimentation
- Data collection and analysis
- Demonstrations
- Project work

SPATIAL RELATIONSHIPS:

☐ Near other science classrooms
☐ Adjacent to science prep room
- Classrooms located in academic "zone" that is away from noisy or public activities

☐ Classrooms with access to media center and administrative services
☐ Proximity to large group restrooms
☐ Flexibility of space

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Higher than normal ventilation requirements
- Moisture- and stain-resistant finishes
- Chemical-resistant counter tops

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Science casework layout to be determined by the school district.
3. Depending upon the educational program of the district, a tall wardrobe may be placed in this classroom or could be placed in a teacher prep area/workroom.
4. The layouts shown do not restrict or reflect the variety of arrangements available to the Design Professional.

GENERAL SCIENCE/PHYSICS

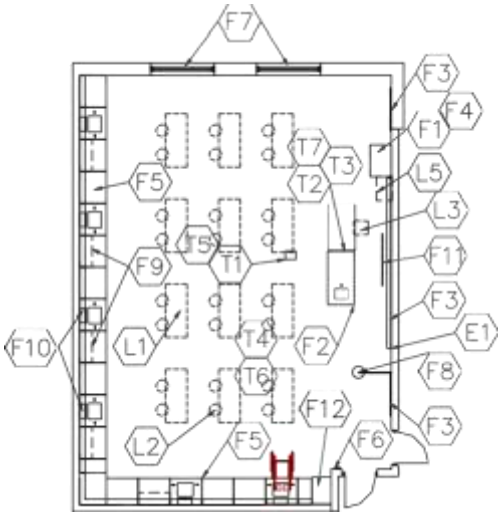
CT-AC-3

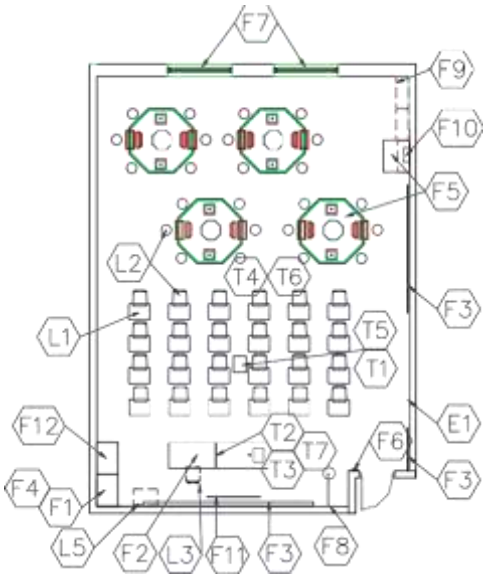
FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096500
rubber, ET, sheet vinyl,	096516
polished concrete finishing	033510
or colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	
099100	
LOOSE FURNISHINGS:	
L1 Student work tables	
L2 Student stools/chairs	
L3 Teacher chair or stool	
L4 Reserved	
L5 File cabinet	
Wastebasket	
L4 could be fixed casework.	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
E1 Duplex receptacle with dedicated circuit for wireless devices	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123553
F2 Demonstration table/teacher desk	123553 F3
20'-32' combination marker board, tack board and tackable wall surface	101100
F4 Technology support casework	123553
F5 40'-60' of lab casework with sinks	123553 F6
Pencil sharpener support (optional)	062000 F7
Windows with integral blinds	085113
F8 Emergency shower/eyewash	224000
F9 18'-24' of wall cabinets	123553
F10 Towel dispensers (optional)	102813
F11 2 eye hooks for demonstrations (optional)	055000
F12 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	224000/221116/221119
Emergency shower/eyewash connections	224000
Gas connections (optional)	226313
Master shutoff for gas	226313
Compressed air connections (optional)	221500
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Manual exhaust	Div. 23
Electrical:	
Fluorescent lighting: Illumination level: See Table 8600-5	265100
Multilevel switching	262726
Duplex receptacles at perimeter workstations and teaching wall	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting	265100
Means of egress lighting per code	265100
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port at demonstration table	271513 T4
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by design – refer to Note 4	272133
T7 Classroom technology center videoport	271543, 274116, 274119, 275127

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Master gas shutoff valve shall be clearly labeled, easily accessible, and immediately operable by staff.
4. Baseline includes WAP cable per classroom. WAP device quantity/placement per 272133 requirements.





CAPACITY: 24 - 28 students
SIZE: 1,200 SF
ANCILLARY SPACES: Science Prep CT-AC-6

PROGRAM ACTIVITIES:
- Large group, small group, and individual instruction
- Group and individual work
- Laboratory experimentation
- Data collection and analysis
- Demonstrations
- Project work

SPATIAL RELATIONSHIPS:
- Near other science classrooms
- Adjacent to science prep room
- Classrooms located in academic “zone” that is away from noisy or public activities
- Classrooms with access to media center and administrative services
- Proximity to large group restrooms
- Flexibility of space
- Appropriate exterior exposure for “grow” window

ENVIRONMENTAL CONSIDERATIONS:
- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Higher than normal ventilation requirements
- Moisture- and stain-resistant finishes
- Chemical-resistant counter tops

NOTES:
1. Loose furnishings shown represent two of many possible arrangements.
2. Science casework layout to be determined by the school district.
3. Depending upon the educational program of the district, a tall wardrobe may be placed in this classroom or could be placed in a teacher prep area/workroom.
4. Option: small, bay window-type, pre-manufactured greenhouse. No additional square footage allowed.
5. The layouts shown do not restrict or reflect the variety of arrangements available to the Design Professional.

BIOLOGY
CT-AC-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096500
Rubber, ET, sheet vinyl,	096516
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	
099100	

LOOSE FURNISHINGS:

- L1 Student work tables
- L2 Student stools/chairs
- L3 Teacher chair or stool
- ***L4 Reserved***
- L5 File cabinet
  Wastebasket

L4 could be fixed casework.

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

E1 Duplex receptacle with dedicated circuit for wireless devices

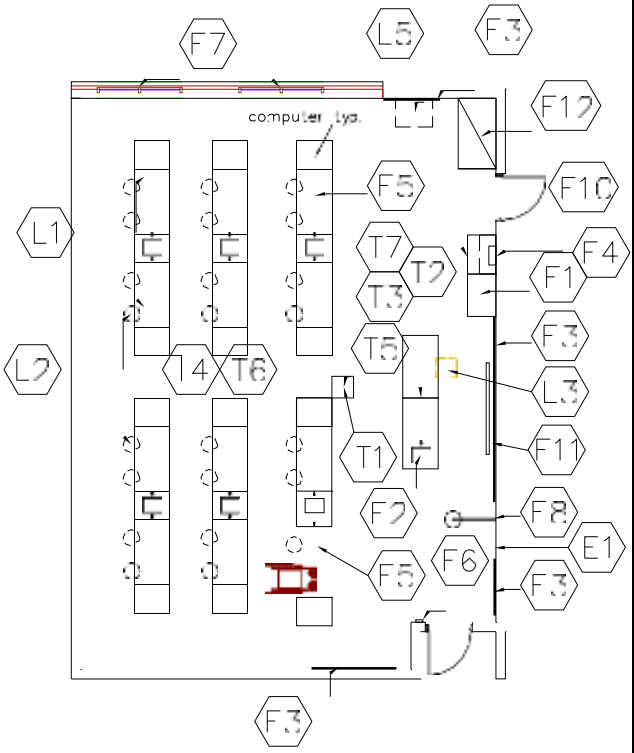
Communications (cont'd):

- T6 Wireless access point (WAP) as determined by Design – refer to Note 4 272133
- T7 Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123553
F2 Demonstration table/teacher desk	123553
F3 20'-32' combination marker board tack board and tackable wall surface	101100
F4 Technology support casework	123550
F5 40'-60' of lab casework with sinks	123553
F6 Pencil sharpener support (optional)	062000
F7 Windows with integral blinds	085113
F8 Emergency shower/eyewash	224000
F9 18'-24' of wall cabinets (total)	123553
F10 Towel dispensers (optional)	102813
F11 Projection screen (optional)	115213
F12 Tall cabinets (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	224000/221116/221119
Emergency shower/eyewash connections	224000
Master shut-off for gas	226313
Gas connections	226313
Compressed air connections (optional)	221500
Acid waste piping	221316
Neutralization tank (optional)	221323
HVAC:	
Supply/return air system	Div. 23
Independent temperature ctrl	230923
Manual exhaust	Div. 23
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
Duplex receptacles at perimeter workstations and teaching wall	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting	265100
Means of egress lighting per code	265100
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port at demonstration table	271513
T4 Wireless access point cable above ceiling	271513
Central sound system	275123
Clock	275313
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Master gas shutoff valve shall be clearly labeled, easily accessible, and immediately operable by staff.
4. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:

- Large group, small group, and individual instruction
- Group and individual work
- Laboratory experimentation
- Data collection and analysis
- Demonstrations
- Project work

SPATIAL RELATIONSHIPS:

- ☐ Near other science classrooms
- ☐ Adjacent to science prep room
- Classrooms located in academic "zone" that is away from noisy or public activities
- ☐ Classrooms with access to media center and administrative services
- ☐ Proximity to large group restrooms
- ☐ Flexibility of space

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Higher than normal ventilation requirements
- Moisture- and stain-resistant finishes
- Chemical-resistant counter tops

CAPACITY:	24 - 28 students
SIZE:	1,200 SF
ANCILLARY SPACES:	Science Prep CT-AC-6

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Science casework layout to be determined by the school district.
3. Depending upon the educational program of the district, a tall wardrobe may be placed in this classroom or could be placed in a teacher prep area/workroom.
4. The layouts shown do not restrict or reflect the variety of arrangements available to the Design Professional.

CHEMISTRY
CT-AC-5

FINISHES[1]:	Spec. Ref.#
Flooring:	
Vinyl sheet flooring, linoleum, rubber, ET, polished concrete finishing, or colored concrete finishing	096500 096516 033510 033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
- L1 Student work tables
- L2 Student stools/chairs
- L3 Teacher chair or stool
- L4 Computer workstation furniture
- L5 File cabinet
  Wastebasket

L4 Could be fixed casework

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

E1 Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):
T6 Wireless access point (WAP) as determined by Design – refer to Note 4 272133
T7 Classroom technology center video port 271543, 274116, 274119, 275127

- F1 Tall wardrobe with file drawers 123553
- F2 Demonstration table/teacher desk 123553
- F3 20'-32' combination marker board, tack board and tackable wall surface 101100
- ***F4*** Technology support casework 123550
- F5 40'-60' lab casework with sinks 123553
- F6 Pencil sharpener support (optional) 062000
- F7 Windows with integral blinds 085113
- F8 Emergency shower/eyewash 224000
- F9 18'-24' of wall cabinets (optional) 123553
- F10 Towel dispensers (optional) 102813
- F11 Projection screen (optional) 115213
- F12 Fume hood 115313
- F13 Tall cabinet for microscopes (optional) 123550

Fire Suppression:
- Fire suppression system 211000

Plumbing:
- Plumbing connections 224000/221116/221119
- Emergency shower/eyewash connections 224000
- Master shut-off for gas 226313
- Gas connections 226313
- Compressed air connections (optional) 221500
- Acid waste piping 221316
- Neutralization tank 221323

HVAC:
- Supply/return air system Div. 23
- Independent temp control 230923
- Manual exhaust Div. 23
- Exhaust for fume hood Div. 23

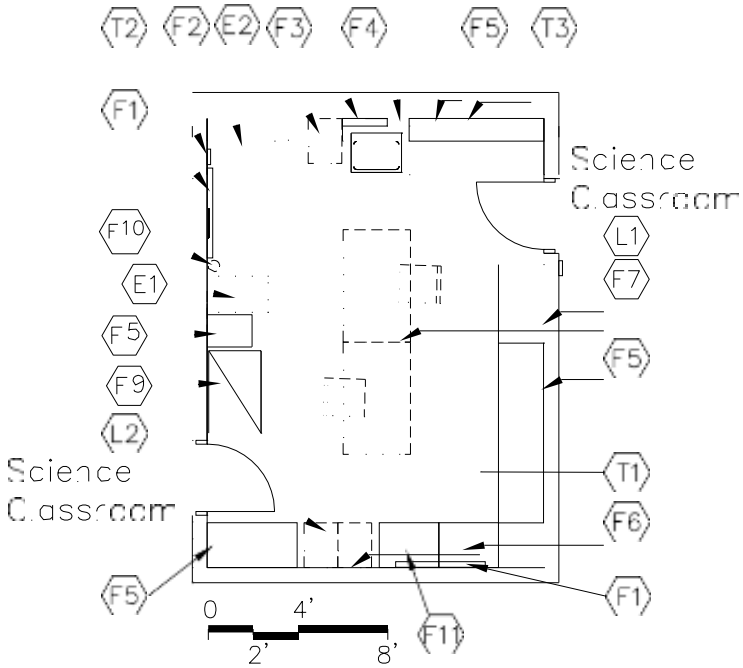
Electrical:
- Fluorescent lighting: 265100
  Illumination level: See Table 8600-5
- Multilevel switching 262726
- Duplex receptacles at perimeter workstations and teaching wall 262726
- Double duplex receptacle adjacent to each data and video port 262726
- Emergency lighting 265100
- Means of egress lighting per code 265100

Communications:
- T1 1 ***projector*** video port 271543
- T2 1 voice port and phone 271513/273123
- T3 1 data port at demonstration table 271513
- T4 ***Wireless access point above ceiling*** 271513
- Central sound system 275123
- Clock 275313
- Sound reinforcement system 275127

T5 ***Ultra-short throw interactive*** projector 274119

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Master gas shutoff valve shall be clearly labeled, easily accessible, and immediately operable by staff.
4. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.



PROGRAM ACTIVITIES:
- Teacher preparation
- Materials storage
- Laboratory experimentation
- Data collection and analysis
- Small group work

SPATIAL RELATIONSHIPS:
- Adjacent to science classrooms
- Shared by more than one science classroom
- Grouped with and have access to other classrooms

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35**,** NRC 0.70
- Ventilation requirements
- Moisture- and stain-resistant finishes
- Chemical-resistant counter tops

CAPACITY:	1-3 Staff
SIZE:	300 SF
ANCILLARY SPACES:	Science Classrooms CT-AC-3, CT-AC-4, CT-AC-5

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Science casework layout to be determined by the school district.
3. Depending upon the educational program of the district, a tall wardrobe may be placed in this science prep room or could be placed in a teacher prep area/workroom.
4. A separate chemical storage room may be created from the science prep room square footage.

SCIENCE PREP

CT-AC-6

FINISHES[1]:	Spec. Ref.#
Flooring:	
Vinyl sheet flooring, linoleum, rubber, ET, polished concrete finishing, or colored concrete finishing	096516 096500 033510 033519
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:

L1 Work tables with chemical-resistant top
L2 2 file cabinets
Wastebasket

EQUIPMENT

E1 Refrigerator/freezer (optional)
E2 Dishwasher (optional)

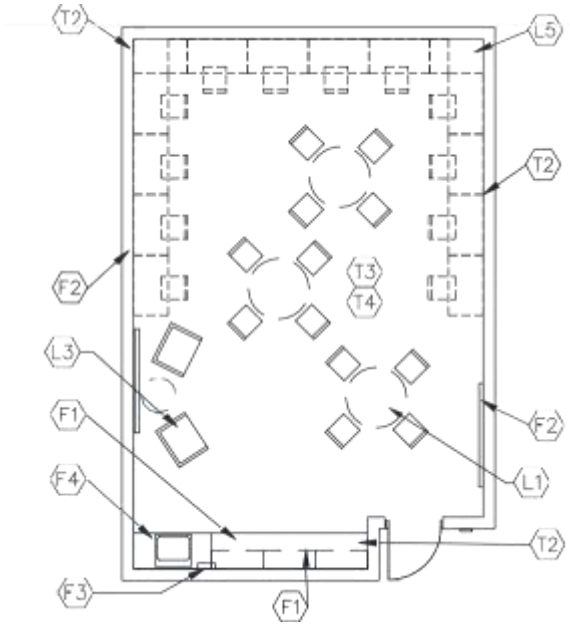
Note: Eliminate 24 hour exhaust if recommended by cabinet manufacturer. Make room 24 hour exhaust if no cabinet exhaust.

FEATURES[1]:		Spec. Ref.#
Fixed Items:		
F1	4' of tack board	101100
F2	8'-15' of lab station with sink	123553
F3	Drying rack with pegs (optional)	123553
F4	Towel dispenser (optional)	102813
F5	16'-31' combination wall cabinets and tall cabinets	123553
F6	Storage cabinets for acids, Ventilated (optional)	123553
F7	Storage cabinets for flammables(optional)	123553
F8	Reserved	
F9		
F10	Emergency eyewash (if applicable) Fume hood (optional)	224000 123553
F11	Chemical storage cabinets with acid resistant lining	123553
Fire Suppression:		
	Fire suppression system	211000
Plumbing:		
	Plumbing connections	224000/221116/221119
	Acid waste system	Div. 23
	Gas connections	226313
	Compressed air connections(optional)	221500
	Access to neutralization tank	221323
HVAC:		
	Independent temperature control Supply/return air system	230923 Div. 23
	Manual exhaust	Div. 23
	24 hour exhaust for acid storage cabinet	Div. 23
Electrical:		
	Single level switching	262726
	Fluorescent lighting:	265100
	Illumination level: See Table 8600-5	
	1 duplex receptacle under work tables	262726
	3 duplex receptacles	262726
	Receptacle for refrigerator/freezer	262726
	Double duplex receptacle at each data and video port	262726
Communications:		
T1	1 ***projector*** video port	271543
T2	1 voice port and phone	271513/273123
T3	1 data port	271513
	Clock	275313
	Central sound system	275123
Electronic Safety and Security;		
	Life safety devices per code	283111
Miscellaneous:		
	Fume hood through wall if adjacent to chemistry	

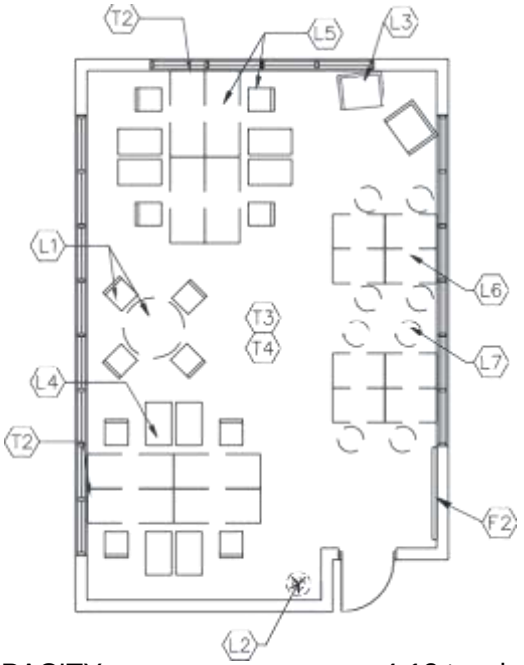
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

600 SF



600 SF



CAPACITY: 4-12 teachers
SIZE: 300 - 600 SF

PROGRAM ACTIVITIES:

- Teachers and other staff members hold team meetings and prepare for class
- Professional interaction should be encouraged to improve communication, professional development, and team building.
- ***Collaboration of grade level grouped or subject grouped instructors.***
- ***Collaboration spaces should support the exchange of ideas, remain instantly flexible, and provide an area for both individual study and group collaboration.***

SPATIAL RELATIONSHIPS:

- Near academic core classrooms
- Near individual restroom
- Near instructional material storage

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- ***Transparent walls or windows to adjacent rooms***

<u>Collaboration Note:</u>

- ***Collaboration is the vehicle by which individuals communicate their vision, desires, opinions, thoughts, and insight to their fellow colleagues. It is the means to address all aspects of the educational process, themes of focus, professional and personal relationships, and to build the camaraderie and teamwork to meet the ever changing educational needs of students of all ages.***

<u>NOTES</u>:

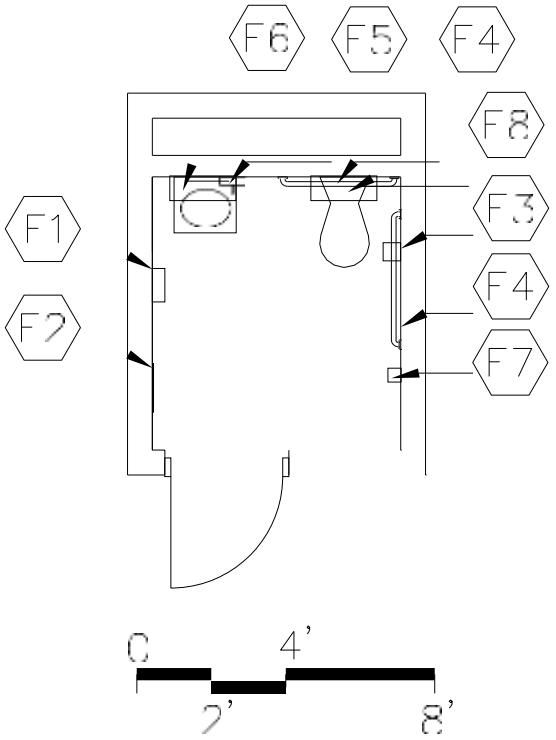
1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this teacher prep area/workroom or could be placed in a classroom

TEACHER PREP AREA/WORKROOM
CT-AC-7

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, ET, linoleum, vinyl sheet, or rubber	096816 096500 096516 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	
099100	
LOOSE FURNISHINGS:	
L1 Tables and chairs	
L2 Coatrack	
L3 Soft Seating	
L4 Teacher computer trucks	
L5 Teacher workstation furniture and chair	
L6 42" high teacher cabinet with work surface top	
L7 Stools	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Copier by school district	
E1 Reserved	

FEATURES[1]:		Spec. Ref.#
Fixed Items[2]:		
F1	12'-18' combination base & wall cabinets (some could be bookcases)	123550
F2	***50-75 sf*** combination marker board, tack board & tackable wall surface	101100
F3	Towel dispenser (optional)	102813
F4	3' sink base cabinet	123550
Fire Suppression:		
	Fire suppression systems	211000
TEX		
Plumbing:		
	Sink	224000
	Plumbing connections	224000/221116/221119
HVAC:		
	Supply/return air system	Div. 23
	Independent temperature control	230923
Electrical:		
	Single-level switching	262726
	Fluorescent lighting	265100
	Illumination level: See Table 8600-5	
	3 duplex receptacles	262726
	Double duplex receptacle adjacent to each data and video port	262726
	Duplex receptacles for office equipment	262726
	Receptacle for copier(if applicable)	262726
Communications:		
T1	***Reserved***	
T2	***Voice ports and phones***	271513/273123
T3	***Wireless access point cable above ceiling***	271513
	Clock	275313
	Central sound system	275123
T4	***Wireless access point (WAP) as determined by Design – refer to Note 3***	***272133***

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.
3. Baseline includes WAP cable. WAP device quantity / placement per 272133 requirements.
4. ***When collaboration area is selected, teacher computer trucks are provided in lieu of teacher desks in classrooms.***



PROGRAM ACTIVITIES:

- Personal and health needs for teachers, staff, and other individuals

SPATIAL RELATIONSHIPS:

- Near academic core classrooms
- Near teacher prep area/workroom

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control - wall minimum STC 48 ceiling minimum CAC 35**,** NRC 0.70
- Moisture- and stain-resistant finishes

CAPACITY: 1 person
SIZE: ***60*** SF

NOTES:

INDIVIDUAL RESTROOM

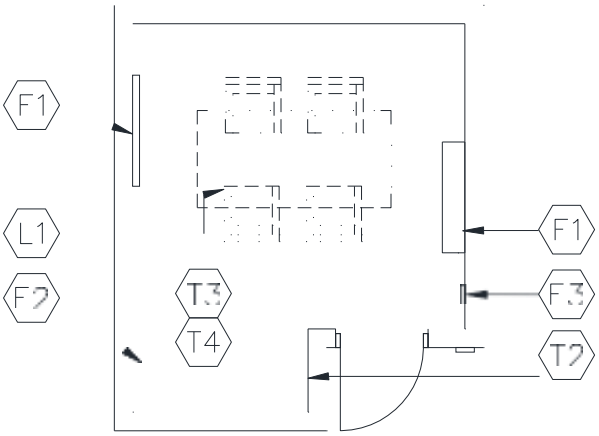
CT-AC-8

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber, ET, or sheet vinyl	096516 096500
Optional: Ceramic mosaic tile, porcelain tile, or resinous flooring	093000 096723
Base:	
Resilient base	096500
Optional: Ceramic mosaic tile, Porcelain tile, resinous flooring, or integral vinyl cove base	093000 096723
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Wastebasket	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 24" x 60" mirror	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Shelf above sink (optional)	102813
F7 Coat hook	102813
F8 Cabinet above toilet (optional)	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Student small group work
- Independent student work
- Small group meetings

SPATIAL RELATIONSHIPS:
- Near academic core classrooms

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	4 - 5 students
SIZE:	150 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

SMALL GROUP ROOM
CT-AC-9

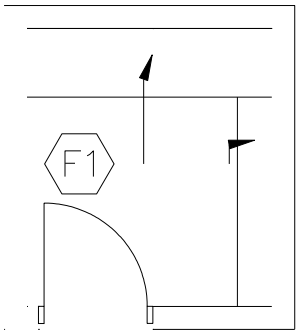
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile	096816
Optional: ET, sheet vinyl,	096500
linoleum, or rubber	096516
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

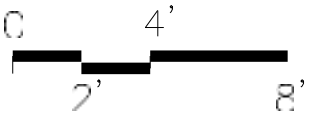
LOOSE FURNISHINGS:
L1 Work tables and chairs
L2 Reserved
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 8'-12' combination marker board, tack board & tackable wall surface	101100
F2 4'-6' of work surface (optional)	123550
F3 Pencil sharpener support (optional)	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Fluorescent lighting: Illumination level: See Table 8600-5	265100
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 Reserved	
T2 voice port with phone	271513/273123
T3 Wireless access point cable above ceiling	***271513***
T4 Wireless access point (WAP) as determined by design – refer to note 2	***271533***
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
Interior window(optional)	081113/088000

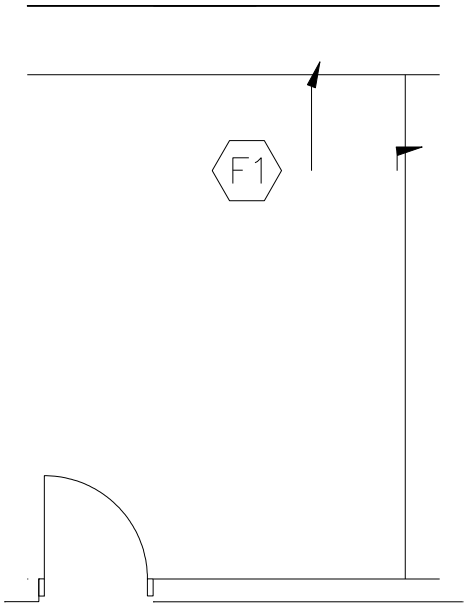
NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable. WAP device quantity / placement per 272133 requirements.

50 SF





120 SF



PROGRAM ACTIVITIES:
- Storage of supplies, textbooks, and equipment

SPATIAL RELATIONSHIPS:
- Near teacher prep workroom

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY: N/A
SIZE: 50 - 120 SF

NOTES:

MATERIAL STORAGE
CT-AC-10

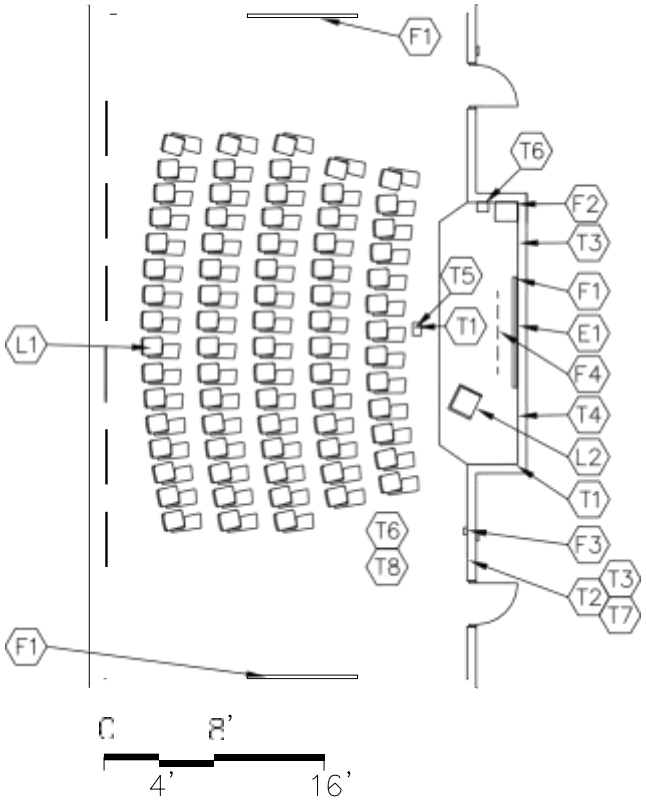
FINISHES[1]:	Spec. Ref.#
Flooring:	
Rubber, ***linoleum, ET, or sheet vinyl***	096500 ***096516***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry	042000/099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 30' of open shelving	
depths may vary (fixed or loose)	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



CAPACITY: 100 students
SIZE: 1,200 - 1,500 SF

PROGRAM ACTIVITIES:
- Group instruction
- Presentations
- Testing
- Community use

SPATIAL RELATIONSHIPS:
- ☐ Near academic core classrooms
- ☐ Near large group restrooms
- ☐ Close to stage to serve as "green" room
- ☐ Flexibility of space

ENVIRONMENTAL CONSIDERATIONS:
- Uniform lighting
- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

MULTIPURPOSE ROOM
CT-AC-11

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, linoleum, rubber, ET, or sheet vinyl	096816 096813 096500 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
Acoustical wall treatment	098000

LOOSE FURNISHINGS:
L1 Student desks and chairs
L2 Podium **/** console (optional)
Portable risers
Wastebasket

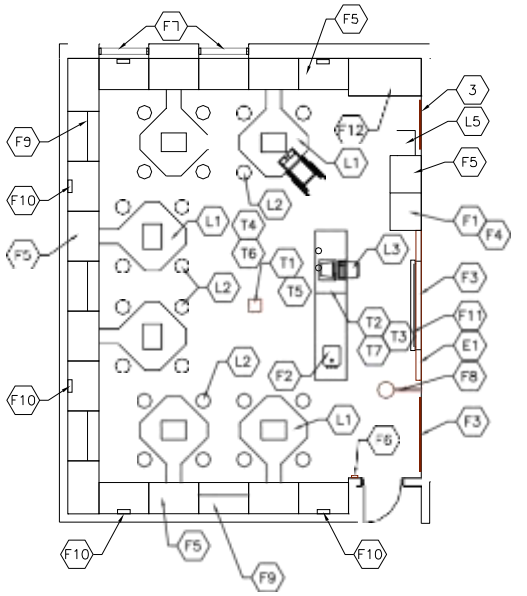
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	

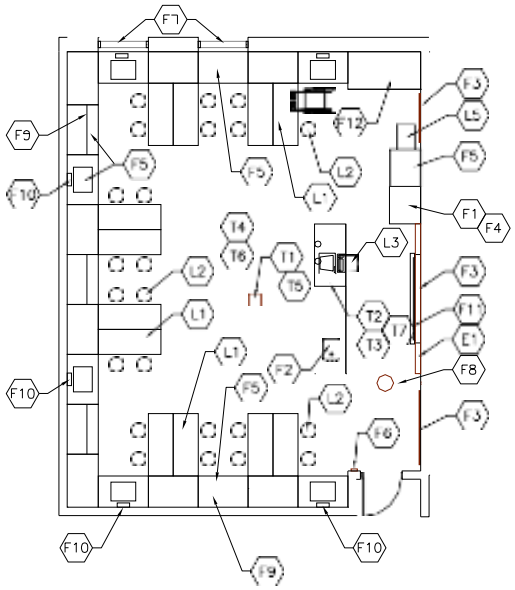
E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 16'-28' combination marker board tack board & tackable wall surface	101100
F2 Technology support casework	123550
F3 Pencil sharpener support (optional)	062000
F4 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Telecommunications Grounding	270526/260526
Communications:	
T1 2 ***projector*** video ports	271543
T2 1 voice port and phone	271513/273123
T3 1 data port (minimum)	271513
T4 1 port to input local computer to monitor	271513
Clock	275313
Central sound system	275123
T5 ***Ultra-short throw interactive*** projector	274119
T6 Student Dining/Cafeteria sound reinforcement system	275122
T7 ***Wireless access point (WAP) as determined by Design – refer to Note 3***	***272133***
T7 Classroom technology center video port	***271543, 274116, 274119, 275127***
T8 Wireless access point cable above ceiling	***271513***

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.





CAPACITY: 24 students
SIZE: 1,000 SF
ANCILLARY SPACES: Science Classrooms

PROGRAM ACTIVITIES:
- Large group, small group, and individual instruction
- Group and individual work
- Laboratory experimentation
- Data collection and analysis
- Demonstrations
- Project work

SPATIAL RELATIONSHIPS:
- Adjacent to other science classrooms
- Near science prep room

ENVIRONMENTAL CONSIDERATIONS:
- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Higher than normal ventilation requirements
- Moisture- and stain-resistant finishes
- Chemical-resistant counter tops

NOTES:
1. Loose furnishings shown represent one of many possible arrangements.
2. Science casework layout to be determined by the school district.
3. Depending upon the educational program of the district, a tall wardrobe may be placed in this classroom or could be placed in a teacher prep area/workroom.
4. The layouts shown do not restrict or reflect the variety of arrangements available to the Design Professional.

SCIENCE LABORATORY

CT-AC-12

FINISHES[1]:	Spec. Ref.#
Flooring:	
Vinyl sheet flooring, linoleum, rubber, ET	096500 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	99100

LOOSE FURNISHINGS:

L1 Student work tables
L2 Student stools/chairs
L3 Teacher chair or stool
L4 Reserved
L5 File cabinet
Wastebasket

L4 Could be fixed casework

Miscellaneous: (Optional)
Pencil sharpener

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

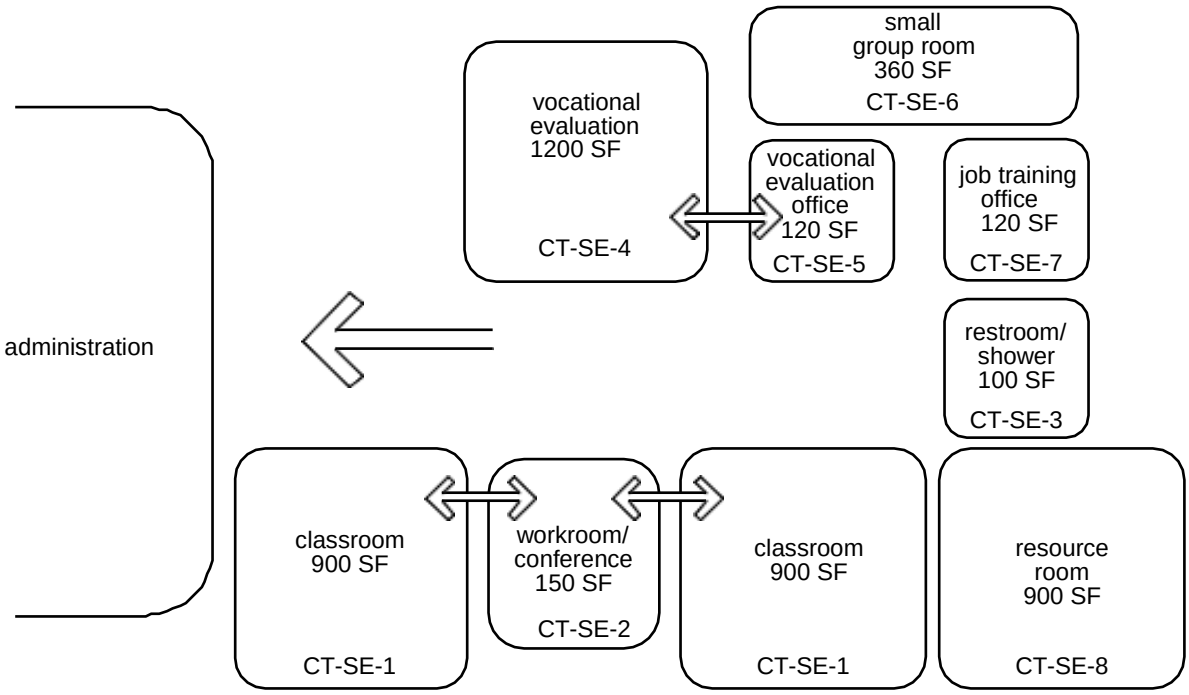
E1 Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):
T6 Wireless access point (WAP) as determined by Design – refer to Note 4 272133
T7 Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123553
F2 Demonstration table/teacher desk	123553
F3 14'-22' combination chalk/marker board, tack board & tackable wall surface	101100
F4 Technology support casework	123550
F5 40'-60' lab casework with sinks	123553
F6 Pencil sharpener support (optional)	062000 F7
Windows with integral blinds	085113
F8 Emergency shower/eyewash	224000
F9 18'-24' of wall cabinets (optional)	123553
F10 Towel dispensers (optional)	102813
F11 Projection screen (optional)	115213
F12 Fume hood	115313
F13 Tall cabinet for microscopes(optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	224000/221116/221119
Emergency shower/eyewash connections	224000
Master shut-off for gas	226313
Gas connections	226313
Compressed air connections (optional)	221500
Acid waste piping	221316
Neutralization tank	221323
HVAC:	
Supply/return air system	Div. 23
Independent temp control	230923
Manual exhaust	Div. 23
Exhaust for fume hood	Div. 23
Electrical:	
Fluorescent lighting: Illumination level: See Table 8600-5	265100
Multilevel switching	262726
Duplex receptacles at perimeter workstations and teaching wall	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting	265100
Means of egress lighting per code	265100
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port at demonstration table	271513 T4
Wireless access point cable above ceiling	271513
Central sound system	275123
Clock	275313
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Master gas shutoff valve shall be clearly labeled, easily accessible, and immediately operable by staff.
4. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



NOTES:

This is an example of how the special education/student services spaces in a career-technical school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Special Education space plates:

CT-SE-1 Classroom
CT-SE-2 Workroom/Conference
CT-SE-3 Restroom/Shower
CT-SE-4 Career Technical Evaluation
CT-SE-5 Career Technical Evaluation Office
CT-SE-6 Small Group Room
CT-SE-7 Job Training Office
CT-SE-8 Resource Room

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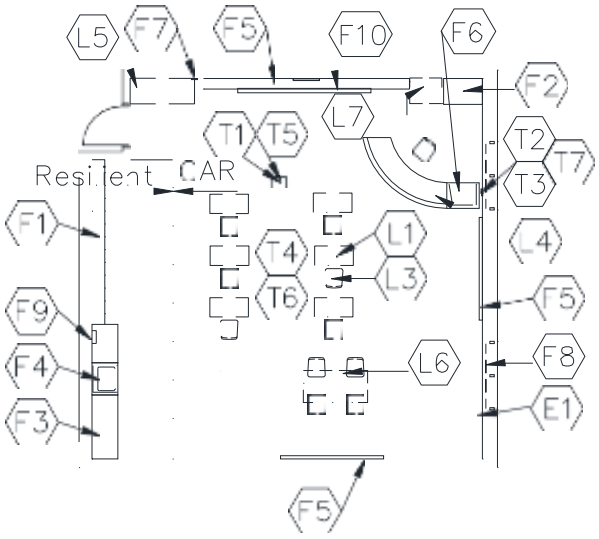


PROGRAM ACTIVITIES:

- Accommodates students who have special needs and are unable to be included in regular instructional program areas a majority of the school day.
- Activities include, but are not limited to: group and individual work to improve auditory, tactile, visual, kinesthetic and academic skills.

SPATIAL RELATIONSHIPS:

- Near academic core classrooms
- Adjacent to special education restroom/ shower

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35**,** NRC 0.70
- Resilient and stain-resistant floor covering
- Special consideration for wheelchair access and physical accessibility needs (ADA)

CAPACITY: Based on disability.
See Chapter 1, Section 1110.

SIZE: 900 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this classroom or could be placed in a workroom/conference area.
3. See Chapter 1, page 1110-16 for specific areas needed for each disability.

CLASSROOM
CT-SE-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Combination carpet, carpet tile	096816
with resilient options	096500
Optional: All ET, sheet vinyl,	096516
linoleum, or rubber	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:
L1 Student desks/tables
L2 Reserved
L3 Student chairs
L4 Teacher workstations/computer support and chair
L5 8'-10' of low bookcases (fixed or mobile)
L6 Reading table
L7 File cabinet
Wastebasket

EQUIPMENT(optional)
Washer and dryer
Small refrigerator
Range
Oven
Microwave

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

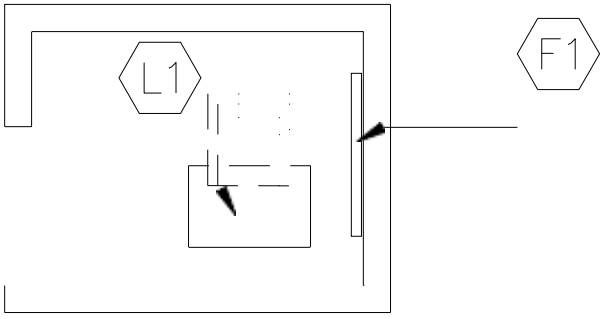
E1 Duplex receptacle with dedicated circuit for wireless devices

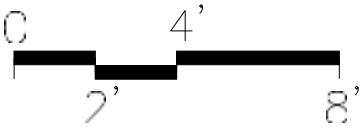
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Open casework – student coats and personal items with wall cabinets above	123550
F2 Tall wardrobe w/file drawers	123550
F3 8'-10' of base & wall cabinets	123550
F4 3' sink base cabinet	123550
F5 24'-32' combination marker board	101100
F6 tack board and tackable wall surface	123550
Technology support casework	
F7 Pencil sharpener support (optional)	062000
F8 Windows with integral blinds	085113
F9 Towel dispenser (optional)	102813
F10 Projection screen (optional)	115213
F11 Tall storage cabinet (optional)	123550
F12 Mirror (optional)	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink with drinking fountain	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 Wireless access point cable above ceiling	271513
Clock	275313
Sound reinforcement system	275127
Central sound system	275123
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 3	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

WORKROOM/CONFERENCE
(Quiet Area) **CT-SE-2**





CAPACITY: 1 - 2 persons
SIZE: 150 SF

PROGRAM ACTIVITIES:
- Could be used for emotionally disturbed or other students requiring a quiet individual area.
- Preparation and storage of instructional materials and equipment.

SPATIAL RELATIONSHIPS:
- Close proximity to academic classrooms
- Integral part of special education classroom or resource room

ENVIRONMENTAL CONSIDERATIONS:
- Dimmed lighting
- Environmental sound control
  wall minimum STC ***45***
  ceiling minimum CAC 35, NRC ***0.70***

NOTES:
1. Loose furnishings shown represent one of many possible arrangements.
2. Walls floor to ceiling and an open area for ½ of the fourth wall.
3. See Chapter 1, page 1110-16 for specific areas needed for each disability.

WORKROOM/CONFERENCE

CT-SE-2 (Quiet Area)

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, ET, linoleum, or sheet vinyl	096816 096500 096516 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:

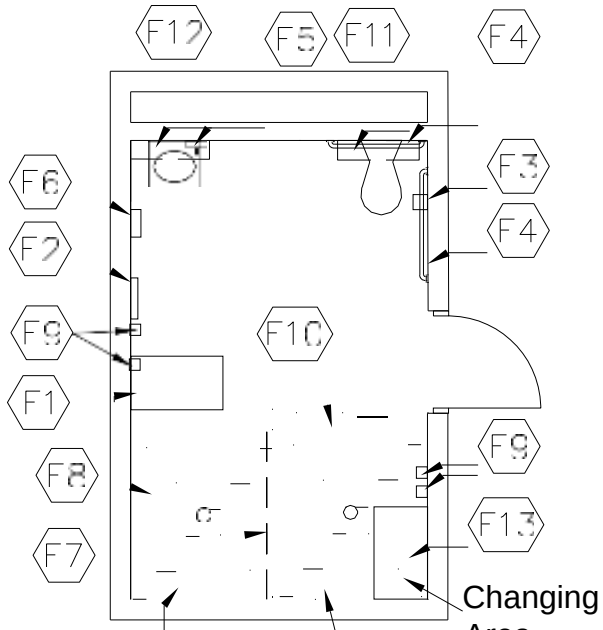
L1 Student desk and chair

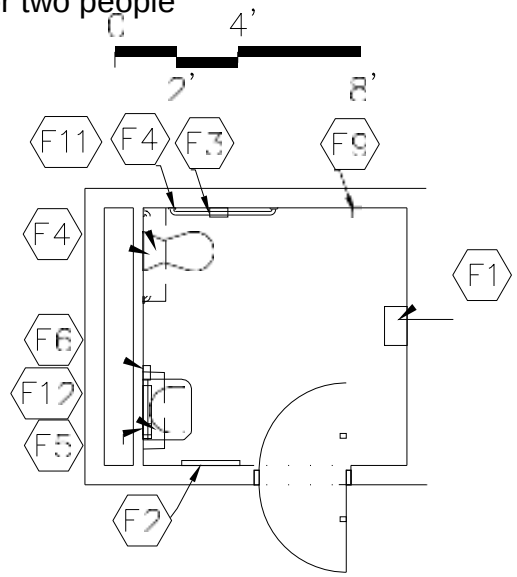
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 4' of tack board (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Dimmable lighting	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Clock (optional)	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window with blinds (optional)	081113/088000

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.





PROGRAM ACTIVITIES:
- Changing area
- Toilet / shower needs

SPATIAL RELATIONSHIPS:
- Next to special education classroom

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- ☐ Moisture- and stain-resistant finishes
- ☐ Special consideration for wheelchair access and physical accessibility needs (ADA)

CAPACITY: 1 - 2 persons
SIZE: 100 SF

NOTES:

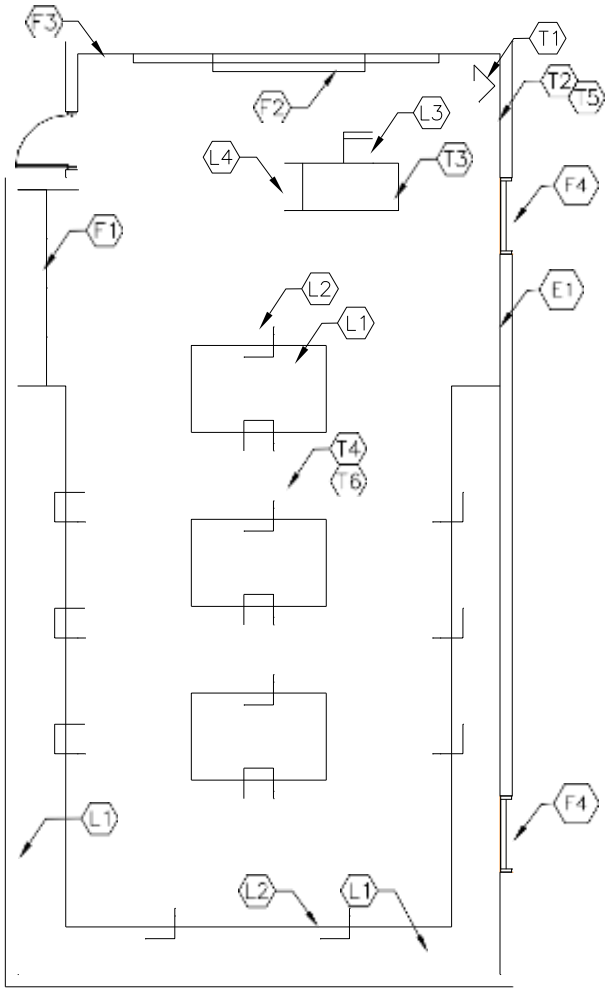
1. See Chapter 1, page 1110-16 for specific areas needed for each disability.

RESTROOM/SHOWER
CT-SE-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Restroom: ET, vinyl sheet flooring,	096500
porcelain tile, or ceramic tile	093000
Shower: Ceramic mosaic tile, or porcelain tile	
Base:	
Restroom: Resilient base,	096500
integral vinyl cove base,	093000
porcelain tile, or ceramic tile	
Shower: Ceramic mosaic tile base or porcelain tile	
Ceiling:	
Restroom: Suspended, acoustical	095113
Shower: Painted portland cement plaster or	092400/099100
interior finish system	092513
Walls:	
Epoxy painted concrete masonry units	042000/099100
or ceramic wall tile in shower	093000
and latex paint in restroom	099100
LOOSE FURNISHINGS:	
Wastebasket	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Base cabinets	123550
F2 24" x 60" mirror	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Towel dispenser	102813
F7 Shower curtain and rod	102813
F8 ADA shower accessories	102813
F9 (2) hooks	102813
F10 Cubicle curtain (optional)	102813
F11 8" deep wall cabinet above toilet	102813
F12 Shelf (optional)	102813
F13 Changing station or fold-down adult changing station	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
ADA shower controls and head	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Refer to ADAAG 4.21 for grab bar and control locations.



CAPACITY: Based on disability.
See Chapter 1, Section 1110.
SIZE: 1200 SF
ANCILLARY SPACES: Career Technical Office
CT-SE-5

PROGRAM ACTIVITIES:

- Testing of students' vocational interests and capabilities via physical aptitude exercises.

SPATIAL RELATIONSHIPS:

- Adjacent to career technical evaluation office
- Near workroom/conference
- Near administrative area

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control –
  wall only minimum STC 45
  ceiling minimum CAC 35**,** NRC 0.70

NOTES:

1. Loose furnishings represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this room or could be placed in a workroom/conference area.

CAREER TECHNICAL EVALUATION

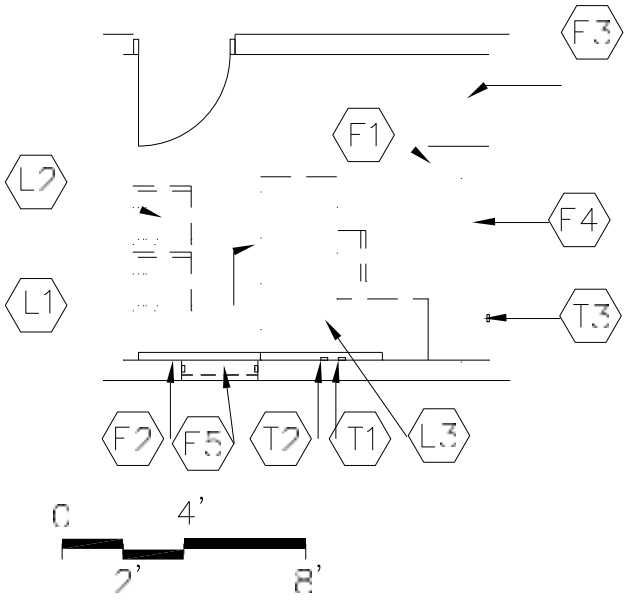
CT-SE-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000 / 099100
Optional: Gypsum drywall on metal studs	092116 / 099100
LOOSE FURNISHINGS:	
L1 Student desk/tables	
L2 Student chairs	
L3 Teacher desk and chair	
L4 Desk height file cabinet	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
E1 Duplex receptacle with dedicated circuit for wireless devices	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Open casework - coats	123550
F2 8'-12' of marker board, tack board, or tackable wall surface	101000
F3 Pencil sharpener support (optional)	062000
F4 Windows with intregal blinds	085113
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port and video display device	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 ***Wireless access point cable above ceiling***	271513
Central sound system	275123
Clock	275313
T5 Classroom technology center video port	***271543, 274116, 274119, 275127***
T6 Wireless access point (WAP) as determined by Design – refer to Note 2	***272133***

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***



CAPACITY: 1 - 3 persons
SIZE: 120 SF
ANCILLARY SPACES: Career Technical Eval
CT-SE-4

PROGRAM ACTIVITIES:
- Private space for vocational evaluation coordinator
- One-on-one conferences with academic instructors, students, etc.

SPATIAL RELATIONSHIPS:
- Near career technical evaluation room
- Near administrative area
- Direct access to school circulation areas

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35**,** NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

CAREER TECHNICAL EVALUATION OFFICE

CT-SE-5

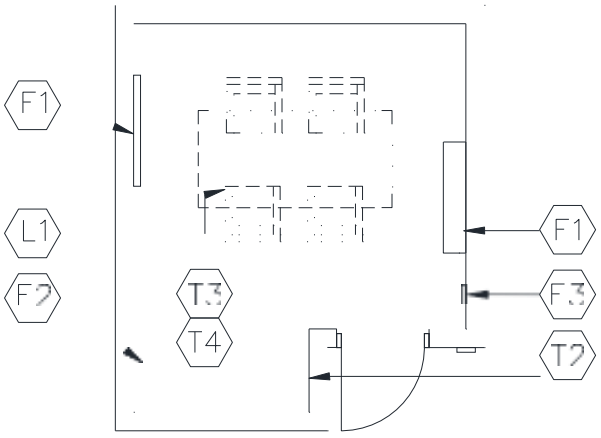
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets above work surface	123550 F5
Window with integral blind	085116
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.



PROGRAM ACTIVITIES:
- Student small group work
- Independent student work
- Small group meetings

SPATIAL RELATIONSHIPS:
- Near special education classrooms

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY:	4 - 5 students
SIZE:	360 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

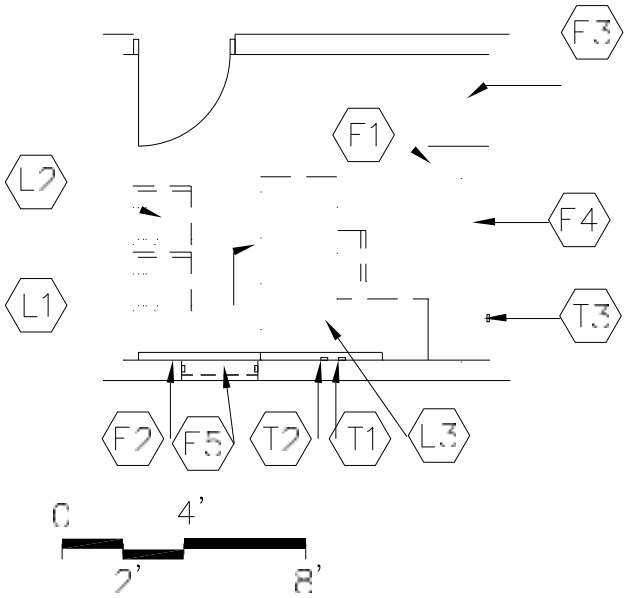
SMALL GROUP ROOM
CT-SE-6

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile	096816
Optional: ET, sheet vinyl,	096500
linoleum, or rubber	096516
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Work tables and chairs
L2 Reserved
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 8'-10' of marker board, tack board, or tackable wall surface	101100
F2 Reserved	101100
F3 4'-6' of work surface (optional)	123550
F4 Pencil sharpener support (optional)	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Fluorescent lighting: Illumination level: See Table 8600-5	265100
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 Reserved	
T2 voice port with phone	271513/273123
T3 Wireless access point cable above ceiling	***271513***
T4 Wireless access point (WAP) as determined by design – refer to note 2	***271533***
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window(optional)	081113/088000
Pencil sharpener (optional)	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:

- Private space for job training coordinator
- One-on-one conferences with academic instructors, students, etc.

SPATIAL RELATIONSHIPS:

- Near career technical evaluation room
- Near administrative area
- Direct access to school circulation areas

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35**,** NRC 0.70

CAPACITY: 1 - 3 persons
SIZE: 120 SF
ANCILLARY SPACES:

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

JOB TRAINING OFFICE
CT-SE-7

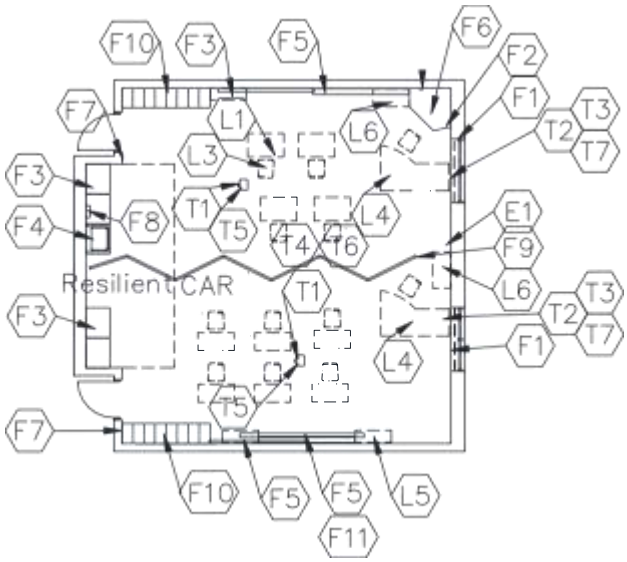
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets above work surface	123550 F5
Window with integral blind	085116
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.



PROGRAM ACTIVITIES:

- Accommodates students who have special needs with cognitive disability, hearing impairment, visual impairment, emotional disturbance, orthopedic impairment, autism, brain injury, learning-deaf-blindness disabilities.
- Variety of special services such as one-on-one instruction and small group instruction.
- Activities include, but are not limited to: group discussions, demonstrations, music activities, life skills, coping skills, speech, and visual and hearing support services.

SPATIAL RELATIONSHIPS:

- Near academic core classrooms
- The space will be used to accommodate the specific IEP requirements of each student

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control –
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: Based on disability.
See Chapter 1, Section 1110.

SIZE: 900 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be located in this room or could be placed in a workroom/conference area.
3. See Chapter 1, page 1110-16 for specific areas needed for each disability.

RESOURCE ROOM

CT-SE-8

FINISHES[1]:	Spec. Ref.#
Flooring:	
Combination carpet, carpet tile	096816
with resilient options	096500
Option: All ET, sheet vinyl, linoleum, or rubber	096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:

L1 Student desks/tables
L2 Reserved
L3 Student chairs
L4 Teacher desk **/** computer support and chair
L5 Mobile bookcases or storage unit
L6 File cabinet
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

E1 Duplex receptacle with dedicated circuit for wireless devices

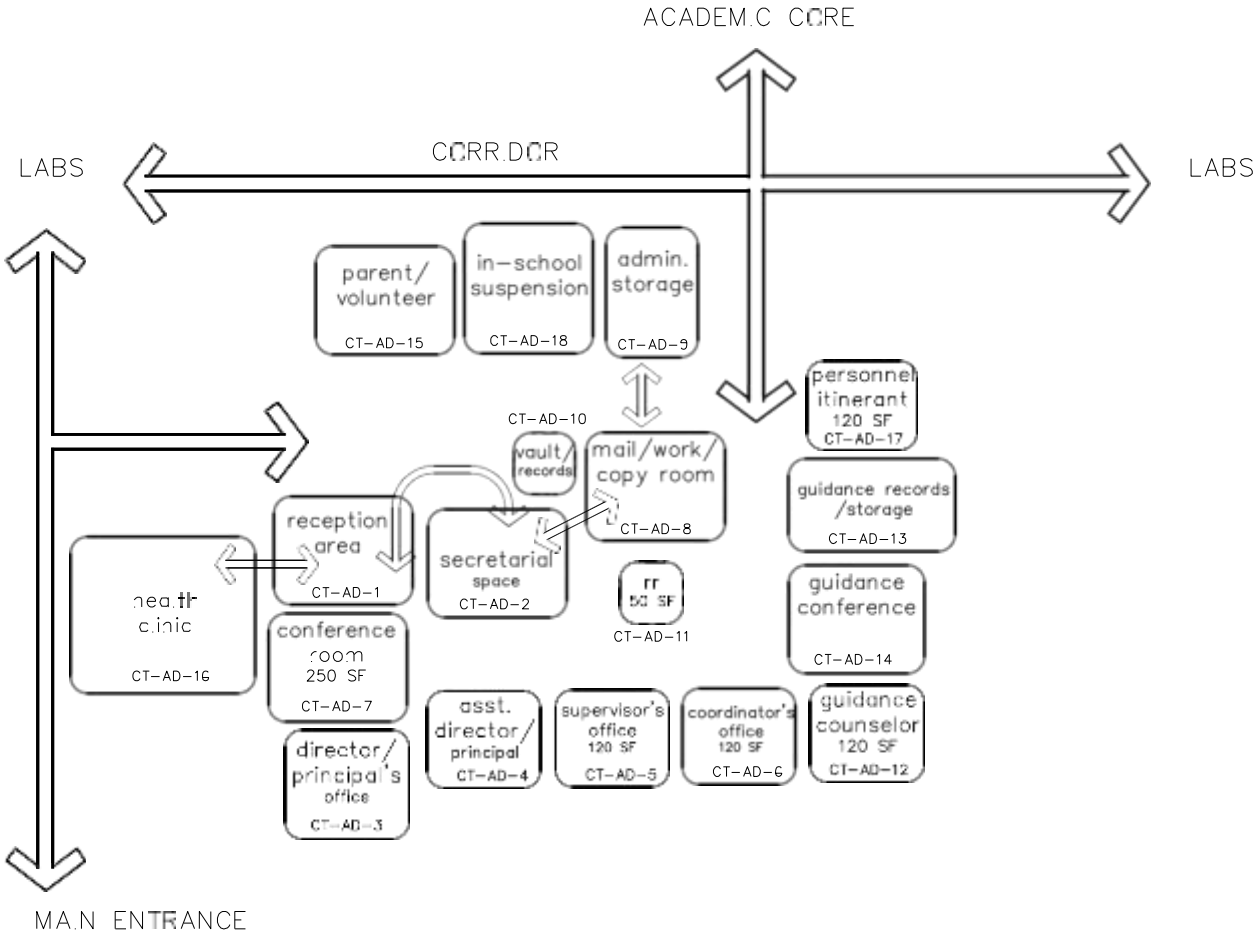
Communications (cont'd):
T6 Wireless access point (WAP) as determined by Design – refer to Note 3 272133
T7 Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Windows with integral blinds	085113
F2 Tall wardrobe with file drawers	123550
F3 8'-12' of base cabinets	123550
F4 3' sink base cabinet	123550
F5 20'-32' combination chalk/marker board, tack board, tackable wall surface	101100 F6
Technology support casework	123550
F7 Pencil sharpener support (optional)	062000 F8
Towel dispenser (optional)	102813
F9 Operable partition (optional)	102226
F10 Open casework coats and personal storage w/wall cabinets above	123550
F11 Projection screen (optional)	115213
F12 Mobile storage cabinet (optional)	123550 F13
Mirror (optional)	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/237123
T3 1 data port near each teacher workstation	271513 T4
Wireless access point cable above ceiling	271513
Clock	275313
Sound reinforcement system	275127
Central sound system	275123
T5 Ultra-short throw interactive projector	274119

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



NOTE:
This is an example of how the administrative spaces in a career-technical school could be arranged. This is only meant to demonstrate the relationships between various areas of the building.

Following are the Administrative space plates for the following rooms:

CT-AD-1	Reception Area	CT-AD-10	Vault/Records
CT-AD-2	Secretarial Space	CT-AD-11	Restroom
CT-AD-3	Director/Principal's Office	CT-AD-12	Guidance Counselor
CT-AD-4	Assistant Director/Principal's Office	CT-AD-13	Guidance Records/Storage
CT-AD-5	Supervisor's Office	CT-AD-14	Guidance Conference
CT-AD-6	Coordinator's Office	CT-AD-15	Parent/Volunteer
CT-AD-7	Conference Room	CT-AD-16	Health Clinic ***(includes restroom)***
CT-AD-8	Mail/Work/Copy room	CT-AD-17	Itinerant Personnel
CT-AD-9	Administrative Storage	CT-AD-18	In-school Suspension

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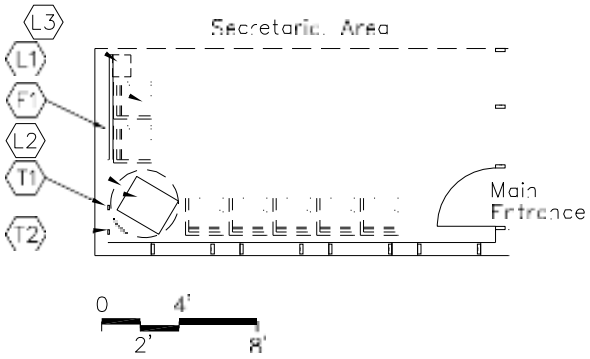
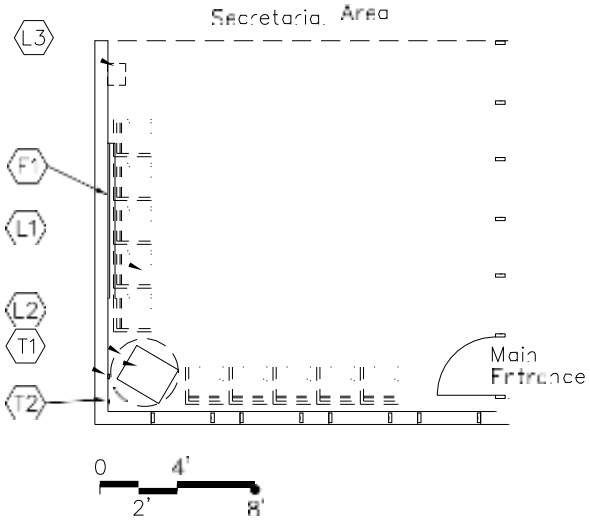
200 SF



500 SF



CAPACITY: 6 - 8 or 8 - 10 visitors
SIZE: 200 – 500 SF
ANCILLARY SPACES: Secretarial Area
CT-AD-2

PROGRAM ACTIVITIES:

- Serves as the main entry to the building
- Visitors may wait or are directed to other areas of the building.

SPATIAL RELATIONSHIPS:

- Access to all areas of the building
- Open to secretarial area
- Near principal's office
- Near main entrance to the building
- Visual access to main entrance of the building

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 40
  ceiling minimum CAC 35**,** NRC 0.70
- Audio and visual control from secretarial area

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

RECEPTION AREA
CT-AD-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

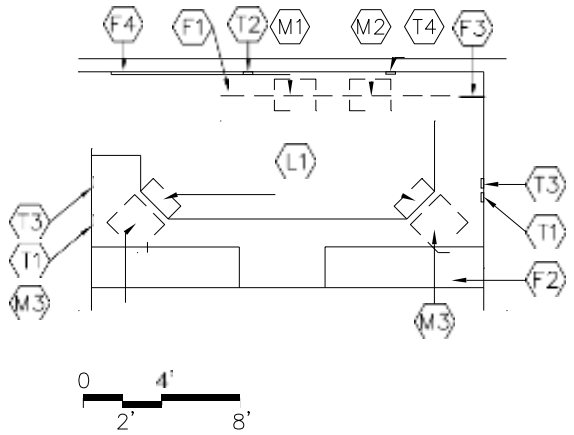
LOOSE FURNISHINGS:
L1 Visitor chairs
L2 End table
L3 Racks for forms (optional)
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tack board or tackable wall surface (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
2 duplex receptacles	262726
Double duplex receptacle adjacent to video port	262726
Means of egress lighting per code	265100
Communications:	
T1 1 ***projector*** video port, monitor, and brackets	271543/274119
T2 1 voice port and phone	271513/273123
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior windows	081113/088000

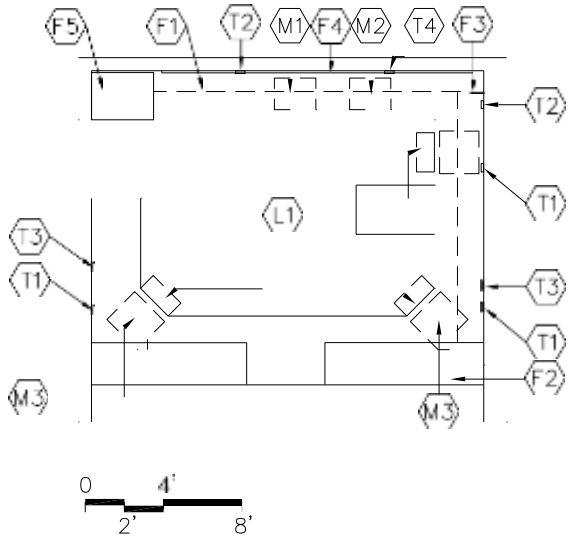
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

200 SF ADA Compliant Approach



500 SF ADA Compliant Approach



CAPACITY:	1 - 2 or 2 - 3 staff
SIZE:	200 – 500 SF
ANCILLARY SPACES:	Reception Area CT-AD-1

PROGRAM ACTIVITIES:

- Conduct administrative support duties, and receive and direct visitors

SPATIAL RELATIONSHIPS:

- Easy access to all areas of the building
- Open to reception area
- Near principal's office
- Near main entrance to the building
- Visual access to main entrance of the building

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 40
  ceiling minimum CAC 35, NRC 0.70
- Audio and visual control of reception area

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

SECRETARIAL AREA

CT-AD-2

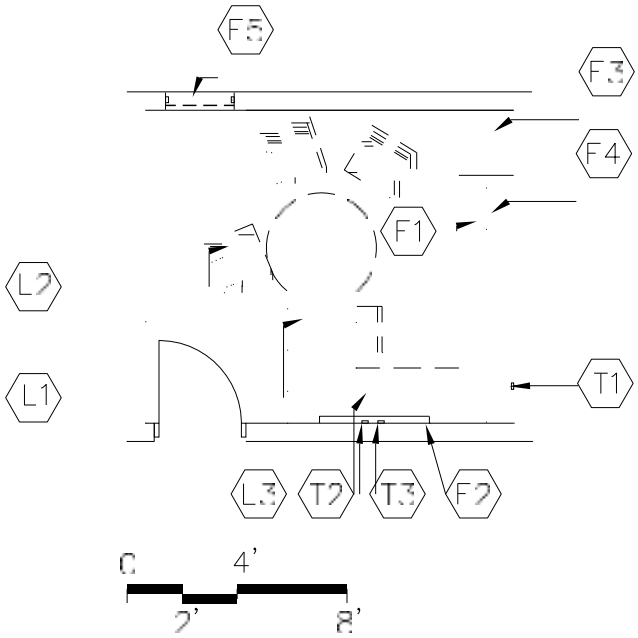
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Secretarial chairs
Wastebasket

Miscellaneous:
The following items are to be funded by the school district:
M1 Fax machine
M2 Printer
M3 Computer/typewriter

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 24' - 60' of work surface with file drawers	123550
F2 42" high counter top with portion of counter 34" high or lower	123550
F3 16'-24' of wall cabinets for forms, supplies, books, and manuals	123550
F4 Tackable wall surface (optional)	101100
F5 Tall cabinet for coats (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Temperature control with reception area (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
3 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Emergency lighting	265100
Communications:	
T1 1 voice port and phone at each secretarial workstation	271513/***273123***
T2 1 fax port	271513/273113
T3 1 data port at each secretarial workstation	271513
T4 1 data port for printer	271513
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown illustrate quantities for the smallest and largest possible room size.



PROGRAM ACTIVITIES:

- Instructional and administrative leader of the building
- One-on-one conferences with parents, small group meetings, and coordination of administrative tasks

SPATIAL RELATIONSHIPS:

- Near reception area
- Near secretarial area
- Easy access to school circulation areas
- Near main entrance to the building
- Near conference room

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35**,** NRC 0.70

CAPACITY: 1 - 4 persons
SIZE: 150 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

DIRECTOR / PRINCIPAL'S OFFICE
CT-AD-3

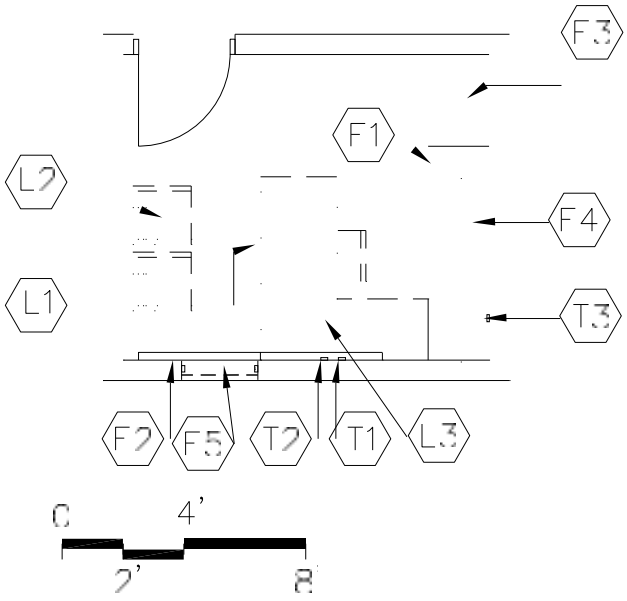
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116 / 099100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe (optional)	123550
F4 Wall cabinets above work surface	123550 F5
Window with integral blind	085116
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near workstation	271513
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.



CAPACITY: 1 - 3 persons
SIZE: 120 SF

PROGRAM ACTIVITIES:
- Assist director/principal in administrative tasks
- One-on-one conferences with academic instructors

SPATIAL RELATIONSHIPS:
- Near reception area
- Near secretarial area
- Easy access to school circulation areas
- Near main entrance to the building
- Near conference room

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35**,** NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

ASSISTANT DIRECTOR / PRINCIPAL'S OFFICE
CT-AD-4

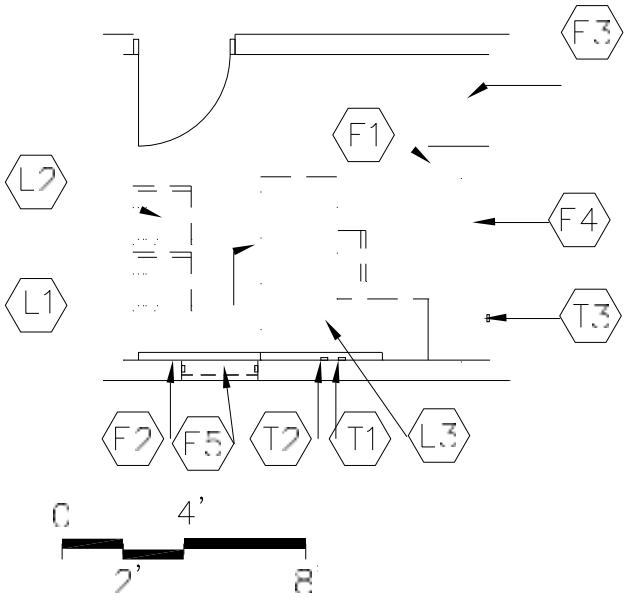
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets above work surface	123550 F5
Window with integral blind	085116
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.



PROGRAM ACTIVITIES:
- Private space for program supervisor
- One-on-one conferences with academic instructors

SPATIAL RELATIONSHIPS:
- Near reception area
- Near secretarial area
- Easy access to school circulation areas
- Near main entrance to the building
- Near conference room

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35**,** NRC 0.70

CAPACITY: 1 - 3 persons
SIZE: 120 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

SUPERVISOR'S OFFICE
CT-AD-5

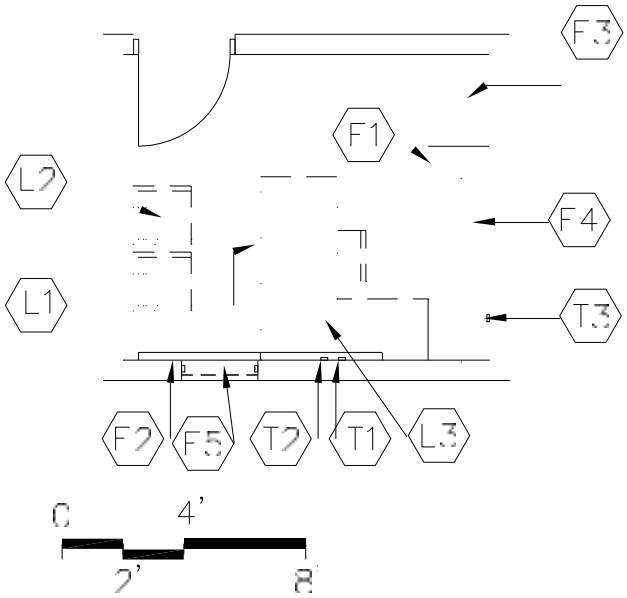
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets above work surface	123550 F5
Window with integral blind	085116
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.



PROGRAM ACTIVITIES:
- Private space for coordinator
- One-on-one conferences with academic instructors

SPATIAL RELATIONSHIPS:
- Near reception area
- Near secretarial area
- Easy access to school circulation areas
- Near main entrance to the building
- Near conference room

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35**,** NRC 0.70

CAPACITY: 1 - 3 persons
SIZE: 120 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

COORDINATOR'S OFFICE
CT-AD-6

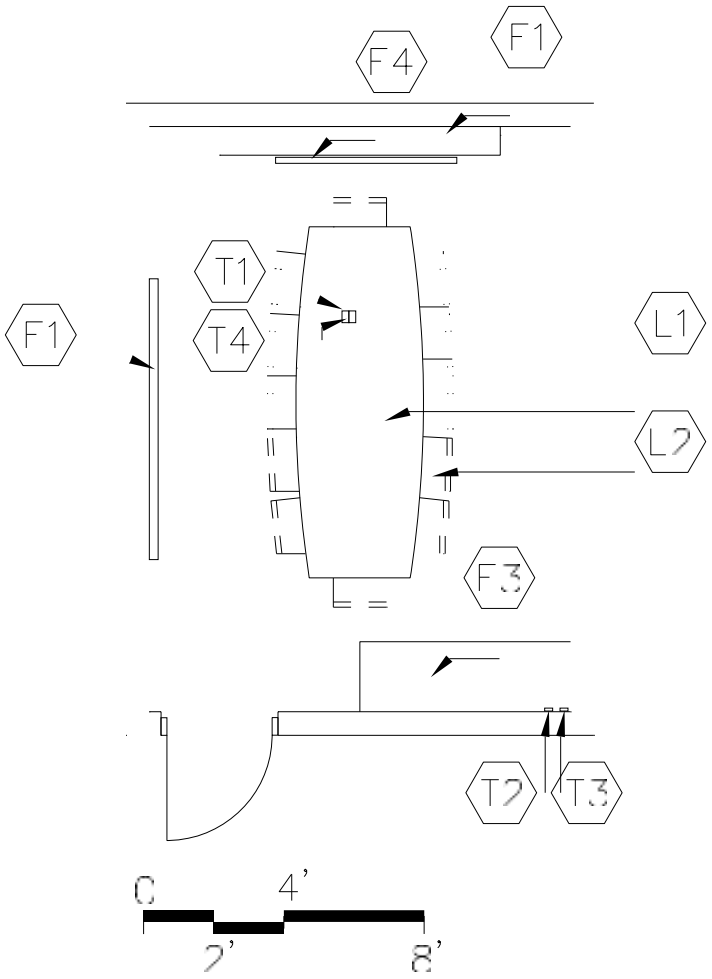
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets above work surface	123550 F5
Window with integral blind	085116
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.



CAPACITY: 12 – 15 persons
SIZE: 250 SF

PROGRAM ACTIVITIES:
- Conferences with staff, students, parents, and other community groups

SPATIAL RELATIONSHIPS:
- Near principal's office
- Near assistant director/principal's office
- Near reception area
- Near secretarial area

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control - wall minimum STC 45 ceiling minimum CAC 35**,** NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

CONFERENCE ROOM
CT-AD-7

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

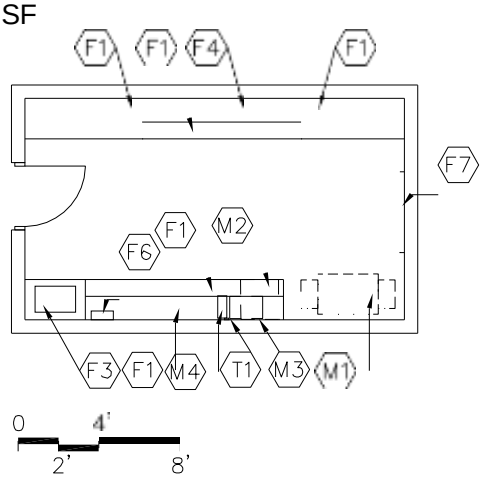
LOOSE FURNISHINGS:
L1 Conference table
L2 Chairs
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 16' combination of marker board, tackboard, tackable wall surface or media display cabinet	101100
F2 Reserved	
F3 4'-6' of base cabinets (optional)	123550
F4 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Multilevel switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
3 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port and video display device	271543/274119
T2 1 voice port and phone	271513/273123
T3 1 data port	271513
T4 Overhead projector	274119
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

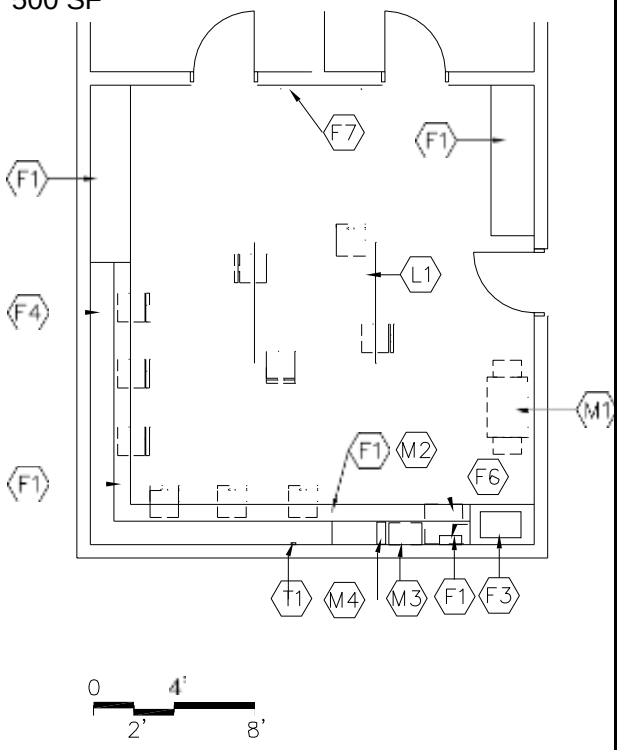
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.

200 SF



500 SF



CAPACITY: N/A
SIZE: 200 - 500 SF

PROGRAM ACTIVITIES:

- Distribution area for preparation/copying of mail and materials.
- Staff receives messages and obtains supplies.

SPATIAL RELATIONSHIPS:

- Near secretarial area

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 40
  ceiling minimum CAC 35**,** NRC 0.70

NOTES:

1. The mail cubicles can be either on the wall or through the wall.

MAIL/WORK/COPY ROOM
CT-AD-8

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, linoleum, ET, rubber, or sheet vinyl	096500 096813 096816 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Work table and chairs
(applicable in 300 SF space only)
Wastebasket

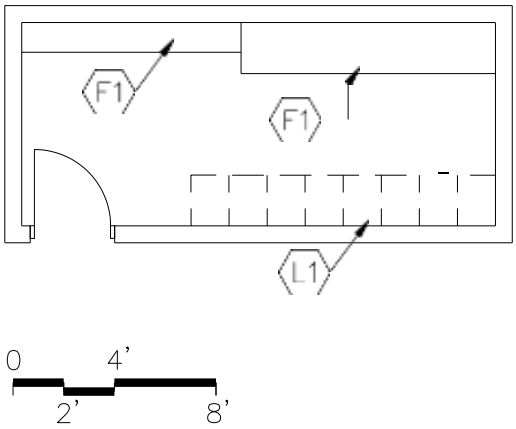
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 20'-24' combination wall and base cabinets	123550
F2 8'-12' of tall storage cabinets or about 32' maximum of a combination storage cabinets	123550
F3 3' sink base cabinet	123550
F4 Mail cubicles for all staff	123200
F5 Reserved	
F6 Towel dispenser (optional)	102813
F7 4' tack board or marker board (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
3 - 5 duplex receptacles	262726
Receptacle for copier	262726
Communications:	
T1 1 voice port and phone	271513/273123
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
The following items are to be funded by the school district:
M1 Copier
M2 Undercounter refrigerator
M3 Microwave
M4 Coffee maker

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

150 SF



PROGRAM ACTIVITIES:

- Supplies, books, records, forms, and equipment storage

SPATIAL RELATIONSHIPS:

- Near mail/work/copy room
- Near vault/records storage

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY: N/A
SIZE: 150 - 200 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

ADMINISTRATIVE STORAGE
CT-AD-9

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, linoleum, ET, rubber***, or sheet vinyl***	096500 ***096813*** ***096816*** ***096516***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

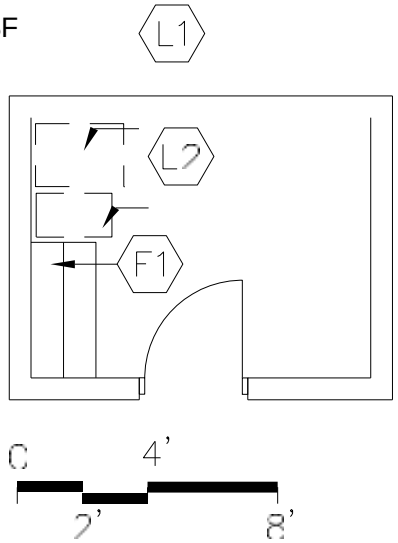
LOOSE FURNISHINGS:
L1 File cabinets

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 10'-20' of open shelving depth may vary (fixed or loose)	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

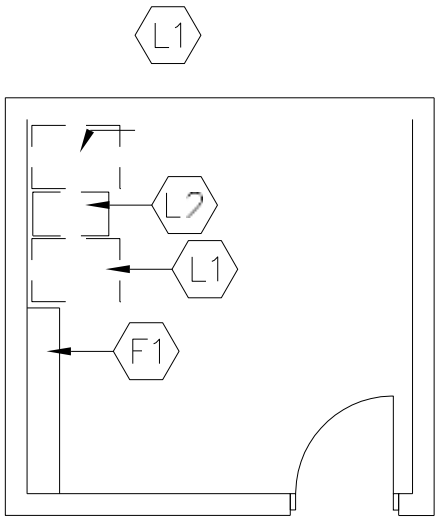
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

85 SF



140 SF



CAPACITY: N/A
SIZE: ***85 - 200*** SF

PROGRAM ACTIVITIES:

- Storage of records and security files in a secure area

SPATIAL RELATIONSHIPS:

- Access to guidance area
- Access to secretarial personnel

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

VAULT/RECORDS
CT-AD-10

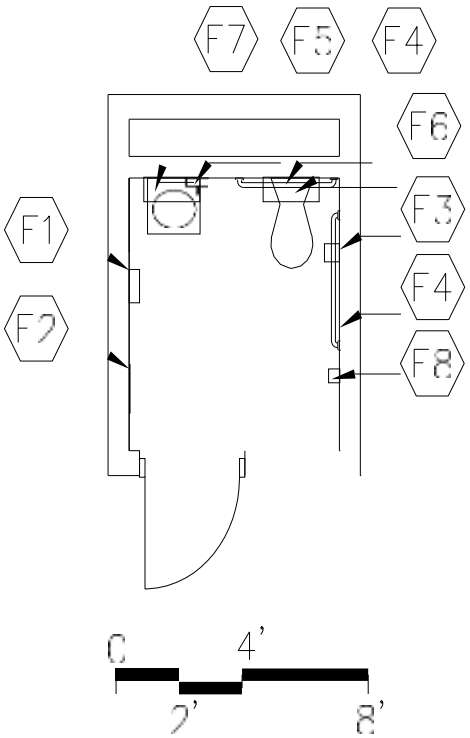
FINISHES[1]:	Spec. Ref.#
Flooring:	
Rubber, ***carpet, carpet tile***, ***linoleum, ET or sheet vinyl***	096500 ***096813*** ***096816*** ***096516***
Base:	
Resilient base	096500
Ceiling:	
Rated 2-hour construction	---
Walls:	
Painted concrete masonry units or painted gypsum wallboard Rated 2-hour construction	042000/099100 092116/099100

LOOSE FURNISHINGS:
L1 File cabinet
L2 Safe (loose or fixed)

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 3'-6' of open shelving, (depth may vary)(fixed or loose)	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
Wall, ceiling, and door construction to have a 2-hour fire rating	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Personal and health needs for teachers and staff
- Restroom facilities for clinic

SPATIAL RELATIONSHIPS:
- Located in the administrative area

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35**,** NRC 0.70
- Moisture- and stain-resistant finishes

CAPACITY: 1 person
SIZE: ***60*** SF

NOTES:

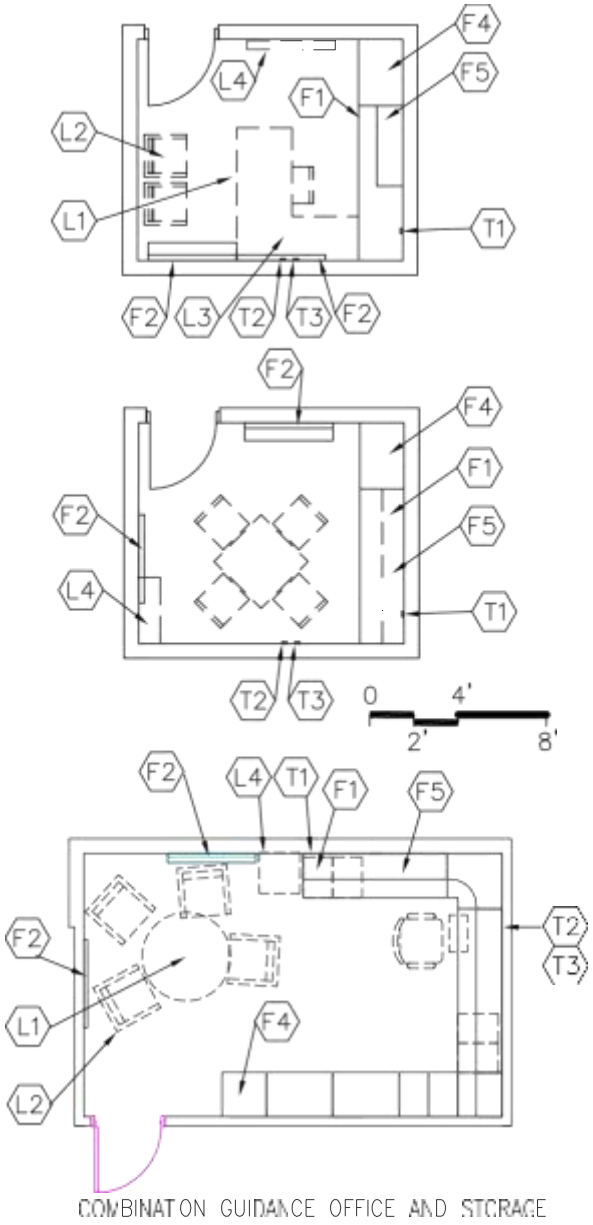
RESTROOM
CT-AD-11

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET, sheet vinyl, porcelain tile,	096516
ceramic mosaic tile, or	096500
resinous flooring	093000
	096723
Base:	
Resilient base	096500
Optional: ceramic mosaic tile, porcelain tile, resinous flooring, or integral vinyl cove base	093000 096723
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
Optional: moisture & abuse-resistant gypsum wall board	092116/099100
LOOSE FURNISHINGS:	
Wastebasket	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 24" x 60" mirror	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 8” deep wall cabinet above toilet for supplies (optional)	102813 F7
Stainless steel shelf (optional)	102813 F8
Coat hook	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications::	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



COMBINATION GUIDANCE OFFICE AND STORAGE

CAPACITY: 1 - 3 persons
SIZE: 120 SF

PROGRAM ACTIVITIES:

- Guidance counselor to do individual work and provide assistance to students
- One-on-one conferences with parents and coordination of administrative tasks
- Could be combined with guidance records/storage

SPATIAL RELATIONSHIPS:

- Near guidance/records storage
- Near reception area
- Near secretarial area
- Access to school circulation areas

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blinds

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

GUIDANCE COUNSELOR
CT-AD-12

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

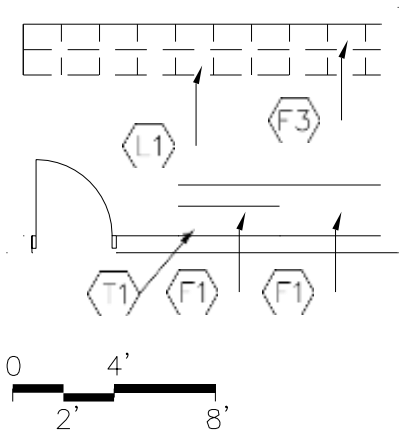
LOOSE FURNISHINGS:
L1 Desk or table, with chair
L2 Visitor chairs
L3 Computer desk return
L4 Bookcase (fixed or loose)
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 8'-12' combination marker board, tack board, tackable wall surface	101100
F3 Reserved	
F4 Tall wardrobe	123550
F5 Wall cabinets	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near workstation	271513
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

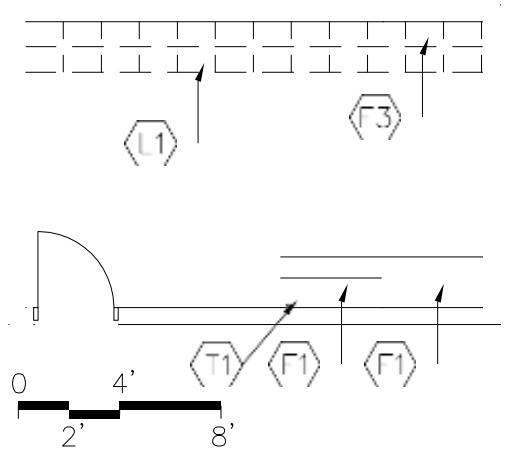
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.

100 SF



150 SF



CAPACITY: N/A
SIZE: 100 - 150 SF

PROGRAM ACTIVITIES:

- Storage of supplies, files, and equipment in a secure area

SPATIAL RELATIONSHIPS:

- Near guidance counselor's office
- Could be combined with guidance counselor's office

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

GUIDANCE RECORDS/STORAGE
CT-AD-13

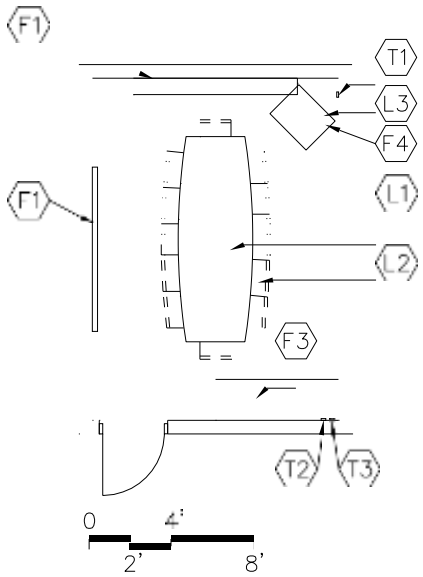
FINISHES[1]:	Spec. Ref.#
Flooring:	
Rubber***, carpet, carpet tile, linoleum, ET, or sheet vinyl***	096500 ***096813*** ***096816*** ***096516***
Base:	
Resilient base	096500
Ceiling:	
Rated 2-hour construction	---
Walls:	
Painted gypsum wallboard over metal studs or	092116/099100
Painted concrete masonry units	042000/099100
Rated 2-hour construction	
LOOSE FURNISHINGS:	
L1 File cabinets	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 ***6'-10' combination wall and base cabinets and tall cabinets***	123550
F2 ***Reserved***	
Option: mobile storage shelving ***or file cabinets***	105626
F3 4'-10' shelving (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
T1 1 data port (optional)	271513
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Wall, ceiling, and door construction to have a 2-hour fire rating	

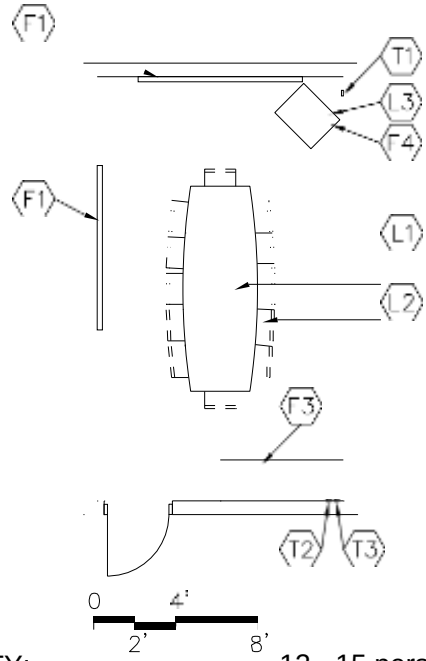
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

150 SF



250 SF



CAPACITY: 12 - 15 persons
SIZE: 150 - 250 SF

PROGRAM ACTIVITIES:
- Conferences with staff, students, parents, and other community groups

SPATIAL RELATIONSHIPS:
- Near guidance counselors office
- Near principal's office
- Near reception area
- Near guidance records/storage area

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blinds

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

GUIDANCE CONFERENCE
CT-AD-14

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

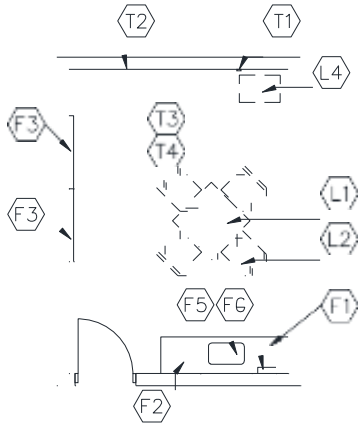
LOOSE FURNISHINGS:
L1 Conference table
L2 Chairs
L3 Monitor cart or cabinet (could be fixed casework)
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 10'-16' combination marker board, tack board, tackable wall surface	101100
F2 Reserved	
F3 4'-6' of base cabinets	123550
F4 Technology support casework (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Multilevel switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
3 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port and video display device	271543/274119
T2 1 voice port and phone	271513/273123
T3 1 data port	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

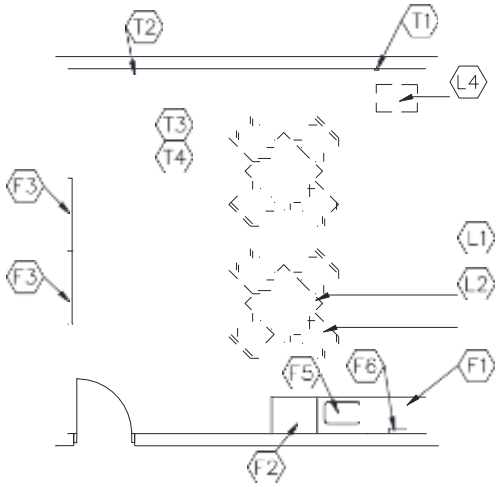
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed casework and loose furnishings can be also either all fixed or all loose.

200 SF



400 SF



CAPACITY: 2 - 8 persons
SIZE: 200 - 400 SF

PROGRAM ACTIVITIES:
- After school meetings, community, and small group meetings

SPATIAL RELATIONSHIPS:
- Near administrative area

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blinds

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

PARENT/VOLUNTEER
CT-AD-15

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

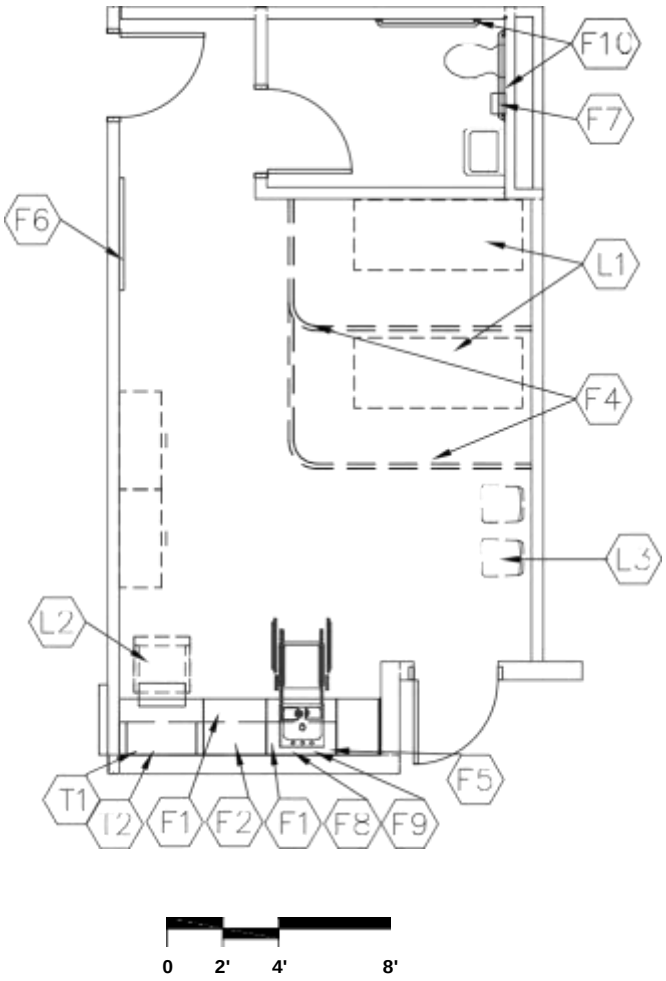
LOOSE FURNISHINGS:
L1 Table
L2 Chairs
L3 Reserved
L4 Monitor cart
Wastebasket

Miscellaneous:
Pencil sharpener (optional)

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 About 3' of base cabinets	123550
F2 Tall wardrobe or coat cabinet (optional)	123550
F3 8'-12' combination marker board, tack board, tackable wall surface	101100
F4 Reserved	
F5 3' sink base cabinet	123550
F6 Towel dispenser	102813
Pencil sharpener support (optional)	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 15
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 Reserved	
T2 voice port with phone	271513/273123
T3 Wireless access point cable above ceiling	***271513***
T4 Wireless access point (WAP) as determined by design – refer to note 2	***271533***
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable. WAP device quantity / placement per 272133 requirements.

450 SF



PROGRAM ACTIVITIES:

- Treatment of minor injuries, administration of medication, and conduction of hearing or vision tests

SPATIAL RELATIONSHIPS:

- Near reception area
- Adjacent to individual restroom
- Near special education shower

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Stain-resistant floor covering

CAPACITY: 2 - 3 patients

SIZE: Clinic…….***340 - 540*** SF
Restroom…..……60 SF

ANCILLARY SPACES: Secretarial Area
CT-AD-2

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

HEALTH CLINIC (includes restroom)
CT-AD-16

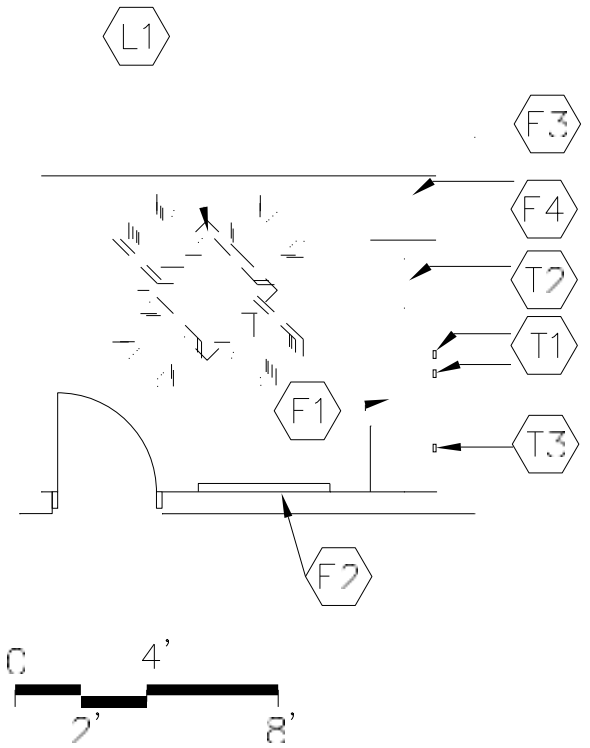
FINISHES[1]:	Spec. Ref.#
Flooring:	
Clinic: Linoleum,	096516
ET, sheet vinyl, or	096500
resinous flooring	096723
Restroom: ET, sheet vinyl, Resinous flooring, ceramic Mosaic tile, or porcelain tile	***093000***
Base:	
Resilient base, resinous flooring,	096500
or integral vinyl cover base	096730
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Cots
L2 Desk and chair
L3 Chairs
Wastebasket

EQUIPMENT
E1 Refrigerator with ice making capabilities

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 ***8'-1' combination base and wall cabinets, lockable***	123550
F2 3' sink base cabinet	123550
F3 ***Reserved***	
F4 Cubicle curtain and track	102123
F5 Towel dispenser	102813
F6 4' of tack board	101100
F7 Sanitary napkin dispenser/disposal	102813 F8
Soap dispenser	102813
F9 24" x 60" mirror	102813
F10 36" and 42" grab bars	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink - with goose neck	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Exhaust directly to exterior	
Electrical:	
Single level switching with dimmer	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
2 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Receptacle for refrigerator	262726
Emergency lighting	265100
Communications:	
T1 1 voice port and phone	271513/***273123***
T2 1 data port near workstation	271523
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:

- Office and work area for specialists such as psychologist, reading specialist, etc., who regularly spend a portion of their schedule at one of several schools

SPATIAL RELATIONSHIPS:

- Near reception area
- Near secretarial area
- Direct access to school circulation areas
- Near main entrance to the building
- Near or accessible to principal's office and guidance counselor's office

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blind

APACITY: 1 - 3 persons
SIZE: 120 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

ITINERANT PERSONNEL

CT-AD-17

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:

L1 Table and chairs

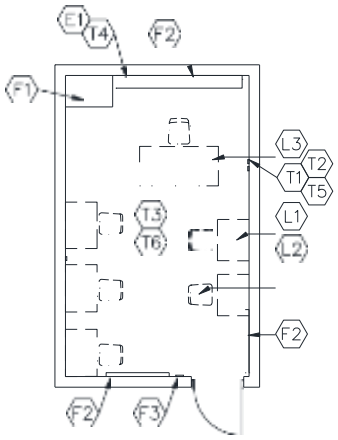
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers(optional)	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe (optional)	123550
F4 Wall cabinets	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123
T2 1 data port	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

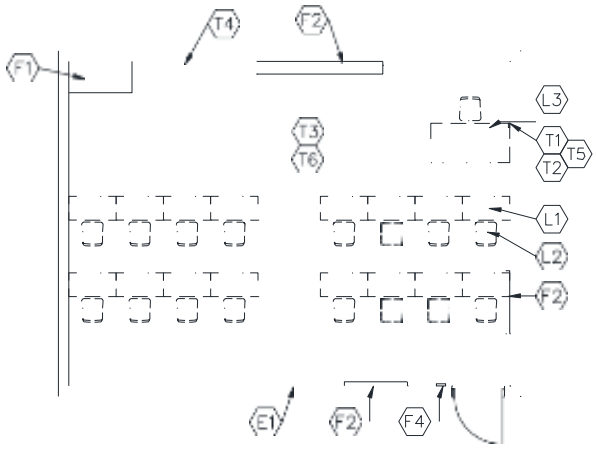
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.

200 SF



400 SF



CAPACITY: 5 - 8 students
SIZE: 200 - 400 SF

PROGRAM ACTIVITIES:

- Instructional area for students who require time away from the normal classroom due to behavioral problems

SPATIAL RELATIONSHIPS:

- Near principal's office
- Near secretarial area

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35**,** NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

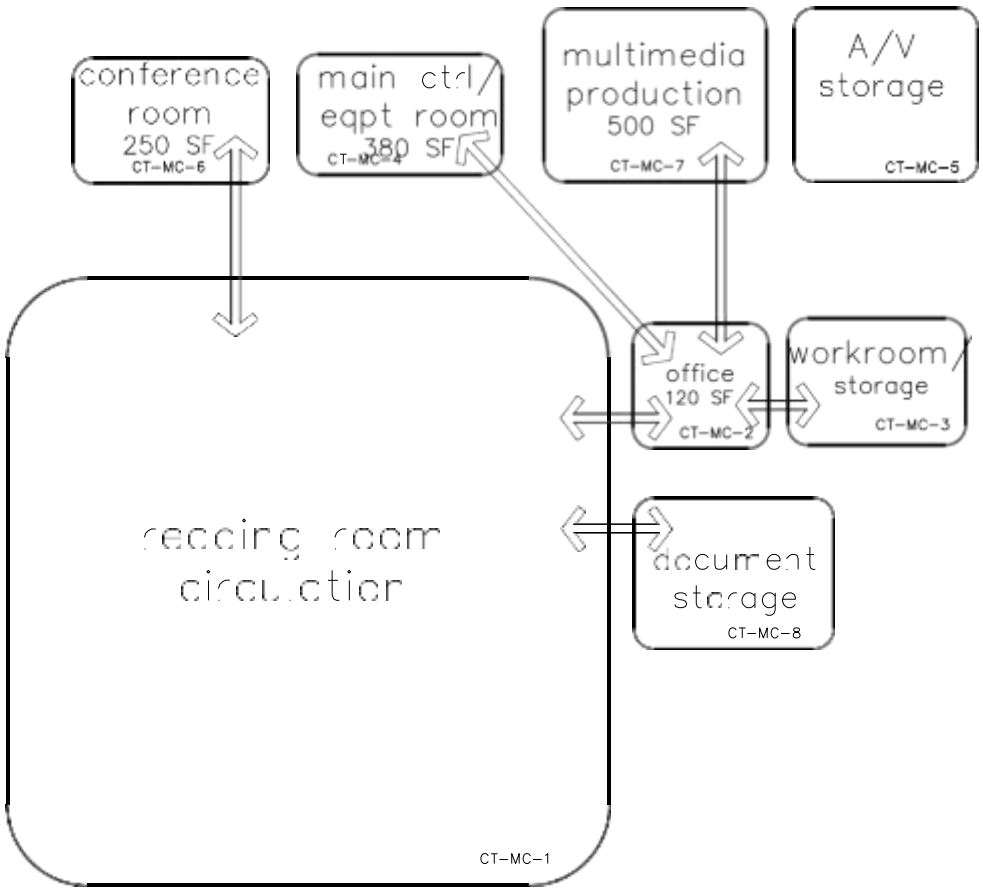
IN-SCHOOL SUSPENSION
CT-AD-18

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet, carpet tile, ET, linoleum, sheet vinyl, or rubber	096816 096500 096516 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Paint	092113
LOOSE FURNISHINGS:	
L1 Student carrels and/or desks	
L2 Student chairs	
L3 Teacher workstation and chair	
L4 Reserved	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
E1 Duplex receptacle with dedicated circuit for wireless devices	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 3'-4' of base cabinets (optional)	123550
F2 10'-16' combination marker board, tack board, tackable wall surface	101100
F3 Reserved	
F4 Pencil sharpener support (optional)	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123
T2 1 data port near teacher workstation	271513
T3 Wireless access point cable above ceiling	271513
T4 1 projector video port	271543
Clock	275313
Central sound system	275123
T5 Classroom technology center video port	271543, 274116, 274119, 275127
T6 Wireless access point (WAP) as determined by Design – refer to Note 2	272133

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable. WAP device quantity / placement per 272133 requirements.



NOTE:

This is an example of how the media center spaces in a career-technical school could be arranged. This is only meant to demonstrate the relationships between various areas of the building.

Following are the Media Center space plates:

CT-MC-1 Reading Room/Circulation
CT-MC-2 Media Specialist Office
CT-MC-3 Workroom/Storage
CT-MC-4 ***Main Control/Equipment Room***
CT-MC-5 A/V Storage
CT-MC-6 Conference Room
CT-MC-7 Multimedia Production Room
CT-MC-8 Document Storage

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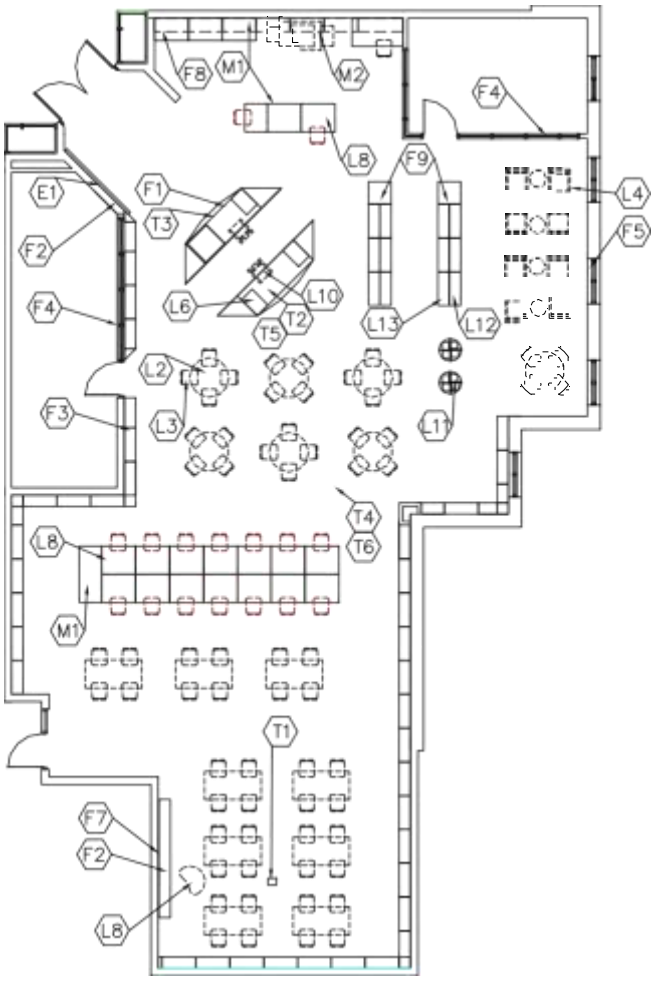


PROGRAM ACTIVITIES:

- Information laboratory that serves the instructional needs of the entire school.
- Recreational reading, research, accessing information, using technology, storing, cataloging, and reproduction of materials and information.
- Individual, small group, and class reading and researching.

SPATIAL RELATIONSHIPS:

- Centrally located and accessible to all areas of the facility
- Locate with access to academic core classrooms
- Easy access to public parking

ENVIRONMENTAL CONSIDERATIONS:

- Natural light opening with an operable vent
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Visual awareness of space to students and staff through transparency to corridor

CAPACITY:	10% of student capacity
SIZE:	10% of student capacity multiplied by 35 SF per student

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

READING ROOM/CIRCULATION
CT-MC-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
Acoustical wall treatment	098000

LOOSE FURNISHINGS[2]:

L1 Mobile book carts
L2 Student tables
L3 Student chairs
L4 Casual seating chairs
L5 Study carrels (optional)
L6 (3) Desk height file cabinets
L7 Atlas stand (optional)
L8 Computer workstation furniture
L9 Dictionary stand (optional)
L10 Circulation desk task chair
L11 Paperback book racks
L12 Newspaper racks
L13 Magazine display
Wastebaskets

Electronic Safety and Security:	
Life safety devices per code	283111

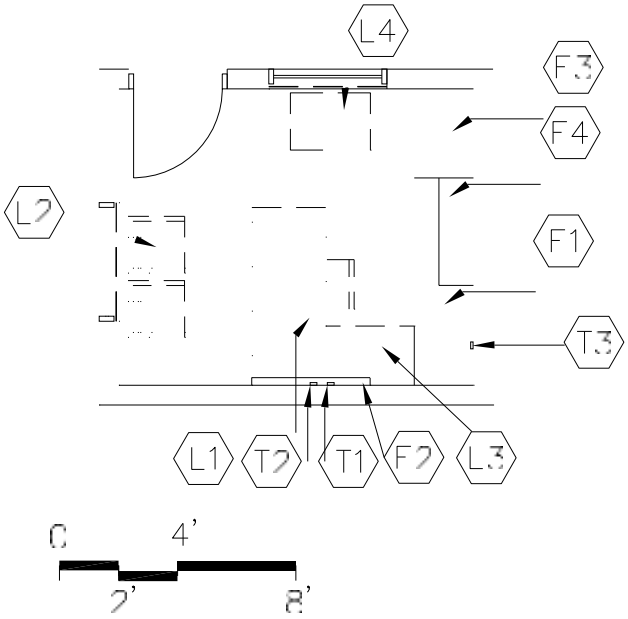
Miscellaneous:
Pencil sharpener (optional)
The following items are to be funded by the owner:
M1 2 printers: 1 at circulation desk and 1 in student work area
M2 Copier

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]: Fixed Items:	Spec. Ref.#
F1 Circulation desk casework	123550
F2 12'-20' combination marker board, tack board, tackable wall surface	101100
F3 Library book shelving (see notes)	115123
F4 Interior windows	081113/088000
F5 Windows with integral blinds or shades	085113
F6 Pencil sharpener support (optional)	062000
F7 Projection screen (optional)	115213
F8 Technology support casework	123550
F9 Search station terminals	123550
Roller window shades (optional)	122413
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
10 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Communications:	
T1 1 ***projector*** video port and video display device	271543/274119
T2 1 voice port and phone at circulation desk	271513/273123
T3 2 data ports for media center automation system	271513
T4 ***Wireless access point cable above ceiling***	271513
Clock	275313
Central sound system	275123
T5 ***Classroom technology center video port***	***271543, 274116, 274119, 275127***
T6 Wireless access point (WAP) as determined by Design – refer to Note 6.	***272133***

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Circulation desks and library shelving can be loose furnishings.
3. Technology components maybe be placed in a separate small cabinet, or integrated in the other casework in the room.
4. Fixed casework and loose furnishings can be interchangeable.

5. Up to 20% of book shelving can be moveable.
6. Baseline includes WAP cable. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:
- Media specialist to conduct duties

SPATIAL RELATIONSHIPS:
- Near reading room/circulation area
- Near workroom/storage
- Could be part of the media center reading room

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35**,** NRC 0.70

CAPACITY: 1 - 3 persons
SIZE: 120 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

MEDIA SPECIALIST OFFICE
CT-MC-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

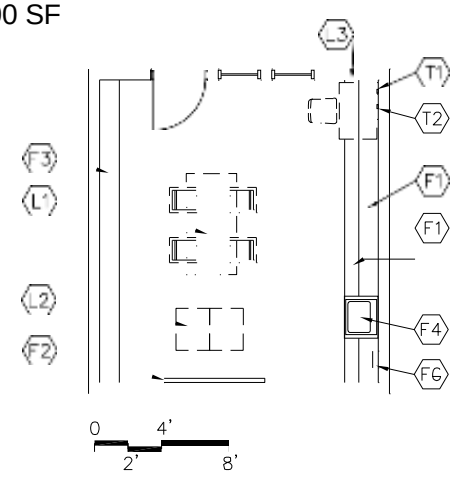
LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
L4 File cabinet
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets	123550
F5 Bookcases (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window	081113/088000

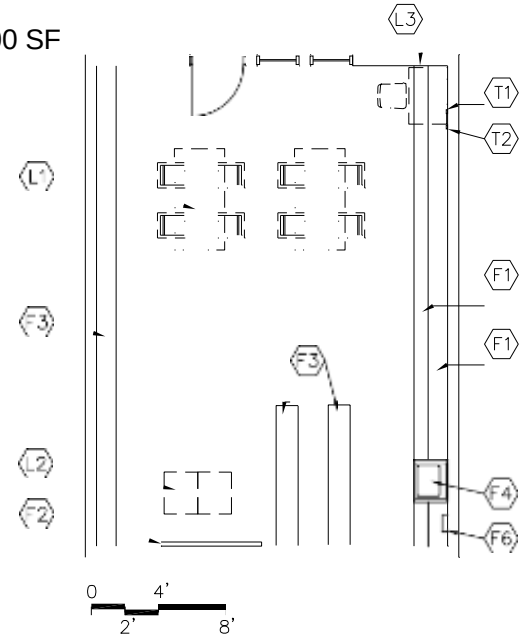
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.

300 SF



500 SF



CAPACITY: 2 - 8 staff
SIZE: 300 - 500 SF

PROGRAM ACTIVITIES:

- Space for receiving, processing, and repairing media material

SPATIAL RELATIONSHIPS:

- Near reading room/circulation
- Near media specialist office

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Visual access to reading room/circulation

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

WORKROOM/STORAGE
CT-MC-3

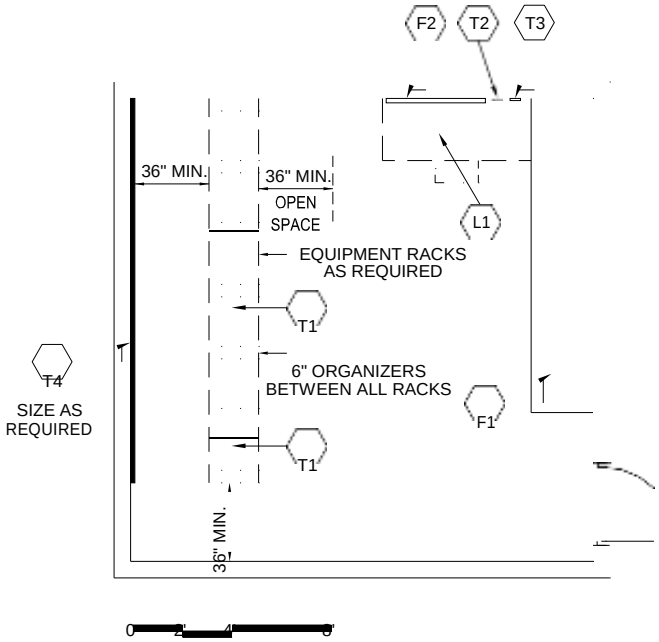
FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber***, ET or sheet Vinyl***	096500 ***096516***
Option: Carpet, carpet tile	***096813 096816***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Table and chairs
L2 Book trucks
L3 Computer workstation
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 ***26'-50' combination base, wall and tall cabinets***	123550
F2 4'-8' of tack board ***or marker board***	101100
F3 16'-60' of bookcases	123550
F4 3' sink base cabinet	123550
F5 ***Reserved***	
F6 Towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
3 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Communications:	
T1 1 voice port and phone	271513/***273123***
T2 1 data port	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window	081113/088000

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



PROGRAM ACTIVITIES:

- Collection and distribution hub for the voice, video, and data networks within the facility
- Contains racks for distribution equipment

SPATIAL RELATIONSHIPS:

- Near the center of the building to minimize the number of Telecommunication Rooms (TR)

ENVIRONMENTAL CONSIDERATIONS:

- Ventilation and cooling of heat-generating electronic equipment

Note: Technology designer shall confer with school district technology director to determine equipment and space needed and coordinate with project designer.

CAPACITY: N/A

SIZE: ***(Baseline) (Minimum)*** 300 - 400 SF

ER Utilized for local serving zone – add minimum 80 SF
ER Utilized as district N.O.C. – add minimum 150 SF
ER Utilized as building data center for central servers/thin client – add minimum 30 SF per 10 classrooms

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. ***Verify and coordinate ER size and location with the technology designer during programming phase.***

MAIN CONTROL / EQUIPMENT ROOM
CT-MC-4

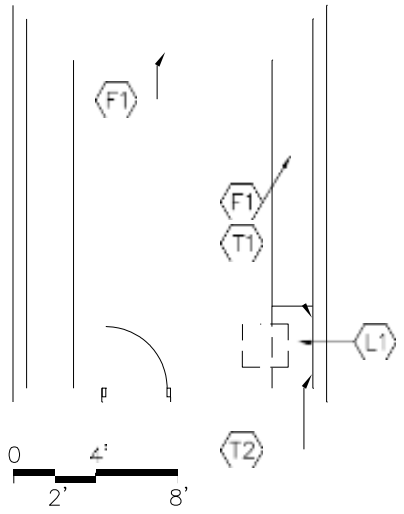
FINISHES[1]:	Spec. Ref.#
Flooring:	
ET or sheet vinyl	096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Desk and chair
Wastebasket

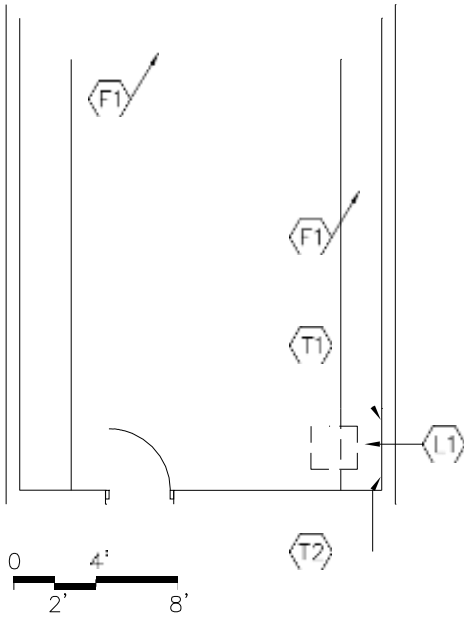
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 8'-16' of open shelving, depth may vary (fixed or loose)	123550
F2 4' of tack board or marker board	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Independent, packaged system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
3 duplex receptacles	262726
Duplex receptacle for electronic systems	262726
Telecommunications Grounding	270526/260526
Standby Power	263213/263600
Communications:	
T1 Technology Equipment	
Central sound system	275123
Telephone wiring	271313/271513
Integrated telephone system	273123
Video wiring	271543
Digital on demand delivery system	274125
Local area network wiring	271513/271323
Local area network electronics	272100/272133
Grounding & Infrastructure Equipment	270526/271100
T2 1 voice port and phone	271513/273123
T3 1 data port near workstation	271513
T4 ***3/4***" plywood back board	271313
Electronic Safety and Security:	
Life safety devices per code	283111
Security system	281300/281600/282300
Miscellaneous:	
Provide distribution equipment with an equipment electrical ground.	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

250 SF



350 SF



CAPACITY: N/A
SIZE: 250 - 350 SF

PROGRAM ACTIVITIES:
- Storage of audio/video (A/V) equipment

SPATIAL RELATIONSHIPS:
- Near media specialist office
- Near workroom/storage

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

A/V STORAGE
CT-MC-5

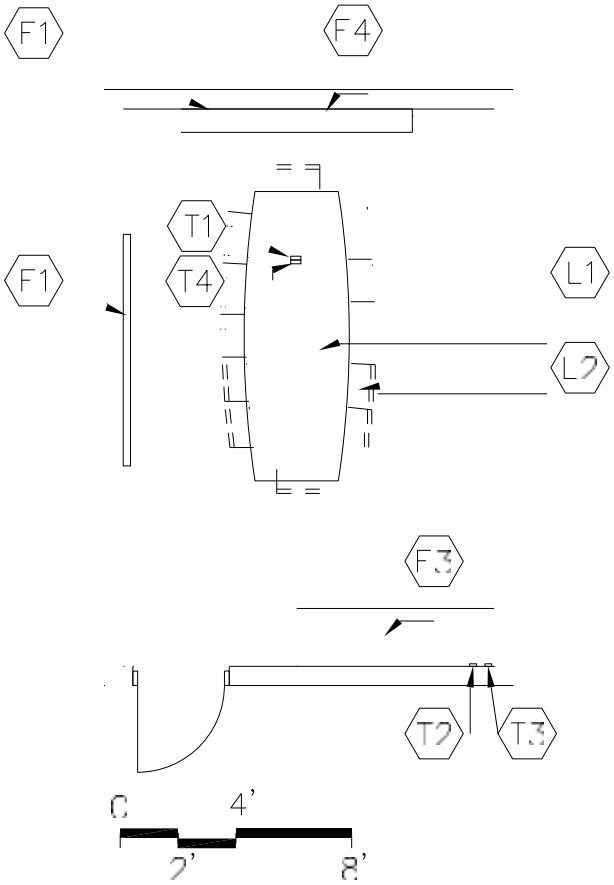
FINISHES[1]:	Spec. Ref.#
Flooring:	
Rubber	096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Desk and chair
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items[3]:	
F1 8' – 26' of open shelving, depths may vary (fixed or loose)	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
4 duplex receptacles (minimum)	262726
Communications:	
T1 1 voice port and phone	271513/***273123***
T2 1 data port near workstation	271513
Central sound system	275123
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



CAPACITY: 8 - 12 persons
SIZE: 250 SF

PROGRAM ACTIVITIES:
- Used primarily by students for group projects

SPATIAL RELATIONSHIPS:
- Near reading room/circulation

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

CONFERENCE ROOM
CT-MC-6

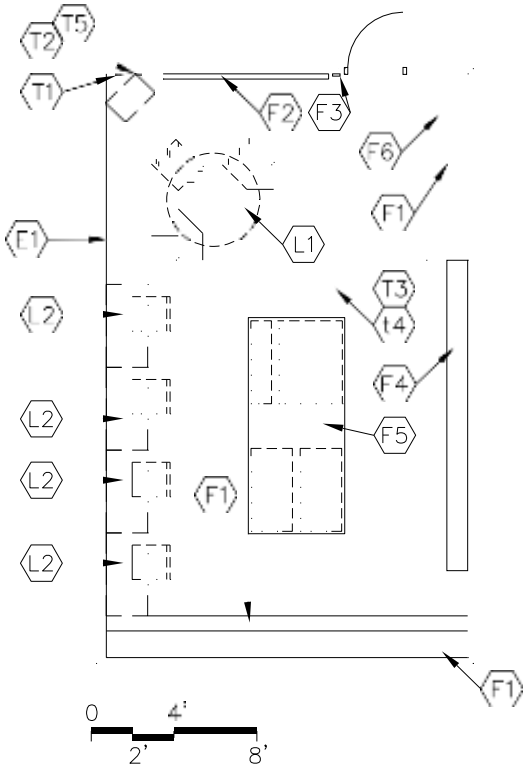
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or Carpet Tile	096816 096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Conference table
L2 Chairs
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 14'-18' combination marker board, tack board and tackable wall surface	101100
F2 Reserved	
F3 4'-6' of base cabinets (optional) (fixed or mobile)	123550
F4 Projection screen (optional)	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Multilevel switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
3 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123 T3
1 data port	271513
T4 ***Ultra-short throw interactive*** projector	274119
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.
3. Fixed casework and loose furnishings can be also all fixed or all loose.

500 SF



PROGRAM ACTIVITIES:

- Production of a variety of media
- Individual student project work and student instruction
- Putting together student project presentations in media such as PowerPoint, video, reports, 3D models, etc.

SPATIAL RELATIONSHIPS:

- Near workroom/storage
- Near media center

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control –
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: 5 - 7 persons
SIZE: 500 - 800 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. This space could be an area inside the media center.

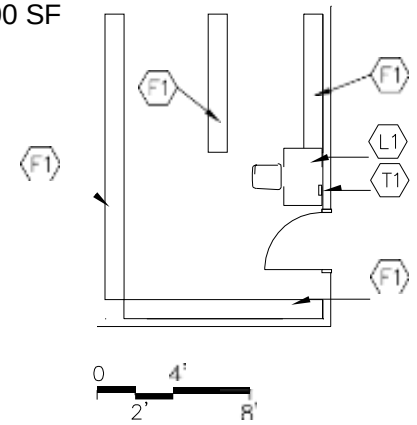
MULTIMEDIA PRODUCTION ROOM
CT-MC-7

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096500
ET, sheet vinyl, or rubber	096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
L1 Tables and chairs/stools	
L2 Computer workstation furniture	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
Interior windows for supervision (optional)	081113/088000
The following items to be provided by the school district:	
Copier, scanner, printers, binders, laminators	
E1 Duplex receptacle with dedicated circuit for wireless devices	

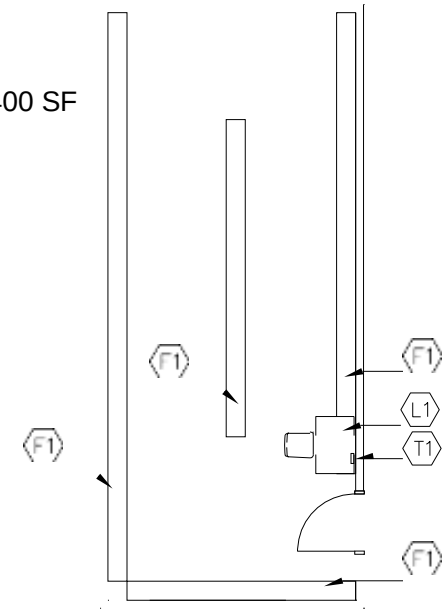
FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 15'-45' combination base, wall and tall cabinets	123550
F2 4'-8' of tack board or marker board	101100
F3 Pencil sharpener support (optional)	062000
F4 4' - 16' of tall bookcases	123550
F5 Work surface	123550
F6 Technology support casework (if applicable)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Multilevel switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port and video display device	271543/274119
T2 1 voice port and phone	271513/273123
T3 ***Wireless access point cable above ceiling***	271513
Clock	275313
Central sound system	275123
T4 Wireless access point (WAP) as determined by Design – refer to Note 3	***272133***
T5 Classroom technology center video port	***271543, 274116, 274119, 275127***

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

200 SF



400 SF



CAPACITY: N/A
SIZE: 200 - ***500*** SF

PROGRAM ACTIVITIES:

- Secured storage for documents, including newspapers, periodicals, microfilm and microfiche

SPATIAL RELATIONSHIPS:

- Near reading room/circulation

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

DOCUMENT STORAGE
CT-MC-8

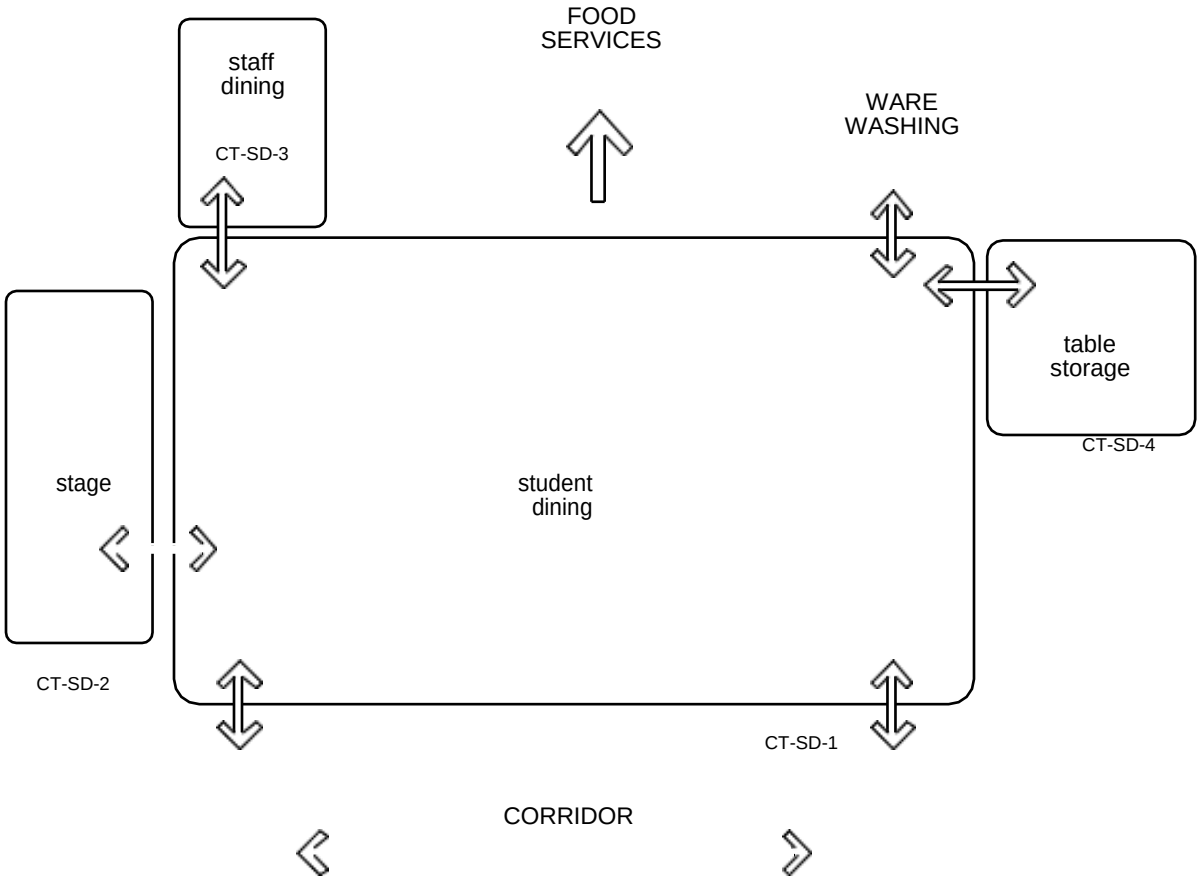
FINISHES[1]:	Spec. Ref.#
Flooring:	
Rubber, ***linoleum, ET, or sheet vinyl flooring***	096500 ***096516***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Computer worksurface

FEATURES:	Spec. Ref.#
Fixed Items[2]:	
F1 36' – 80' of open shelving (fixed or loose)	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-***5***	
Single level switching	262726
2 duplex receptacles	262726
Communications:	
T1 1 data port (optional)	271523
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



NOTE:

This is an example of how the student dining spaces in a career-technical school could be arranged. This is only meant to demonstrate the relationships between various areas of the building.

Following are the Administrative space plates for the following rooms:

CT-SD-1 Student Dining
CT-SD-2 Stage
CT-SD-3 Staff Dining
CT-SD-4 Table Storage
CT-SD-5 Family Restroom

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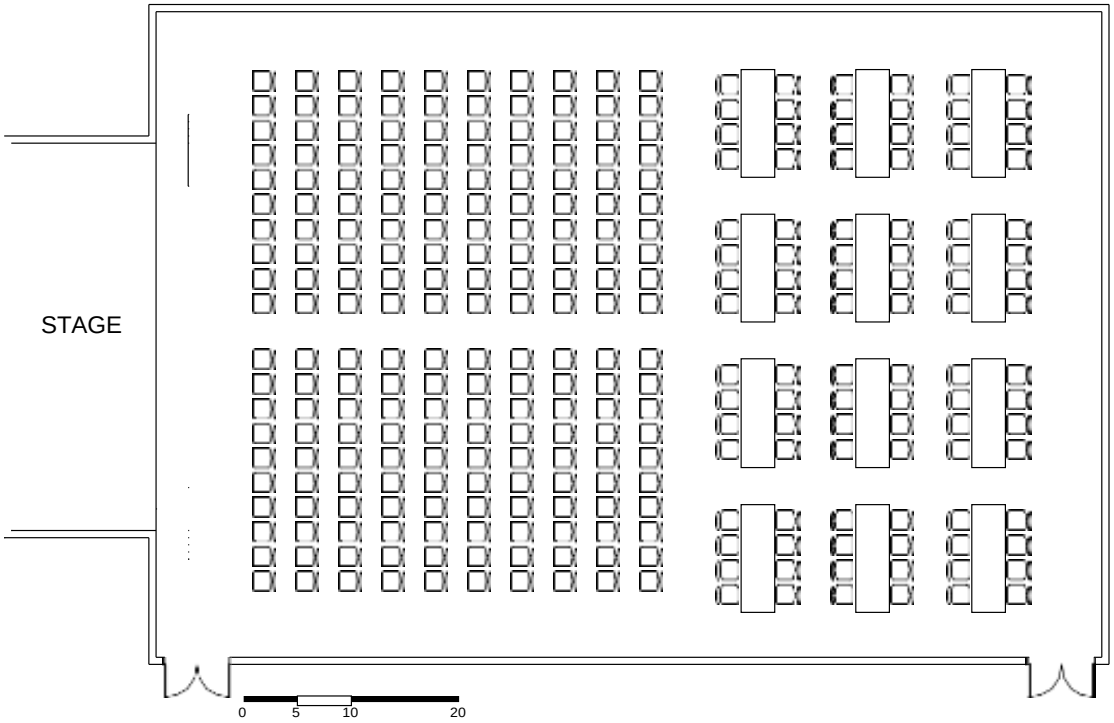


CAPACITY: 1/3 of student capacity

SIZE: 1/3 of student capacity multiplied by 17.5 SF per student or 3,000 SF whichever is greater

ANCILLARY SPACES:
Kitchen,CT-FS-1
Stage, CT-SD-2
Staff Dining, CT-SD-3
Table Storage, CT-SD-4

PROGRAM ACTIVITIES:
- Student dining
- Large group instruction, meetings and banquets
- Special activities
- Refreshment area for school activities

SPATIAL RELATIONSHIPS:
- Adjacent to kitchen

ENVIRONMENTAL CONSIDERATIONS:
- Uniform non-glare lighting
- Environmental sound control - walls and ceiling to be designed for auditorium-type acoustics sound system
- Flexibility of space
- Access capability
- Environmental sound control wall minimum STC ***60***

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

STUDENT DINING
CT-SD-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber, ET,	096500
sheet vinyl, porcelain tile,	096516
resinous flooring	033519
polished concrete finishing,	033510
or colored concrete finishing	096723
Base:	
Resilient base	096500
Option: Porcelain tile base	093000
Ceiling[3]:	
Suspended, acoustical	095113
Painted exposed structure	099100
Reflector panels	098000
Walls:	
Painted concrete masonry units	042000/099100
Diffusing block on 2 walls (minimum) or	042000
Acoustic treatment (varies with geometry of room)	098000

LOOSE FURNISHINGS:

L1 Tables
L2 Folding or high-density stack chairs for large assembly use
Waste receptacles
Recycling bins
Carts for chairs

Note: Cafeteria tables with attached stools shall be securely anchored to walls when not in use, or be kept in a secure storage area when not in use.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
High intensity discharge lighting or fluorescent lighting	265100
Dimmable quartz lighting	265100
Illumination level: see table 8600-6	
Multilevel switching with dimming	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Telecommunications Grounding	270526/260526

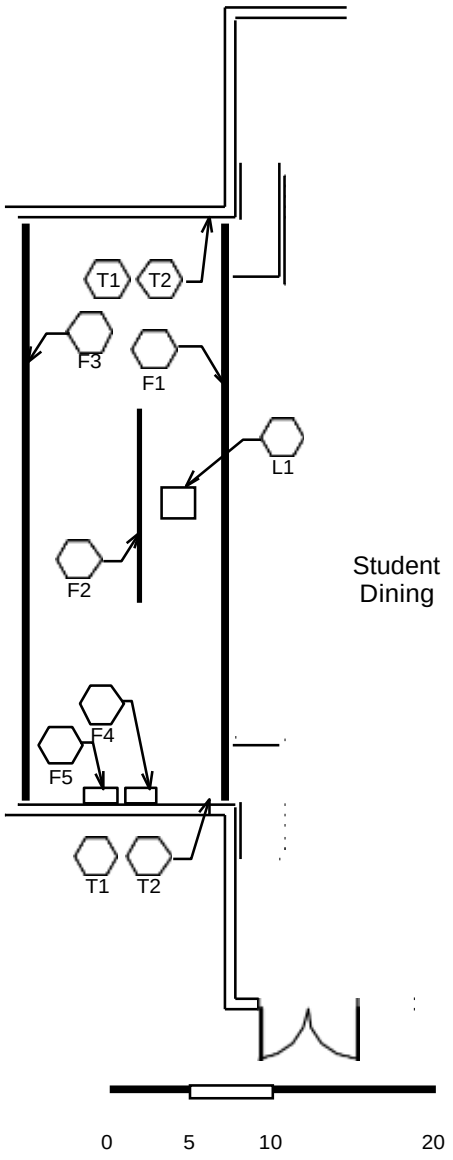
Communications:

T1	2 voice ports	271513/273123
T2	2 ***projector*** video ports	271543
T3	2 data ports (minimum)	271513
	Clocks	275313
	Central sound system	275123
	Student dining/auditeria sound system	275121
T4	***Ultra-short throw interactive*** projector	274119

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
N/A

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Other types of ceiling may be appropriate based on the actual facility design. High ceilings are appropriate for auditorium-type of acoustics.
3. Ceiling height to be 18’0” AFF minimum.



CAPACITY: N/A

SIZE: student capacity multiplied by 1.5 SF or 800 SF, whichever is larger

ANCILLARY SPACES:

Student Dining, CT-SD-1

PROGRAM ACTIVITIES:

- Presentations

SPATIAL RELATIONSHIPS:

- Adjacent to student dining
- Near food services

ENVIRONMENTAL CONSIDERATIONS:

- Access capability
- Sound system

NOTES:

STAGE
CT-SD-2

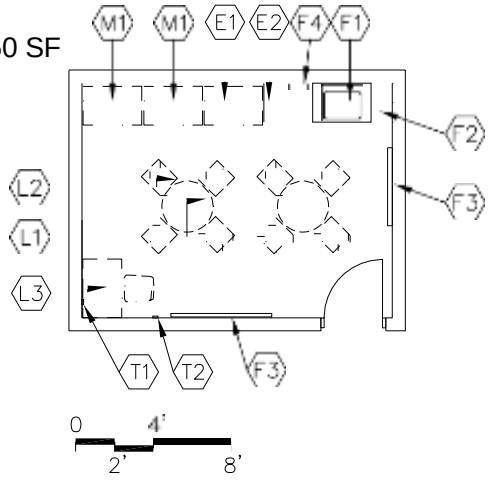
FINISHES[1]:	Spec. Ref.#
Flooring:	
Stage: Softwood or combination hardwood and softwood	096400
Stairs: Carpet, rubber, wood, or carpet tile	096816 096813
Base:	
Ventilated resilient base	096400
Ceiling:	
Painted exposed structure	099100
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Podium

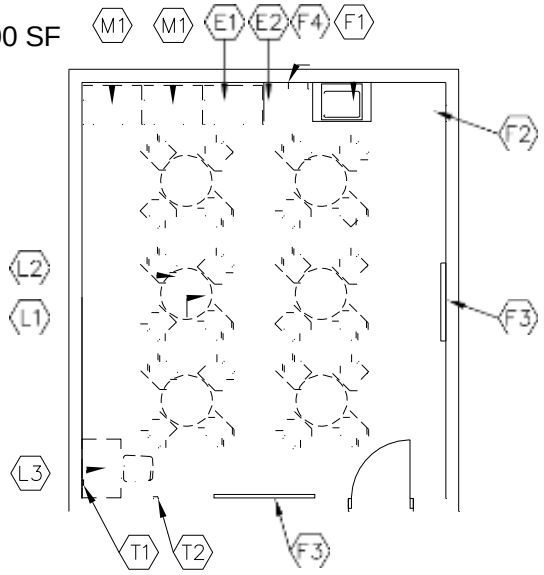
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Front curtain, track, and valance	116143
F2 Projection screen	116143
F3 Rear curtain	116143
F4 Sound control console	275121
F5 Lighting control console	265100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-6	
Single level switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting per code	265100
Means of egress lighting per code	265100
Telecommunications Grounding	270526/260526
Communications:	
T1 2 ***projector*** video ports	271543
T2 2 data ports	271513
Student dining/auditeria sound system[2]	275121
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Auditeria sound system is to be used in conjunction with the auditeria/student dining area.
3. Provide a reflective strip on floor at edge of stage.

450 SF



700 SF



CAPACITY: 8 – 24 staff
SIZE: 450 – ***1,200*** SF
ANCILLARY SPACES: Student Dining
CT-SD-1

PROGRAM ACTIVITIES:
- Space for staff dining

SPATIAL RELATIONSHIPS:
- Near student dining
- Near food services

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  walls ***only*** minimum STC ***45***
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

STAFF DINING
CT-SD-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, rubber, ET,	096500
sheet vinyl, porcelain tile,	096516
or resinous flooring	093000
	096723
Base:	
Resilient base	096500
Optional: porcelain tile base	093000
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted, concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Tables
L2 Chairs
L3 Computer workstation
Waste receptacle

EQUIPMENT:
E1 Refrigerator
E2 Microwave

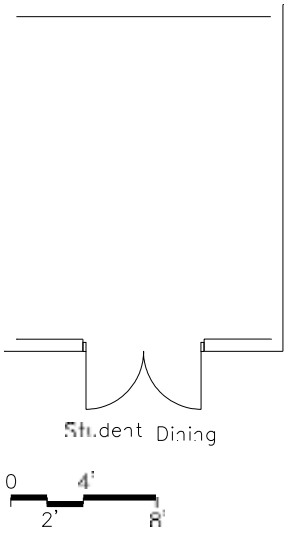
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 3' sink base cabinet with wall cabinet	123550
F2 About 8' of base and wall cabinets	123550
F3 8'-10' combination marker board,	101100
tack board, tackable wall surface	
F4 Towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
4 duplex receptacles	262726
Double duplex receptacle adjacent to each video port	262726
Receptacles for vending machines, refrigerator, and microwave	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
The following items are to be funded by the school district:
M1 Vending machines

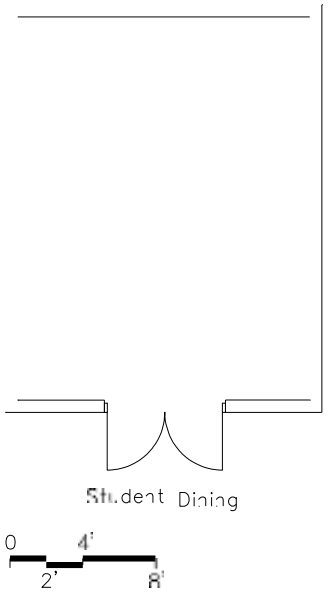
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

400 SF



550 SF



CAPACITY: N/A
SIZE: 400 - ***700*** SF
ANCILLARY SPACES: Student Dining
CT-SD-1

PROGRAM ACTIVITIES:
- Storage for tables and chairs

SPATIAL RELATIONSHIPS:
- Adjacent to student dining
- Near food services

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

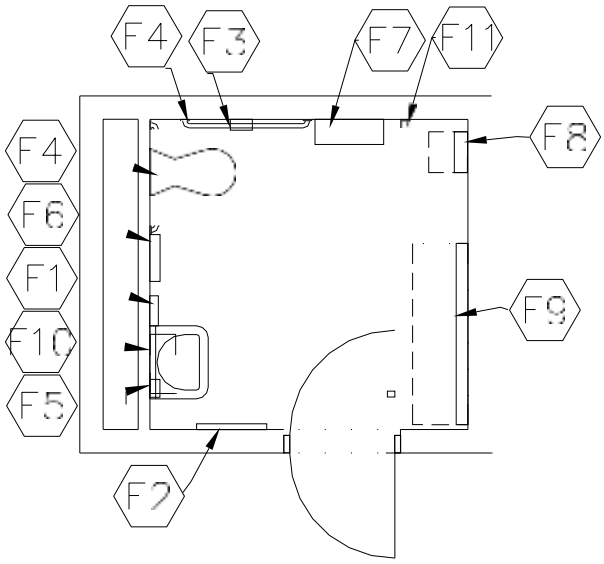
TABLE STORAGE
CT-SD-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	093000
Base:	
No base	
Ceiling:	
Exposed structure	
Option: Rated gypsum wallboard	092116
Walls:	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



CAPACITY: 2 people
SIZE: 80 SF

PROGRAM ACTIVITIES:

- Personal, health, and handicap needs for all building occupants

SPATIAL RELATIONSHIPS:

- Located where best accessible to all building occupants and the public

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

NOTES:

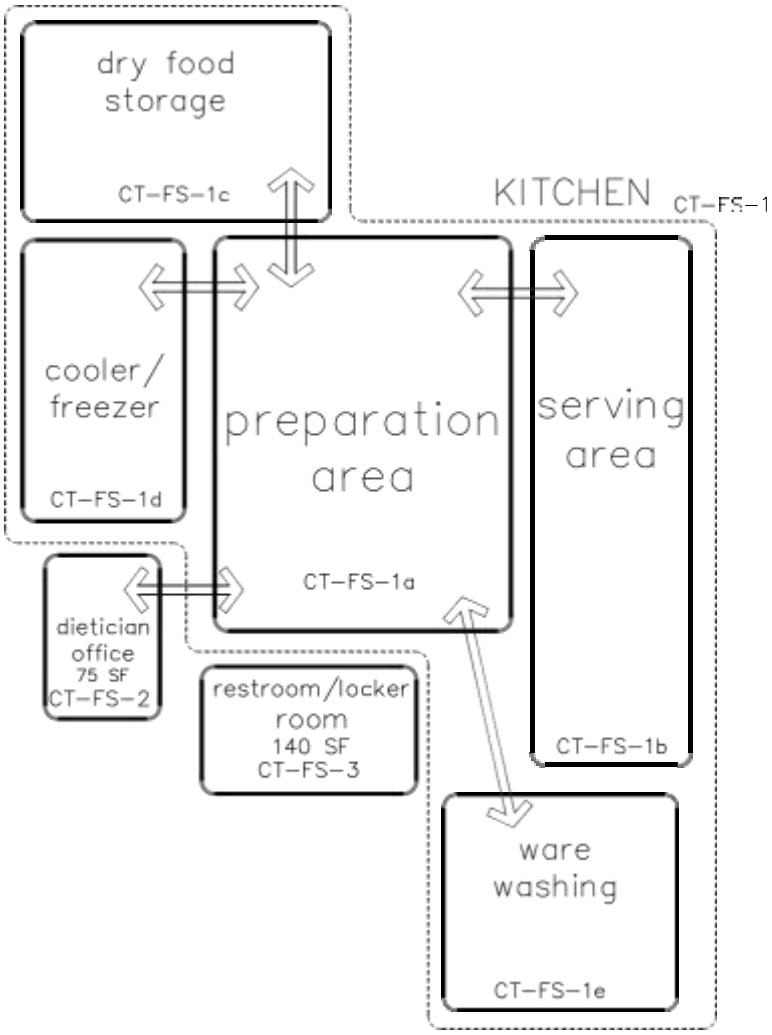
FAMILY RESTROOM
CT-SD-5

FINISHES[1]:	Spec. Ref.#
Flooring:	
ET or sheet vinyl	096516 096500
Optional: Ceramic mosaic tile, porcelain tile, or resinous flooring	093000 096723
Base:	
Resilient base	096500
Optional: Ceramic mosaic tile, porcelain tile, resinous flooring flooring, or integral vinyl cove base	093000 096723
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Wastebasket	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 24" x 60" mirror	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Sanitary napkin dispenser/disposal	102813
F7 Folding utility shelf	102813
F8 Mounted child seat	102813
F9 Adult/child changing station	102813
F10 16” x 24” mirror with shelf	102813
F11 Coat hooks	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



NOTES:

This is an example of how the food service spaces in a high school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

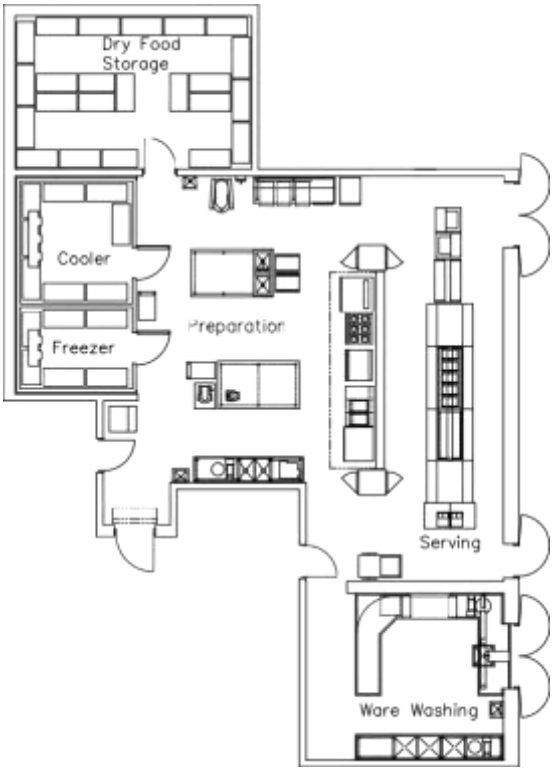
Following are the Food Service space plates:

CT-FS-0	Warming Kitchen
CT-FS-1	Kitchen
CT-FS-1a	Preparation Area
CT-FS-1b	Serving Area
CT-FS-1c	Dry Food Storage
CT-FS-1d	Cooler/Freezer
CT-FS-1e	Ware Washing
CT-FS-2	Custodial Closet
CT-FS-3	Dietician Office
CT-FS-4	***Restroom/Locker Room***

KITCHEN
CT-FS-1

This space consists of various areas:
- Preparation Area
- Serving Area
- Dry Food Storage
- Cooler/Freezer
- Ware Washing

A space plate follows for each of these areas.



CAPACITY: 3 – 10 persons
SIZE: Student capacity multiplied by 3.5 SF per student
ANCILLARY SPACES: Student Dining CT-SD-1
Loading/Receiving Area CT-GS-7

PROGRAM ACTIVITIES:
- Space for the planning, ordering, preparation, and serving of the meals, and for providing meals for the students and staff

SPATIAL RELATIONSHIPS:
- Adjacent to student dining
- Near staff dining
- Near table storage
- Adjacent to loading/receiving area

ENVIRONMENTAL CONSIDERATIONS:
- Compliance with State Board of Health requirements

MISCELLANEOUS:
- The sizing of the kitchen area assumes: Type “A” meal service only at 80% of the student capacity and 3, 30-minute serving periods.

NOTES:

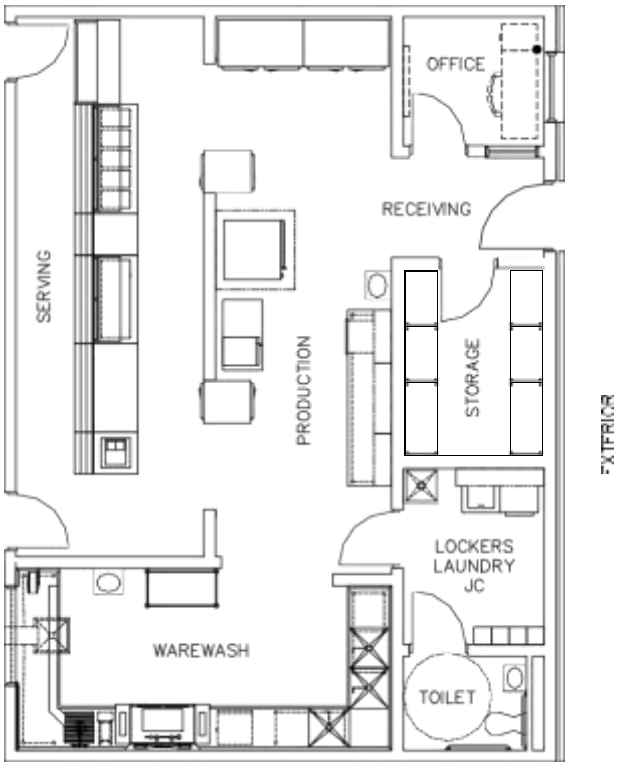
This kitchen layout is to be used only for a central kitchen operation.

This space consists of various areas:

Production Area	25%
Serving Area	35%
Warewash	25%
Storage	10%
Receiving	5%

Additional areas to be added:

Office	75 SF
Toilet	50 SF
Lockers/Laundry/Janitorial Closet	125 SF



CAPACITY: 3 - 7 persons
SIZE: Student capacity multiplied by 2.0 SF per student
ANCILLARY SPACES: Student Dining CT-SD-1
Loading/Receiving Area CT-GS-7

PROGRAM ACTIVITIES:
- Space for receiving, organizing, and serving of the meals prepared in the central kitchen.

SPATIAL RELATIONSHIPS:
- Adjacent to student dining
- Near staff dining
- Near table storage
- Adjacent to loading/receiving area

ENVIRONMENTAL CONSIDERATIONS:
- Compliance with State Board of Health requirements

MISCELLANEOUS:
- Kitchen area must be located adjacent to exterior loading dock area to receive transported food from central kitchen.

NOTES:

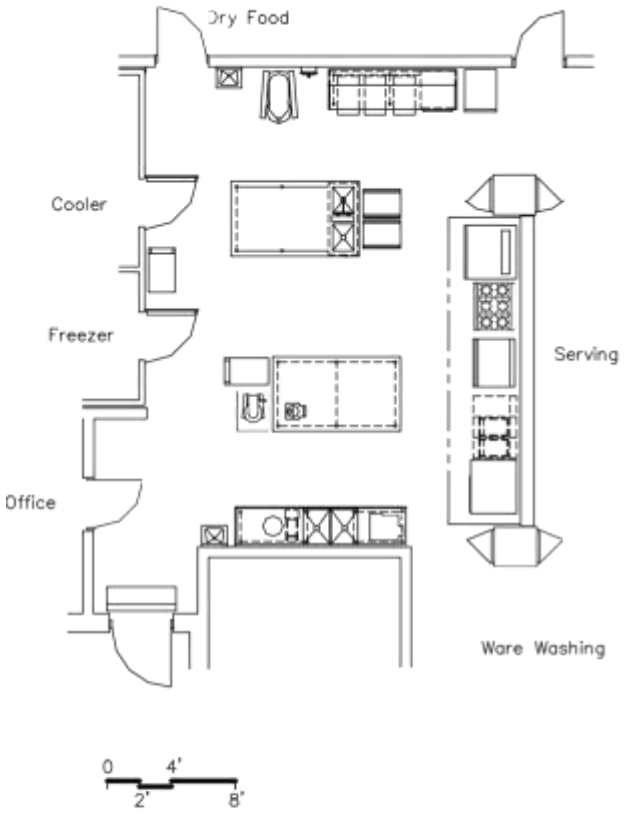
WARMING KITCHEN
CT-FS-0

FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile ***or***	093000
resinous flooring	***096723***
Base:	
Quarry tile base ***or integral base***	093000
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Option: Ceramic wall tile or	093000
latex paint	099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Connections to food service eqpt.	224000
Plumbing connections	224000/221116/221119
Hand washing lavatory	224000
Gas connections	226313
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Kitchen canopy exhaust system	233800
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
10 duplex receptacles	262726
Duplex receptacle at each cash register	262726
Emergency lighting	265100
Connections to food service eqpt.	262726
Means of egress lighting per code	265100
Communications:	
1 voice port and phone	271513/***273123*** 1
data port at cash register(s)	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.



CAPACITY: 3 – 10 persons
SIZE: Based on 36% of the kitchen area
ANCILLARY SPACES: Part of the kitchen

PROGRAM ACTIVITIES:

- Space and equipment for the preparation of food for students and staff

SPATIAL RELATIONSHIPS:

- Adjacent to the serving area
- Near the cooler/freezer
- Near the dry food storage

ENVIRONMENTAL CONSIDERATIONS:

- Proper ventilation of space to remove cooking odors
- Cleanable building surfaces

NOTES:

1. This is an example of a preparation area. Food service equipment will vary from school district to school district.

KITCHEN - Preparation Area

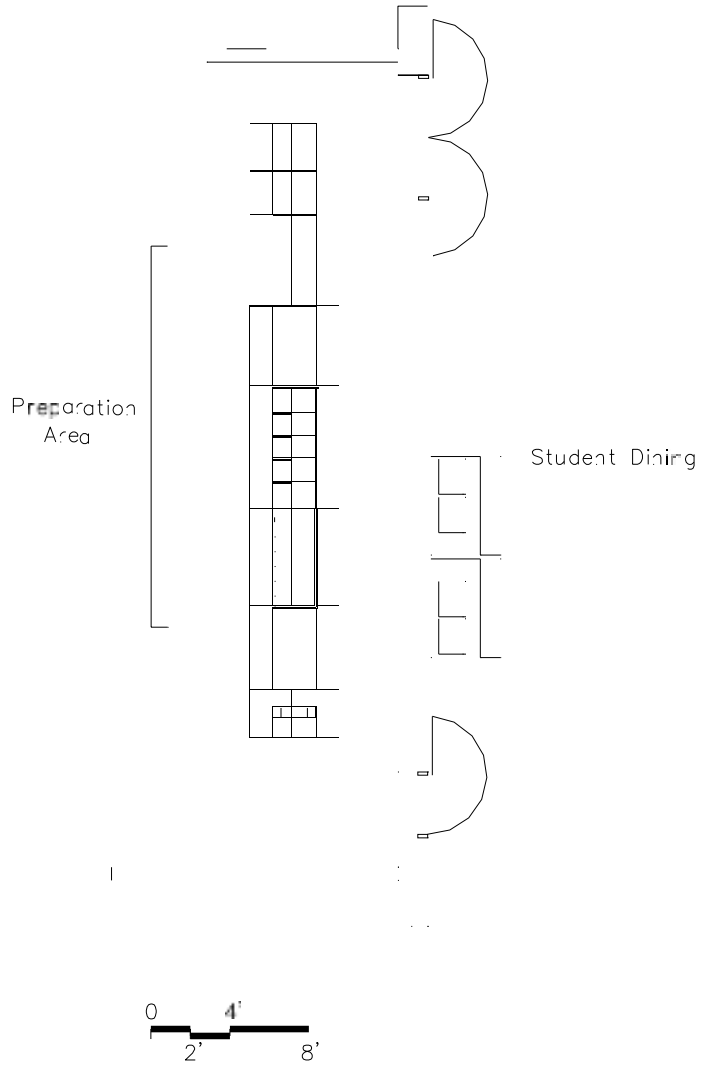
CT-FS-1a

FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile ***or***	093000
resinous flooring	***096723***
Base:	
Quarry tile base ***or integral base***	093000
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Option: ceramic wall tile	093000
or latex paint	099100
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Connections to food service equipment	224000
Plumbing connections	224000/221116/221119
Hand washing lavatory	224000
Gas connections	226313
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Kitchen canopy exhaust system	233800
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
4 duplex receptacles	262726
Emergency lighting	265100
Connections to food service equipment	262726
Means of egress lighting per code	265100
Communications:	
1 voice port and phone	271513/***273123***
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.



CAPACITY: N/A
SIZE: Based on 34% of the kitchen area
ANCILLARY SPACES: Part of the kitchen

PROGRAM ACTIVITIES:
- Space for serving of food

SPATIAL RELATIONSHIPS:
- Adjacent to student dining
- Adjacent to preparation area

ENVIRONMENTAL CONSIDERATIONS:
- Cleanable building services

NOTES:

1. This is an example of a serving area. Food service equipment will vary from school district to school district.

KITCHEN - Serving Area
CT-FS-1b

FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile	093000
Optional: porcelain tile ***or resinous flooring***	***096723***
Base:	
Quarry tile base	093000
Optional: porcelain tile base ***or integral base***	
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Ceramic wall tile	093000
or latex paint	099100

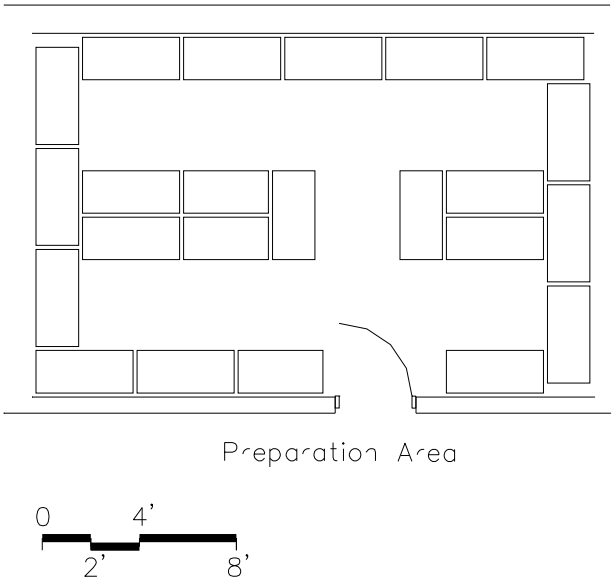
LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Equipment:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Connections to food service equipment	224000
HVAC:	
Supply/return air system	Div. 23
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
4 duplex receptacles	262726
Connections to food service equipment	262726
Emergency lighting	265100
Means of egress lighting per code	265100
Duplex receptacle at each cash register	262726
Communications::	
Data port(s) at cash register(s)	271513
Clock	275313
Central sound system	275123
1 voice port and phone	271513/***273123***
Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
N/A

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.



PROGRAM ACTIVITIES:

- Lockable space to store dry food products and government commodities for 15 to 30 days

SPATIAL RELATIONSHIPS:

- Near the food preparation area
- Access to the loading/receiving area

ENVIRONMENTAL CONSIDERATIONS:

- Continuous conditioning of air
- Cleanable building surfaces

CAPACITY: N/A
SIZE: Based on 11% of the kitchen area
ANCILLARY SPACES: Part of the kitchen

NOTES:

1. This is an example of a dry food storage area. Food service equipment will vary from school district to school district.

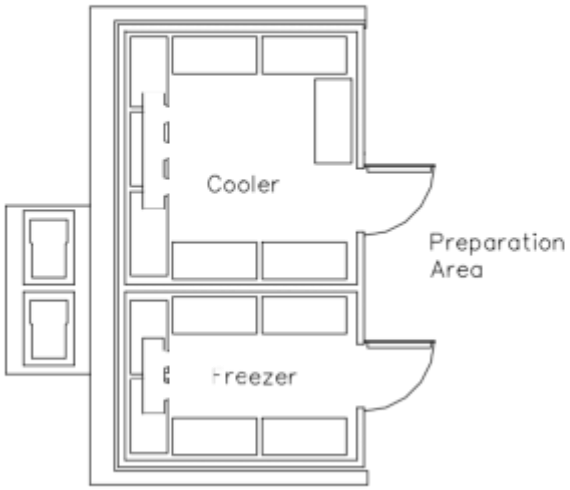
KITCHEN - Dry Food Storage
CT-FS-1c

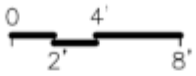
FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, ET, or sheet vinyl	096500
Option: Quarry tile ***or***	093000
resinous flooring	096516
	096723
Base:	
Resilient base	096500
Option: Quarry tile	093000
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Option: Ceramic wall tile	093000
or latex paint	099100
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supply/return air system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.





CAPACITY: N/A
SIZE: Based on 10% of the kitchen area
ANCILLARY SPACES: Part of the Kitchen

PROGRAM ACTIVITIES:
- Space for refrigerated storage of perishable products

SPATIAL RELATIONSHIPS:
- Adjacent to food preparation area
- Access to the loading/receiving area

ENVIRONMENTAL CONSIDERATIONS:
- Ventilation for refrigeration machinery
- Cleanable building surfaces
- Floor to be flush with adjacent kitchen floor

NOTES:

1. This is an example of a cooler/freezer. Food service equipment will vary from school district to school district.

KITCHEN - Cooler/Freezer

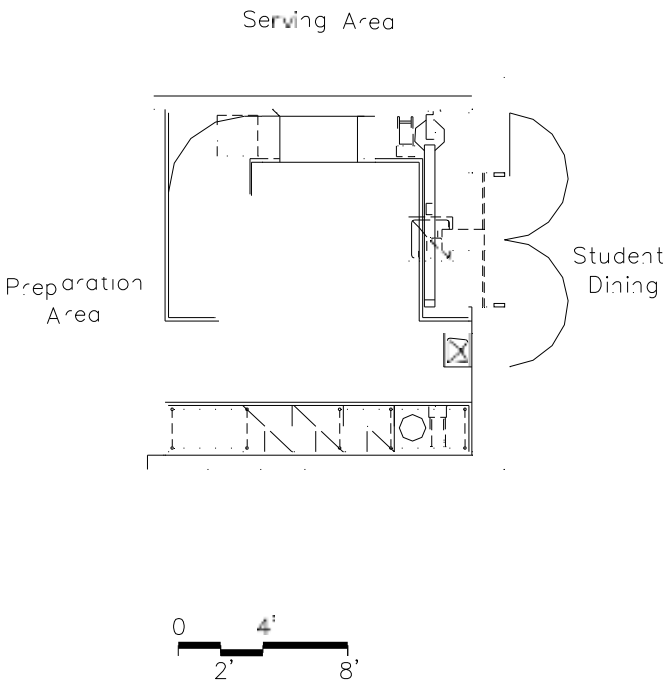
CT-FS-1d

FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile or resinous flooring	093000 096723
Base:	
Quarry tile base or integral base	093000
Ceiling:	
Manufactured insulated panel	114000
Walls:	
Manufactured insulated panel	114000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system for compressors	Div. 23
Electrical:	
Single level switching	262726
Fluorescent or LED lighting	265100
Illumination level: See Table 8600-6	
Electrical connections to freezer/cooler refrigeration equipment	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.



PROGRAM ACTIVITIES:
- Space and equipment to scrape, wash, air dry, and store serving trays and utensils

SPATIAL RELATIONSHIPS:
- Adjacent to student dining

ENVIRONMENTAL CONSIDERATIONS:
- Proper ventilation of space to remove steam and condensation
- Cleanable building surfaces

CAPACITY: N/A
SIZE: Based on 9% of the kitchen area
ANCILLARY SPACES: Part of the kitchen

NOTES:

1. This is an example of a ware washing area. Food service equipment will vary from school district to school district.

KITCHEN - Ware Washing
CT-FS-1e

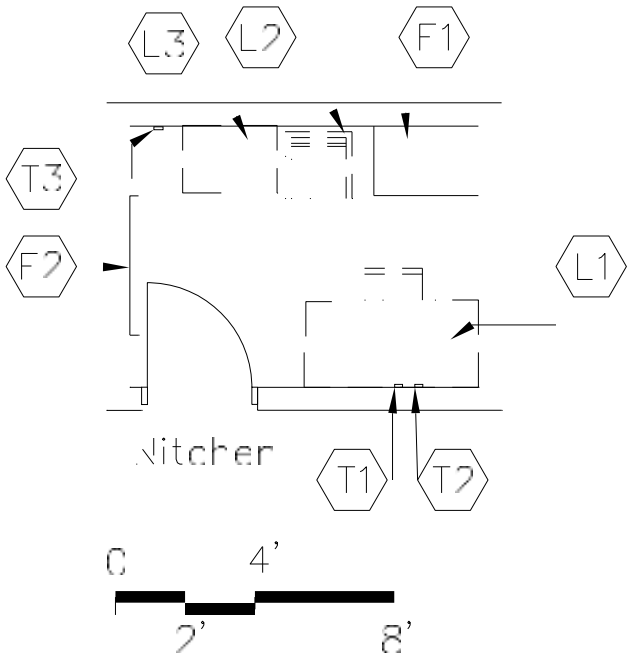
FINISHES[1]:	Spec. Ref.#
Flooring:	
Quarry tile ***or resinous flooring***	093000 ***096723***
Base:	
Quarry tile base ***or integral base***	093000
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	***042000***/099100
Option: Ceramic wall tile or latex paint	093000 099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Food service equipment	114000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Lavatory	224000
Connections to food service equipment	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Exhaust hood system	Div. 23
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Connections to food service equipment	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references and refer to Chapter 10 for a list of possible food service equipment.



PROGRAM ACTIVITIES:

- Space for the dietician to plan menus and meet with various vendors

SPATIAL RELATIONSHIPS:

- Adjacent to kitchen

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70
- Optional – window with integral blind

CAPACITY:	1 - 2 persons
SIZE:	75 SF
ANCILLARY SPACES:	Kitchen
	CT-FS-1

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

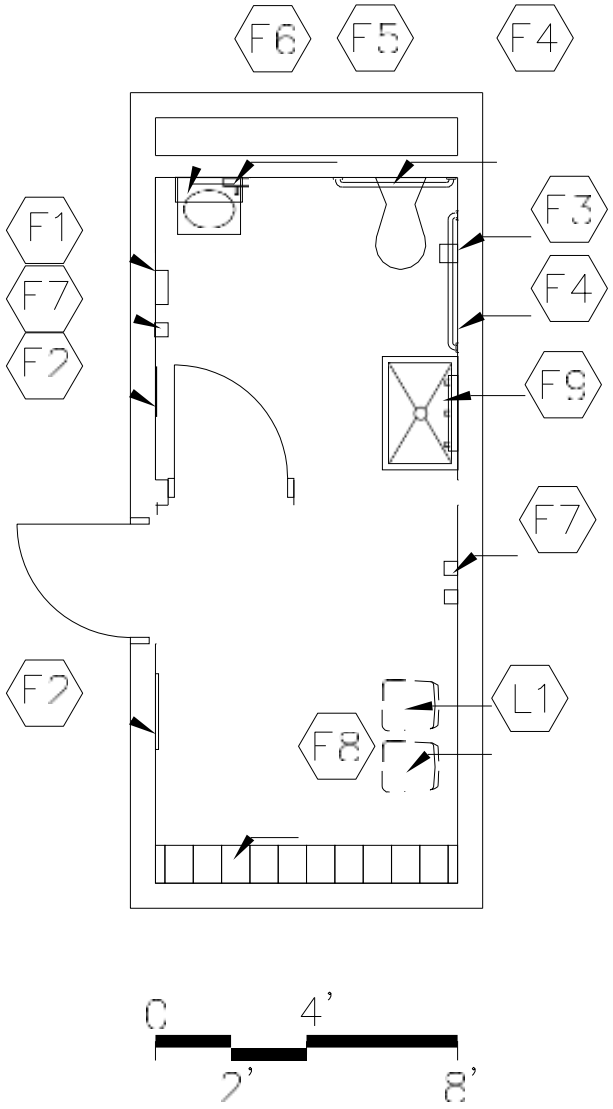
DIETICIAN'S OFFICE
CT-FS-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, ET, or sheet vinyl	096500 096516
Option: Quarry tile, or resinous flooring	093000 096723
Base:	
Resilient base	096500
Option: Quarry tile	093000
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chair
L3 File cabinet
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe (optional)	123550
F2 4' of tack board	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window (optional)	081113/088000

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed equipment or loose furnishings can also be all fixed or all loose.



CAPACITY: 2 persons
SIZE: 140 SF
ANCILLARY SPACES:

PROGRAM ACTIVITIES:
- Personal and health needs for food service staff

SPATIAL RELATIONSHIPS:
- Adjacent to kitchen

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

NOTES:

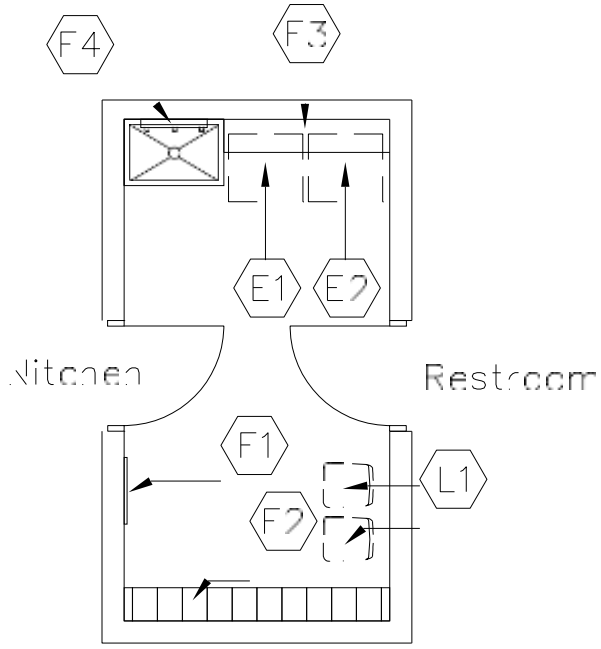
RESTROOM / LOCKER ROOM
CT-FS-3

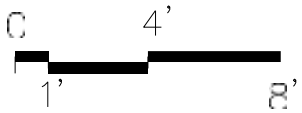
FINISHES[1]:	Spec. Ref.#
Flooring:	
ET or sheet vinyl,	096516
	096500
Optional: quarry tile ***or***	093000
resinous flooring	***096723***
Base:	
Resilient base	096500
Optional: quarry tile,	093000
integral vinyl cove base, or ***resinous flooring***	***096723***
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
L1 Chairs
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 2, 24" x 60" mirrors	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Mirror with shelf above sink(optional)	102813
F7 Coat hooks	102813
F8 Lockers 12” x 12” x 60”	105113
F9 Mop holder	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Floor service sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
2 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.





CAPACITY: 2 persons
SIZE: 125 SF
ANCILLARY SPACES: Kitchen, CT-FS-1
Restroom, CT-FS-3

PROGRAM ACTIVITIES:

- Space for the food service staff to store their personal belongings and to change their clothing
- Space for the washing, drying, and storage of towels, aprons, etc.
- ***This space could replace CT-FS-3***

SPATIAL RELATIONSHIPS:

- Adjacent to kitchen
- Adjacent to restroom

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

LOCKER ROOM
CT-FS-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sheet vinyl, rubber, rubber tile, or resinous flooring	096500 096723
Base:	
Resilient base, resinous flooring, or integral vinyl cove base	096500 096723
Ceiling:	
Suspended, acoustical with high-impact, hold-down clips	095113
Option: exposed, painted pre-cast units	099100
Walls:	
Painted concrete masonry units	042000/099100

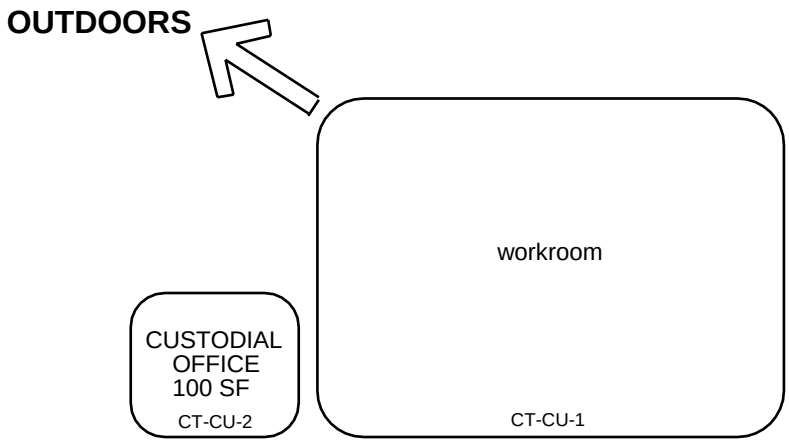
LOOSE FURNISHINGS:
L1 Chairs
Wastebasket

EQUIPMENT:
E1 Washer
E2 Dryer

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 24" x 60" mirror (optional)	102813
F2 Lockers 12" x 12" x 60"	105113
F3 6’ of wall cabinets or shelf (optional)	123550
F4 Mop holder	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	224000/221116/221119
Floor service sink	224000
Washer connection	224000
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Dryer vent system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
Connections for washer and dryer	262726
Communications:	
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Provide storage cabinet for supplies if required by governing agency.	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



NOTES:

This is an example of how the custodial spaces in a career-technical school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Custodial space plates:

CT-CU-1 Workroom
CT-CU-2 Custodial Office

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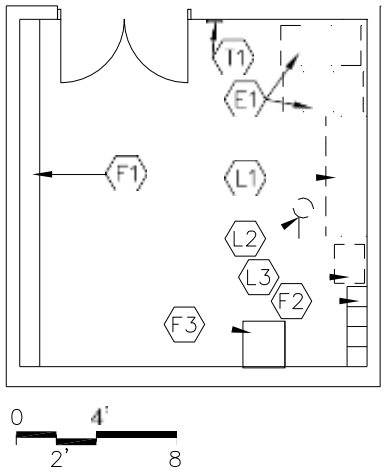
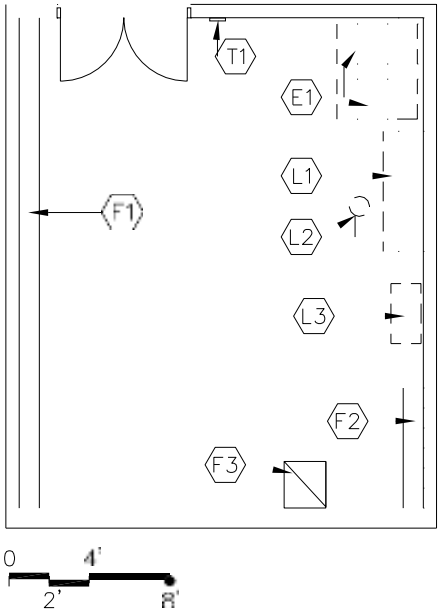
200 SF



400 SF



CAPACITY: N/A

SIZE: 200 - ***800*** SF

PROGRAM ACTIVITIES:

- Space for storage of custodial equipment needed to maintain the building
- Space for equipment repair

SPATIAL RELATIONSHIPS:

- Near central storage area
- Near custodial office

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

WORKROOM
CT-CU-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Polished concrete finishing,	033510
colored concrete finishing, or	033519
sealed concrete	***093000***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

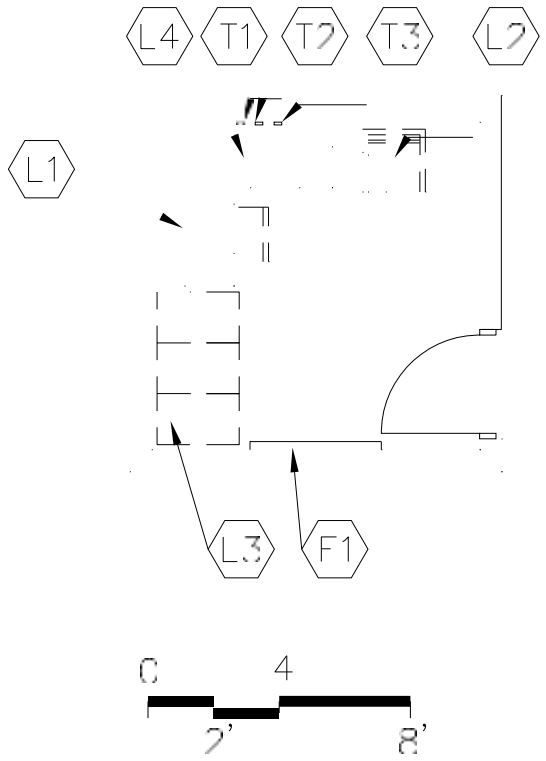
LOOSE FURNISHINGS:
L1 Workbench
L2 Stool
L3 Tool cabinet
Waste receptacles

EQUIPMENT:
E1 Recycling bins

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 10' - 24' of open shelving, depths can vary (fixed or loose)	123550
F2 4 - 6 lockers	105113
F3 Mop holder	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Floor service sink	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Single level switching	262726
4 duplex receptacles (minimum)	262726
Electrical receptacles for custodial equipment	262726
Communications:	
T1 1 voice port and phone	271513/***273123***
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



PROGRAM ACTIVITIES:
- Office for the custodian for scheduling, ordering, and inventory

SPATIAL RELATIONSHIPS:
- Near custodial workroom

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control - wall minimum STC 45 ceiling minimum CAC 35, NRC 0.70
- ***Optional – window with integral blind***

CAPACITY: N/A
SIZE: 100 ***- 400*** SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

CUSTODIAL OFFICE
CT-CU-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum,	096500
ET, sheet vinyl,	096516
polished concrete finishing,	033510
colored concrete finishing, or	033519
resinous flooring	***096723***
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

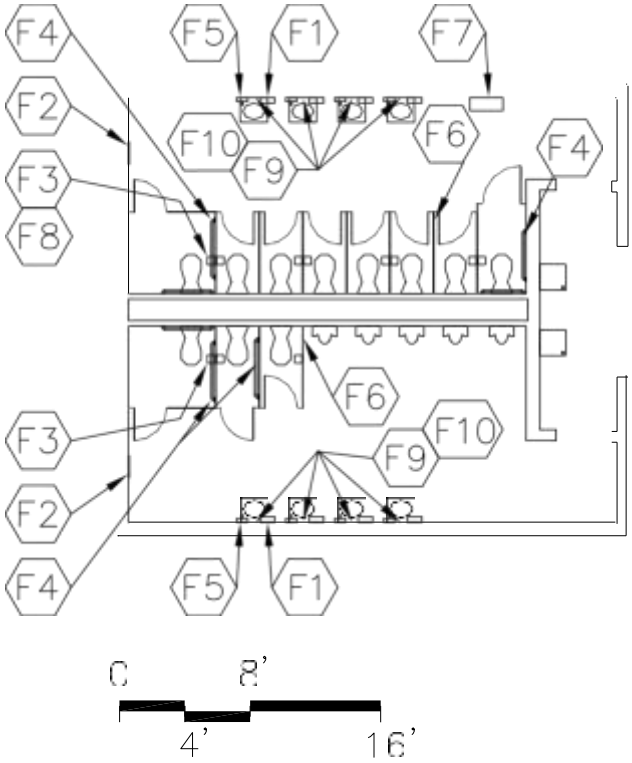
LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chair
L3 File cabinets
L4 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 4' of tack board (optional)	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control (coupled with similarly loaded adjacent spaces)	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and modem port	262726
Communications:	
T1 Modem port for temperature controls computer	271523
T2 1 voice port and phone	271513/***273123***
T3 1 data port near workstation	271513
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window (optional)	081113/088000

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.

Spaces to be determined by Design Professional based on the number of fixtures required.



CAPACITY: Based on size of program area

SIZE: Based on the sum of the program areas excluding building services, multiplied by 3.5%

PROGRAM ACTIVITIES

- Personal and health needs for the general public
- Groups of restrooms should be located in several areas throughout the building

SPATIAL RELATIONSHIPS:

- Near student dining area
- Near public use areas, such as media center and gymnasium
- Near academic core area

ENVIRONMENTAL CONSIDERATIONS:

- Uniform lighting
- Environmental sound control
  wall minimum STC 53
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Where individual restrooms are provided in lieu of large group restrooms, refer to ***CT-GS-8***.

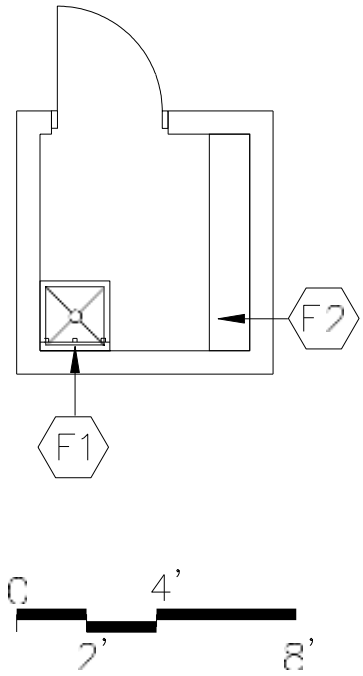
LARGE GROUP RESTROOMS

CT-GS-1

FINISHES[1]:	Spec. Ref.#
Flooring:	
Ceramic mosaic tile	093000
Optional: porcelain tile,	093000
rubber, resinous flooring, or	096723
unbacked sheet vinyl with welded seams	***096500***
Base:	
Ceramic mosaic tile base	093000
Optional: structural glazed tile,	096616
porcelain tile base,	093000
resinous flooring, or	096723
integral tile base	***096500***
Ceiling:	
Suspended, acoustical	095113
Option: Abuse resistant gypsum wallboard	092116
Walls:	
Painted concrete masonry unit	042000/099100
LOOSE FURNISHINGS:	
Waste Receptacles	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispensers	102813
F2 24" x 60" mirror	102813
F3 Toilet tissue holders	102813
F4 36" and 42" grab bar	102813
F5 Soap dispensers	102813
F6 Toilet partitions	102113
F7 Sanitary product dispenser	102813
F8 Sanitary product receptacles	102813
F9 16" x 24" mirrors with shelf (optional)	102813
F10 Shelves (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closets	224000
Wall-mounted urinals	224000
Wall-mounted lavatories or wash fountains	224000
Wall hydrants	224000
Plumbing connections	224000/221116/221119
Floor drains	Div. 22
Drinking water cooler	224000
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Emergency lighting	265100
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Optional: electric hand dryers



PROGRAM ACTIVITIES:
- Space for storage of custodial supplies throughout the building

SPATIAL RELATIONSHIPS:
- Near large group restrooms

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	50 SF

NOTES:

CUSTODIAL CLOSET
CT-GS-2

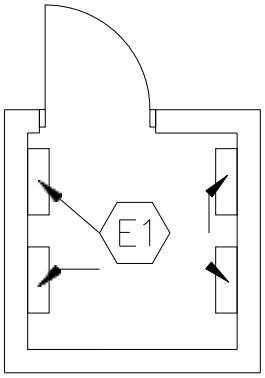
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
Resilient base	096500
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Shelving (optional)	

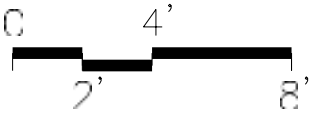
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Mop holder	102813
F2 Fixed or loose shelving (optional)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Service sink or floor drain sink	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

Space to be determined by Design Professional.





PROGRAM ACTIVITIES:
- Space for electrical wiring and panels

SPATIAL RELATIONSHIPS:
N/A

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	50 SF

NOTES:

ELECTRICAL CLOSET
CT-GS-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls:	
Unpainted concrete masonry units	042000

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
1 duplex receptacle	262726
E1 Electrical switchboard	262413/262416

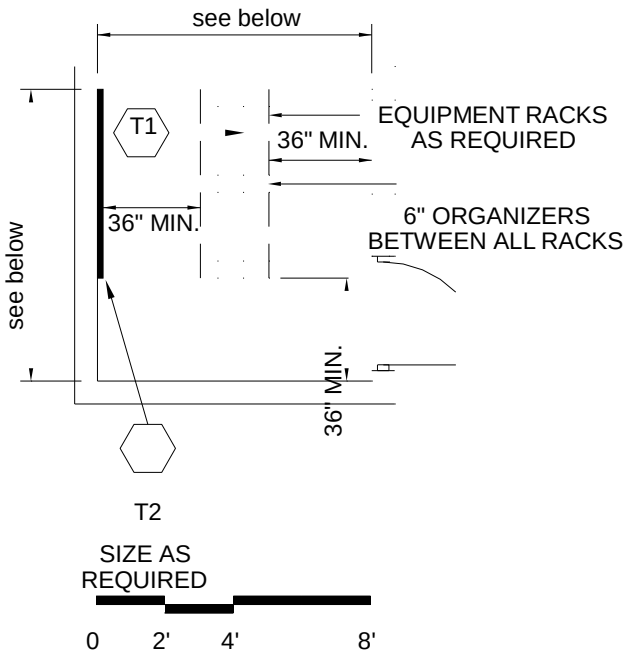
Communications:
N/A

Electronic Safety and Security:
N/A

Miscellaneous:
N/A

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Space for technology needs

SPATIAL RELATIONSHIPS:
N/A

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY: N/A

SIZE:

TR Serving Zone > 188 ports:
minimum 10 ft. x 12 ft.
TR Serving Zone of 96-188 ports:
minimum 8 ft. x 10 ft.
TR Serving Zone of < 96 ports:
minimum 8 ft. x 8 ft.

NOTES:
1. This is an example of a telecommunications room. The equipment and layout will vary from school district to school district.
2. ***Verify and coordinate TR quantity, size and location with technology designer during programming phase.***

3. Multiple TR's may be required.

TELECOMMUNICATIONS ROOM
CT-GS-4

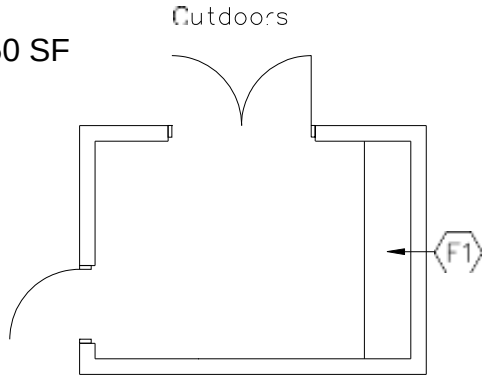
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete,	033000
polished concrete finishing, or	033510
colored concrete finishing	033519
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls:	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS	
N/A	

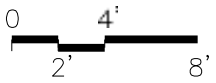
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Cooling and Exhaust air system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
1 duplex receptacle	262726
Receptacles for data equipment	262726
Telecommunications Grounding	270526/260526
Standby power	263213/263600
Communications:	
T1 Technology equipment	
Central sound system	275123
Telephone Wiring	271313/271513
Integrated Telephone System	273123
Video Wiring	271543
Digital on Demand Delivery System	274125
Local Area Network Wiring	271513/271323
Local Area Network Electronics	272100/273123
Grounding & Infrastructure Equipment	270526/271100
T2 ***3/4***" plywood back board	271313
Electronic Safety and Security:	
Security System	281300/281600/282300
Miscellaneous:	
N/A	

NOTES:

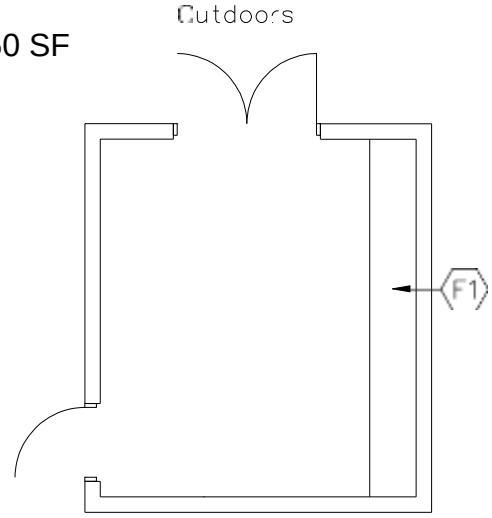
1. Finishes/Features: Refer to Chapter 9 for specification references.

150 SF





250 SF



CAPACITY: N/A
SIZE: 150 - 500 SF

PROGRAM ACTIVITIES:
- Space for storage of outdoor custodial equipment

SPATIAL RELATIONSHIPS:
- Near custodial office
- Near custodial workroom
- Direct access to outdoors

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

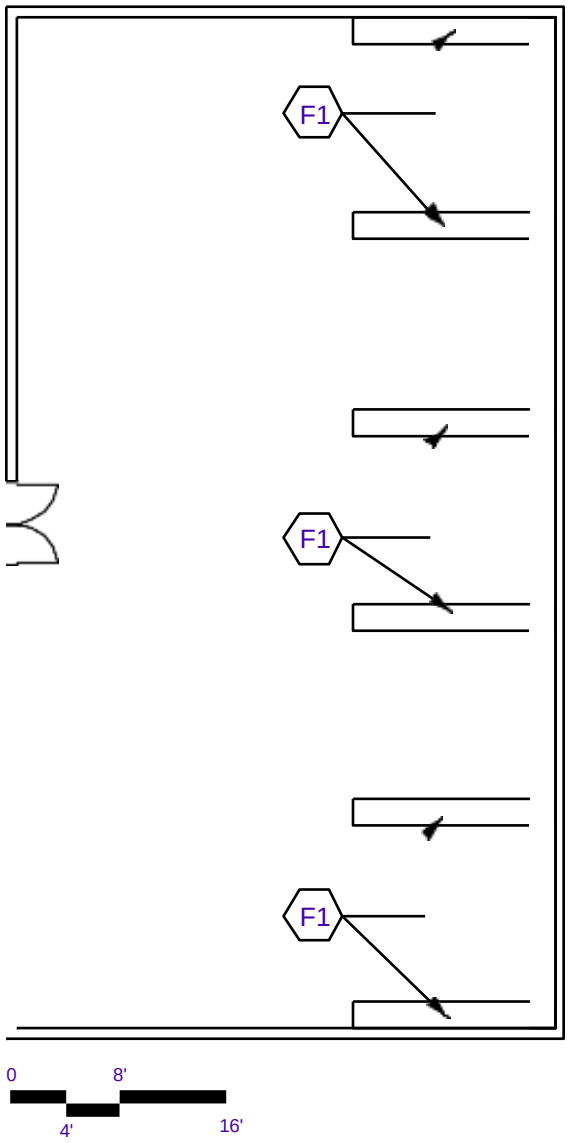
STORAGE AREA
CT-GS-5

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls:	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 8'-20' of open shelving , depths may vary (fixed or loose)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.



CAPACITY: N/A
SIZE: 1000 - 1667 SF

PROGRAM ACTIVITIES:
- Storage for paper products, utensils, supplies, etc., to be used throughout the entire building

SPATIAL RELATIONSHIPS:
- Near loading/receiving area
- Direct access to building circulation

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

CENTRAL STORAGE / DISTRIBUTION AREA

CT-GS-6

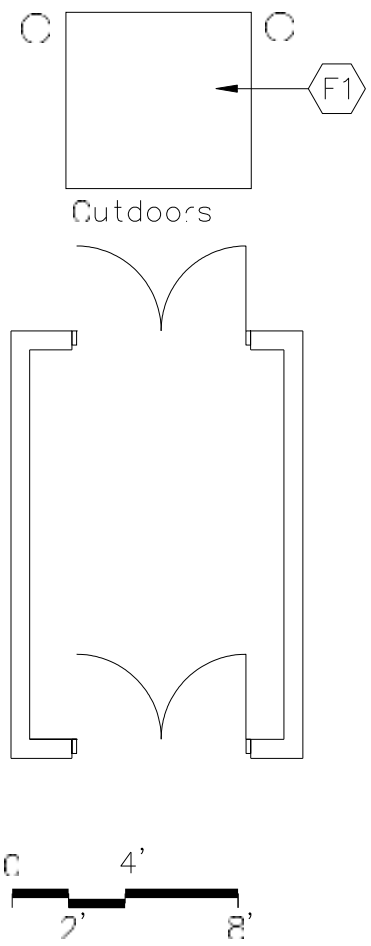
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls:	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items[2]:	
F1 26' - 32' of open shelving (total), depths may vary (fixed or loose)	123550
Option: mobile storage shelving	105626
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Ranges shown indicate quantities for the smallest and largest possible room size.

Recycling space to be determined by Design Professional.



CAPACITY: N/A
SIZE: 120 SF

PROGRAM ACTIVITIES:
- Delivery of materials and goods to be used throughout the building

SPATIAL RELATIONSHIPS:
- Near food service spaces
- Near central storage area
- Near mechanical room
- Adjacent to loading dock

ENVIRONMENTAL CONSIDERATIONS:
N/A

MISCELLANEOUS:
- Refer to Chapter 3, Section 3201, for site vehicular circulation requirements

NOTES:

LOADING/RECEIVING AREA

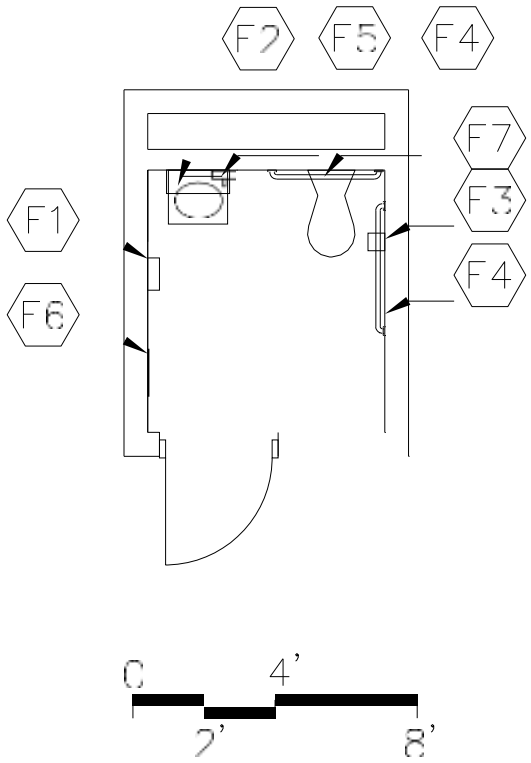
CT-GS-7

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	
Walls:	
Epoxy-painted concrete masonry units	042000 / 099100
LOOSE FURNISHINGS	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Loading dock leveler and dock bumpers	111300
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Personal and health needs for the building occupants

SPATIAL RELATIONSHIPS:
- Near academic area

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 48
  ceiling minimum CAC 35, NRC 0.70
- Moisture- and stain-resistant finishes

CAPACITY: 1 person
SIZE: ***60*** SF
ANCILLARY SPACES:

NOTES:

1. Separate restrooms must be provided for male and female students

RESTROOM
CT-GS-8

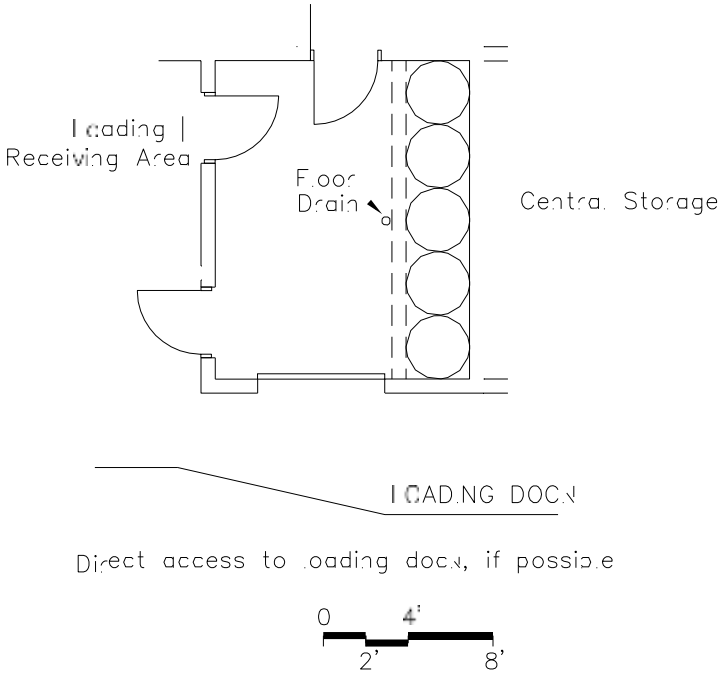
FINISHES[1]:	Spec. Ref.#
Flooring:	
ET or sheet vinyl	096516
	096500
Optional: quarry tile, or	093000
resinous flooring	096723
Base:	
Resilient base	096500
Optional: quarry tile, resinous	093000
flooring, or integral vinyl cove base	096723
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 Mirror with shelf above sink(optional)	102813
F3 Toilet tissue holder	102813
F4 36" and 42" grab bar	102813
F5 Soap dispenser	102813
F6 Sanitary product dispenser	102813
F7 Sanitary product receptacle	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall-mounted water closet	224000
Wall-mounted lavatory	224000
Plumbing connections	224000/221116/221119
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
1 duplex receptacle	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. F6 and F7 required for female restroom only.



PROGRAM ACTIVITIES:
- Provide recyclable collection for paper, cardboard, glass, plastics and metals.

SPATIAL RELATIONSHIPS:
- Near food service spaces
- Near central storage area
- Near mechanical room
- Adjacent to loading dock

ENVIRONMENTAL CONSIDERATIONS:
N/A

MISCELLANEOUS:
- Refer to Chapter 3, Section 3201, for site vehicular circulation requirements

CAPACITY:	N/A
SIZE:	80 - 160 SF

NOTES:

1. Contact local collection agency to see if co-mingling of materials is permitted. Design team should meet the LEED intent when designing the recycling area.

RECYCLING ROOM
CT-GS-9

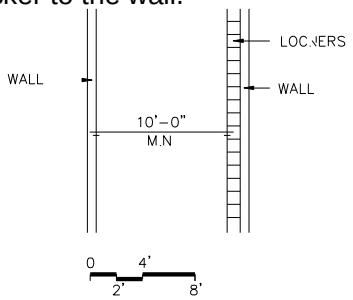
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	
Walls:	
Epoxy-painted concrete masonry units	042000 / 099100
LOOSE FURNISHINGS	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Floor drain	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

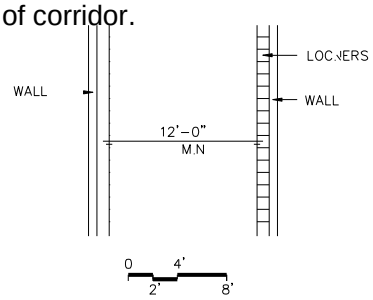
NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

- Corridors shall be a minimum of 8 feet wide if no lockers are located in the corridor.
- Corridors shall be a minimum of 10 feet wide if lockers are located on one side of the corridor. The corridor width is from the face of the locker to the wall.



- Corridors shall be a minimum of 12 feet wide if lockers are located on each side of the corridor. The corridor width is from the face of the locker to the face of locker on opposite side of corridor.



- Instructional and activity areas shall be accessible by corridors without passing through another instructional or activity area.
- The corridors are to meet the existing requirements of applicable codes
- Stairs, ramps, and elevators are included under the corridor category.
- It is recommended that stairs in multi-story buildings not be enclosed unless required by code.

CAPACITY: Based on size of program area
SIZE: See Chapter 2

PROGRAM ACTIVITIES:
- Circulation space

SPATIAL RELATIONSHIPS:
N/A

ENVIRONMENTAL CONSIDERATIONS:
N/A

VESTIBULES
- Area of vestibules to be included within area allotted for corridors.
- Width of vestibules can be no less than minimum width of adjacent corridor.
- Minimum corridor length to be 8'-0" between doors.
- Vestibules are to be provided at major entrances/exits and may be eliminated at minor entrances/exits as determined by the Design Professional.
- Provide automatic door operator on one leaf of main entrance/exit door and related vestibule door.
- Provide a five-step or fifteen foot walk off mat extending from main outside entry doors into the building and as wide as the entry doors.
- Option – entrance floor grilles. See Chapter 9, Section 124816.
- ***Lockers are not part of the construction factor, but are a part of the circulation/corridor factor.***

NOTES:

CORRIDORS

CT-BS-1

FINISHES[1]:	Spec. Ref.#
Flooring[2]:	
Linoleum, ET, sheet vinyl,	096516
Carpet, carpet tile, rubber,	096500
polished concrete finishing,	096816
or colored concrete finishing	096813
	033510
	033519
Base:	
Resilient base	096500
Optional: structural glazed tile	042000
Ceiling:	
Suspended, acoustical	095113
Option in vestibules: Abuse resistant gypsum wallboard	092113
Walls:	
Painted concrete masonry units	042000/099100
LOOSE FURNISHINGS:	
Recycling bins and waste receptacles	
Fixed or loose benches	

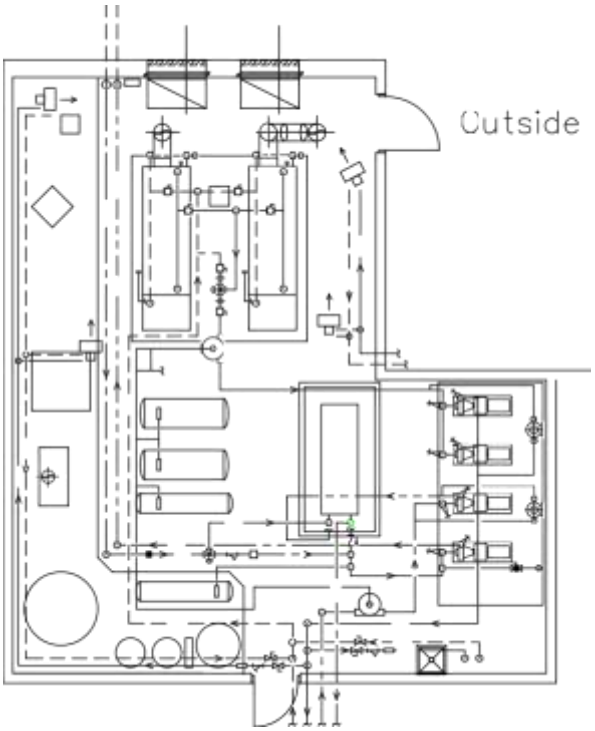
NOTE: At entries adjacent to dining/ commons area, match dining/commons flooring.

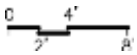
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Corridor lockers	105113
Fire extinguishers and cabinets	104400
Recessed vinyl floor mats or surface mats	124813
Tack board or tackable wall surface	101100
Fire Suppression:	
N/A	
Plumbing:	
Drinking water coolers	224000
HVAC:	
Supply/return air system	Div. 23
Temperature control from adjacent instructional spaces	230923
Electrical:	
Dual level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
Duplex receptacles	262726
Double duplex receptacle adjacent to each video port	262726
Means of egress lighting per code	265100
Emergency lighting	265100
Communications:	
Video ports	271543
Data ports	271523
Pay phone terminals	271513/273113
Central sound system	275123
Clocks	275313
Wireless access points	271523/272100/272133
Electronic Safety and Security:	
Life safety devices per code	283111
Security System	281300/281600/282300
Miscellaneous:	
Display cases and Directory	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Linoleum, VET, or sheet vinyl is to be used in vestibules, stairwells, and elsewhere as appropriate. Porcelain tile is optional in lobbies, with resilient or structural glazed tile base.

Space to be determined by Design Professional.





CAPACITY: Based on size of program area
SIZE: Based on the sum of the program areas excluding building services, multiplied by 6.9%

PROGRAM ACTIVITIES:
- Space for mechanical and electrical equipment

SPATIAL RELATIONSHIPS:
- Accessible for maintenance and repair
- Access to outside
- Isolate from main area of building
- Near loading/receiving area
- Near custodial area

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control
  wall minimum STC 60
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. This is an example of a mechanical room. The equipment and layout will vary depending upon the heating, ventilating, and air conditioning system used.
2. A penthouse is considered a mechanical room.

MECHANICAL/ELECTRICAL SPACE/DECKS

CT-BS-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
No base	
Ceiling:	
Exposed structure	---
Walls: (note 2)	
Unpainted concrete masonry units	042000
LOOSE FURNISHINGS:	
N/A	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
To be determined by Design Professional	
Fire Suppression:	
To be determined by Design Professional	
Plumbing:	
To be determined by Design Professional	
HVAC:	
To be determined by Design Professional	
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
Others as determined by Design Professional	
Communications:	
Central sound system	275123
Voice port and phone	271513/***273123***
Electronic Safety and Security:	
To be determined by Design Professional	
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Option for penthouse to use metal panel on concrete masonry or metal panel on metal framing wall systems.

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- ► Automation & Robotics ---------- 6311-***9***
- ► Aviation Occupations 6311-***10***
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E. Office Plate 6311-17

F. Storage Area Plate 6311-19

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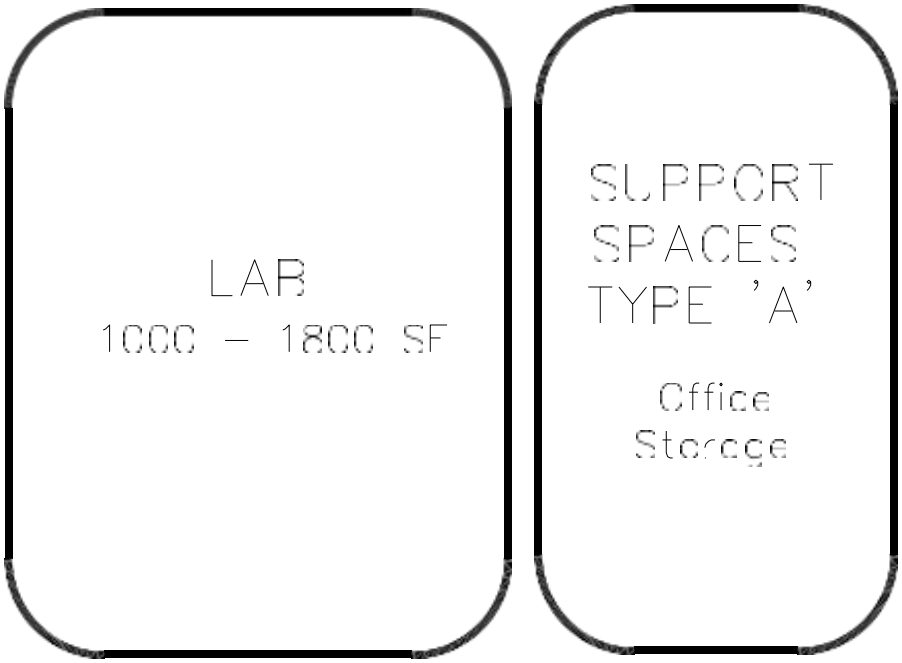
Program Type 1

Description: Small to medium sized lab space with typical support space. Lab and support space to have finished floor, painted walls, and suspended acoustical ceiling. ***Where necessary, include emergency shut-off switch for equipment.***



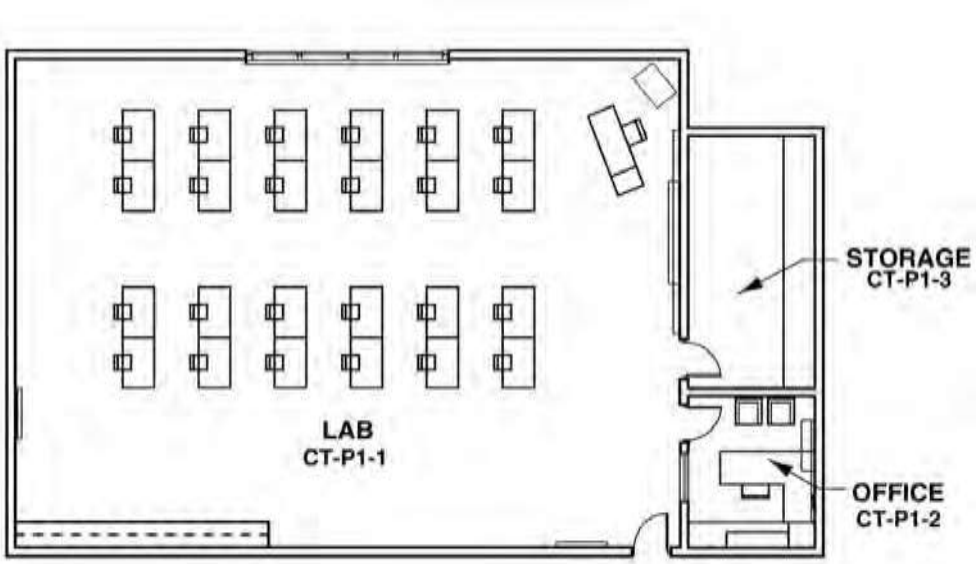
NOTES:

This is an example of how the Program Type 1 spaces in a career-technical school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Program Type 1 space plates:

CT-P1-1 Lab
CT-P1-2 Office
CT-P1-3 Storage

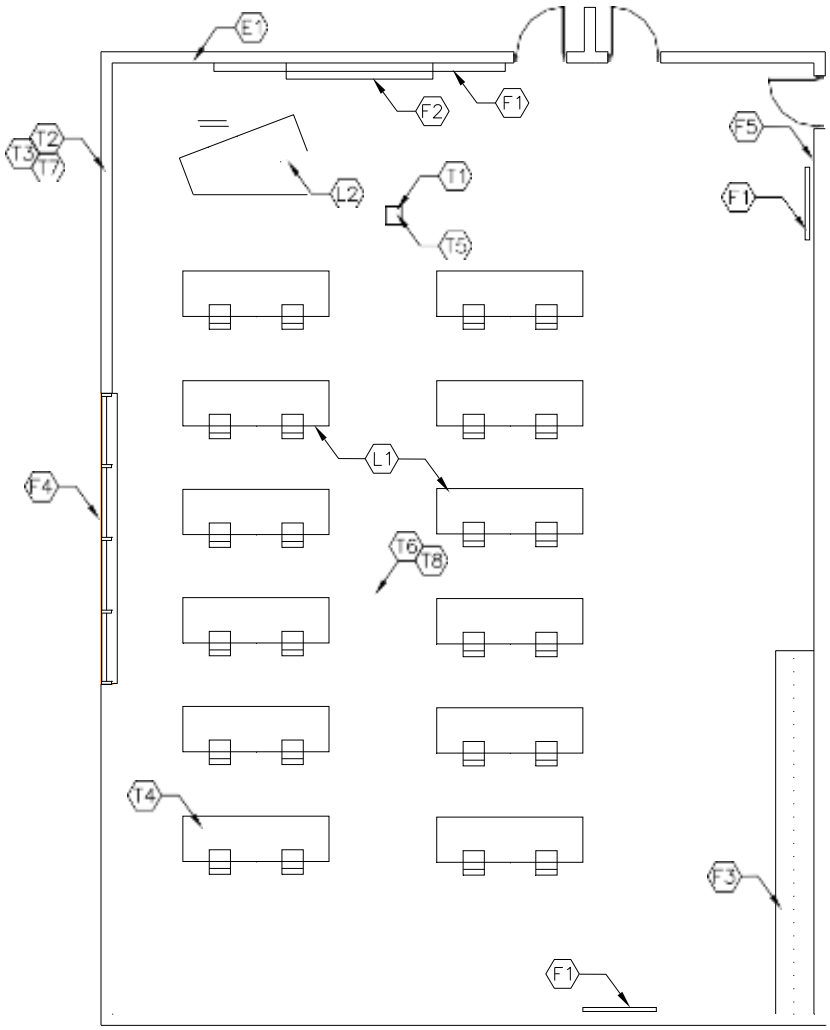
PROGRAM TYPE 1
EXAMPLE



Program Type 1
This is an example to show the possible relationships of spaces for this program type.

NOTES:

1. See lab descriptions within this section for specific lab requirements.
2. See individual space plates at the end of this section for specific requirements for the storage room and office.



CAPACITY: 24 Students SIZE: 1,000 – 1,800 SF (see lab summaries for exact sizes) ANCILLARY SPACES: CT-P1-2 and CT-P1-3	

NOTES:
1. Loose furnishings shown represent one of many possible arrangements.
2. Graphic plate is an example only. Other labs within this program are not drawn – refer to lab summaries within this program type for information on a particular lab.

PROGRAM ACTIVITIES:
- Large and small group instruction
- Group and individual work
- Demonstrations

SPATIAL RELATIONSHIPS:
- Near other related labs
- Adjacent to typical support spaces
- Proximity to large group restrooms
- Located away from noisy or public activities
- Proximity to core academic area and common use areas
- Flexibility of space

ENVIRONMENTAL CONSIDERATIONS:
- ***Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.***
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall ***only*** minimum STC ***45***
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Loose Furnishings: Refer to Lab Profiles within this section.
3. Loose Furnishings, fixed equipment, utility locations, and general footprint of room shown represent one of many possible arrangements.

PROGRAM DESCRIPTION:

Prepares students for careers that record, classify, summarize, analyze and communicate a business's financial information and business transactions. Accounting includes such activities as bookkeeping, systems design, and analysis and interpretation of accounting information. Sample occupations include: certified public accounting (CPA), auditor, financial accountant, accounting clerk, treasurer, bookkeeper, forensic accountant, and international accountant.

Program Type: 1

Size Requirements: 1,200 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Carpet	096816
Optional: ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

L1 (24) Computer workstation furniture & chairs
L2 (1) Teacher station & chair
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 24' of marker board, tack board, or tackable wall surface	101100
F2 Projection screen, 6'x8'	115213
F3 40' of base and wall cabinets	123550
F4 Windows with integral blinds	085113
F5 Pencil sharpener support (optional)	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting, ***computer aided*** lenses: Illumination level: See Table 8600-5	265100
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123 T3
1 data port near teacher workstation	271513 T4
26 data ports	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127
T8 Wireless access point cable above ceiling	271513
E1 Duplex receptacle with dedicated circuit for wireless devices	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

C2 / 14.0310 ADMINISTRATIVE and PROFESSIONAL SUPPORT
C0 / 14.0300 LEGAL MANAGEMENT and SUPPORT
CT-P1-1

PROGRAM DESCRIPTION:

A&PS: Based on a sequence of courses, students will be prepared for careers which support business operations through a variety of administrative duties including information and communication management, data processing and collection, and project tracking. Due to changes in technology, the skills required in administrative support careers have increased and correspond with that of a mid-level manager. Sample occupations within this pathway include: administrative assistant, customer service representative, executive assistant, office manager, and project coordinator.

LM&S: Based on a sequence of courses, students will be prepared for careers which facilitate legal operations through a variety of management and administrative duties. Employees in this field are found in law firms, courts, court reporting firms, legal departments of corporate businesses, and government regulatory agencies. Sample occupations within this pathway include: legal office manager, legal assistant, legal secretary, paralegal, court administrator, compliance analyst, and regulatory analyst.

Program Type: 1
Size Requirements: 1,200 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Carpet	096816
Optional: ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

FEATURES :	Spec Ref.#
Fixed Items:	
F1 24' of marker board, tack board, or tackable wall surface	101100
F2 Projection screen, 6'x8'	115213
F3 40' of base and wall cabinets	123550
F4 Windows with integral blinds	085113
F5 Pencil sharpener support (optional)	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing: N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting, ***computer aided*** lenses: Illumination level: See Table 8600-5	265100
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123 T3
1 data port near teacher workstation	271513 T4
26 data ports	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127
T8 Wireless access point cable above ceiling	271513
E1 Duplex receptacle with dedicated circuit for wireless devices	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous: Pencil sharpener (optional)	
LOOSE FURNISHINGS:	
L1 (24) Computer workstation furniture & chairs	
L2 (1) Teacher station & chair	
Wastebasket	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.

PROGRAM DESCRIPTION:

Electronics: Classroom, laboratory, and practical learning experiences that includes both theory and practice. Students learn construction, maintenance, and repair of digital, analog, and microprocessor circuits in applications such as communications equipment, consumer equipment, and industrial equipment.

Automation & Robotics: Utilizing business and Industry, math, English, science and technology standards, introduces concepts in Automation and Robotics technologies: Computer Numerical Control (CNC), Data Acquisition and Analysis, Electrical/Electronic controls, Fluid Power, Robotics and Programmable Logic Controllers (PLC).

Program Type: 1

Size Requirements: 1,800 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Carpet	096816
Optional: ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(12) Two-person work tables w/storage below
(24) Computer workstation furniture & chairs
(1) Teacher station & chair
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 24' of marker board, tack board, or tackable wall surface	101100
F2 Projection screen, 6'x8'	115213
F3 60' of base and wall cabinets	123550
F4 Windows with integral blinds	085113
F5 Pencil sharpener support (optional)	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 26 data ports	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127
T8 Wireless access point cable above ceiling	271513
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
E1 Duplex receptacle with dedicated circuit for wireless devices	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity/placement per 272133 requirements.

T4 / 17.0400 AVIATION OCCUPATIONS
CT-P1-1

PROGRAM DESCRIPTION:
Classroom and practical experiences that include instruction relating to aircraft maintenance, operation, and ground support. Instructor and program must be certified by the Federal Aviation Administration (FAA).

Program Type: 1

Size Requirements: 1,500 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
- (12) 2-person work tables w/epoxy tops and gas & electric connections
- (24) Student stools/chairs
- (1) Teacher chair or stool
- (4) Computer workstations
- Wastebasket

Electronic Safety and Security:
- Life safety devices per code 283111

Miscellaneous:
- Pencil sharpener (optional)

Communications: (cont'd)
Classroom technology center video port 271543, 274116, 274119, 275127

Duplex receptacle with dedicated circuit for wireless devices

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, and tackable wall surface	101100
Demonstration table/teacher desk	123550
60' of perimeter sink base cabinets with 5 sinks	123550
30' of wall cabinets	123550
Fume hood	115313
(5) Paper towel dispensers	102813
(1) Safety shower/eyewash	224000
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
Projection screen, 6'x8'	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
Safety shower/eyewash connections	224000
Master shut-off for gas	226313
Gas connections	226313
Compressed air connections	221500
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Manual exhaust	Div. 23
Fume hood exhaust	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting	265100
Means of egress lighting per code	265100
Communications:	
1 ***projector*** video port	271543
1 voice port and phone	271513/273123 1
data port near teacher workstation	271513
11 data ports	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Ultra-short throw interactive projector	274119
Wireless access point cable above ceiling	***271513***
Wireless access point (WAP) as determined by Design – refer to Note 4	***272133***

PROGRAM DESCRIPTION:
An instructional program that generally prepares individuals to plan, organize, direct, and control the functions and processes of a firm or organization. Includes instruction in human resources management, strategic planning, managing technology, staffing functions, general office functions, financial functions, telecommunications, and supervisory functions.

Program Type: 1

Size Requirements: 1,200 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Carpet	096816
Optional: ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
L1 (24) Computer workstation furniture & chairs
L2 (1) Teacher station & chair
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 24' of marker board, tack board, or tackable wall surface	101100
F2 Projection screen, 6'x8'	115213
F3 40' of base and wall cabinets	123550
F4 Windows with integral blinds	085113
F5 Pencil sharpener support (optional)	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 26 data ports	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127
T8 Wireless access point cable above ceiling	271513
E1 Duplex receptacle with dedicated circuit for wireless devices	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

G1 / 14.0110 FINANCIAL SERVICES
CT-P1-1

PROGRAM DESCRIPTION:
Prepares students for careers in banking, securities and investments, and insurance. Activities include accepting deposits, lending funds and extending credit, banking services, investments, mortgages and loans, real estate, and insurance. Sample occupations include: loan officer, branch manager, investment banker, financial planner, bank teller, personal financial advisor, real estate broker, and credit analyst.

Program Type: 1

Size Requirements: 1,200 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Carpet	096816
Optional: ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
L1 (24) Computer workstation furniture & chairs
L2 (1) Teacher station & chair
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 24' of marker board, tack board, or tackable wall surface	101100
F2 Projection screen, 6'x8'	115213
F3 40' of base and wall cabinets	123550
F4 Windows with integral blinds	085113
F5 Pencil sharpener support (optional)	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 26 data ports	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127
T8 Wireless access point cable above ceiling	271513
E1 Duplex receptacle with dedicated circuit for wireless devices	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

PROGRAM DESCRIPTION:
Based on a sequence of courses, students will be prepared for careers which facilitate medical business operations, through a variety of management and administrative duties. Employees in this field are found in medical offices, hospitals, and insurance companies. Sample occupations within this pathway include: admissions specialists, benefits coordinators, medical billing specialists, medical records and health information technician, medical office manager, claims processor, and medical coding specialist.

Program Type: 1

Size Requirements: 1,200 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Optional: carpet	096816
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(12) Two-person work stables
(24) Student chairs/stools
(1) Teacher station & chair
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 24' of marker board, tack board, or tackable wall surface	101100
F2 Projection screen, 6'x8'	115213
F3 40' of base and wall cabinets	123550
F4 Windows with integral blinds	085113
F5 Pencil sharpener support (optional)	062000
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123 T3
1 data port near teacher workstation	271513 T4
8 data ports	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 ***Ultra-short throw interactive*** projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	***272133***
T7 Classroom technology center video port	***271543, 274116, 274119, 275127***
T8 Wireless access point cable above ceiling	***271513***
E1 Duplex receptacle with dedicated circuit for wireless devices	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

F5 / 17.1504 TELECOMMUNICATIONS
CT-P1-1

PROGRAM DESCRIPTION:
Specialized classroom and practical experiences concerned with the assembly, installation, operation, maintenance, and repair of telephone equipment, which includes pole climbing, cable construction, cable splicing, cable pulling, job planning, equipment wiring, trouble-shooting procedures of PBX systems, and field repair of telephones.

Program Type: 1

Size Requirements: 1,200 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Carpet	096816
Optional: ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
L1 (24) Computer workstation furniture & chairs
L2 (1) Teacher station & chair
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 24' of marker board, tack board, or tackable wall surface	101100
F2 Projection screen, 6'x8'	115213
F3 40' of base and wall cabinets	123550
F4 Windows with integral blinds	085113
F5 Pencil sharpener support (optional)	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 26 data ports	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127
T8 Wireless access point cable above ceiling	271513
E1 Duplex receptacle with dedicated circuit for wireless devices	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

PROGRAM DESCRIPTION:

Educational programs in travel and tourism prepare learners for careers in management, marketing and operation of destination marketing organizations, attractions, meetings and events, transportation, and travel related services.

Program Type: 1

Size Requirements: 1,200 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Carpet	096816
Optional: ET, sheet vinyl,	096500
or linoleum	096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

L1 (24) Computer workstation furniture & chairs
L2 (1) Teacher station & chair
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 24' of marker board, tack board, or tackable wall surface	101100
F2 Projection screen, 6'x8'	115213
F3 40' of base and wall cabinets	123550
F4 Windows with integral blinds	085113
F5 Pencil sharpener support (optional)	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123 T3
1 data port near teacher workstation	271513 T4
26 data ports	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127
T8 Wireless access point cable above ceiling	271513
E1 Duplex receptacle with dedicated circuit for wireless devices	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

B2 / 34.0005 VISUAL DESIGN AND IMAGING ■ N0 /14.0210 INFORMATION SUPPORT & SERVICES
N3 / 14.0230 PROGRAMMING and SOFTWARE DEVELOPMENT
N2 / 14.0220 NETWORK SYSTEMS ■ N1 / 14.0240 INTERACTIVE MEDIA
CT-P1-1

PROGRAM DESCRIPTION:

VD&I: Programs that focus on the creation, design, and execution of layouts and illustrations on various mediums including electronic media and the theory and processes of image transfer, including offset, flexography, lithography, photoengraving and other techniques. Communications, business principles and leadership skill development related to the industry are essential to the program. Specialization areas include commercial art and graphic occupations.

IS&S: An instructional program that provides training for careers in dealing in information technology deployment and information systems management.

P&SD: An instructional program that provides training for careers dealing with hardware and software programming, to design, development, and implementation computer systems and software.

NS: An instructional program that provides training for careers in communication network system planning, administration, and management. Skills for programs/pathways in this are taken from the itWORKS.OHIO Career Field Technical Content Standards.

IM: An instructional program that provides training in the area of interactive mutli-media development that includes creating, designing, and producing interactive multimedia products and services and digitally-generated or computer-enhanced media.

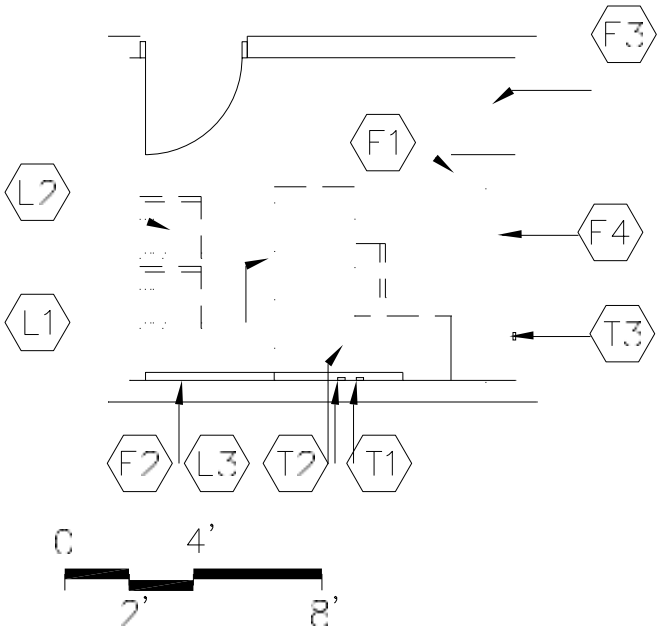
Program Type: 1
Size Requirements: 1,200 SF Lab

Lab Requirements:	Spec. Ref #
FINISHES:	
Flooring:	
Carpet	096816
Optional: ET, sheet vinyl,	096500
or linoleum	096516
Base: Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

Miscellaneous: Pencil sharpener (op tional)

FEATURES :	Spec Ref.#
Fixed Items:	
F1 24’ of marker board, tack board, or tackable wall surface	101100
F2 Projection screen, 6’x8’	115213
F3 40’ of base and wall cabinets	123550
F4 Windows with integral blinds	085113
F5 Pencil sharpener support (optional)	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing: N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting, ***computer aided*** lenses:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 26 data ports	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Ultra-short throw interactive projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127
T8 Wireless access point cable above ceiling	271513
E1 Duplex receptacle with dedicated circuit for wireless devices	
Electronic Safety and Security:	
Life safety devices per code	283111
LOOSE FURNISHINGS:	
L1 (24) Computer workstation furniture & chairs	
L2 (1) Teacher station & chair	
Wastebasket	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.



PROGRAM ACTIVITIES:

- Private space for program instructor
- One-on-one conferences with academic instructors, students, etc.

SPATIAL RELATIONSHIPS:

- Near related lab
- Direct access to school circulation areas

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35**,** NRC 0.70

CAPACITY: 1 - 3 persons
SIZE: 120 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

OFFICE
CT-P1-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or carpet tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

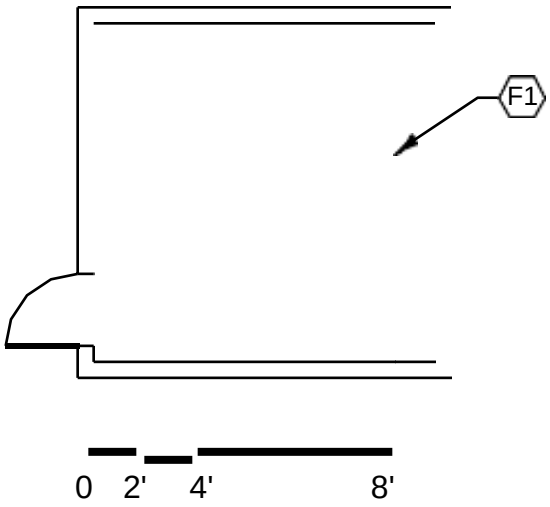
LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets above work surface	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.

STORAGE AREA
CT-P1-3



PROGRAM ACTIVITIES:
- Space for storage of lab equipment

SPATIAL RELATIONSHIPS:
- Near related lab

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	200 SF

NOTES:

STORAGE AREA
CT-P1-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
Resilient base	096500
Ceiling:	
Exposed structure	---
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items[1]:	
F1 8'-20' of open shelving	
Depth may vary (fixed or loose)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

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E. Office Plate 6312-17

F. Storage Area Plate 6312-19

G. Changing Room Plate 6312-21

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Program Type 2

Description: Small to medium sized lab space with typical support space. This program is to utilize standard construction and be one-story (16'+/- tall. Lab and support space to have finished floor, painted walls, and suspended acoustical ceiling. ***Where necessary, include emergency shut-off switch for equipment.***

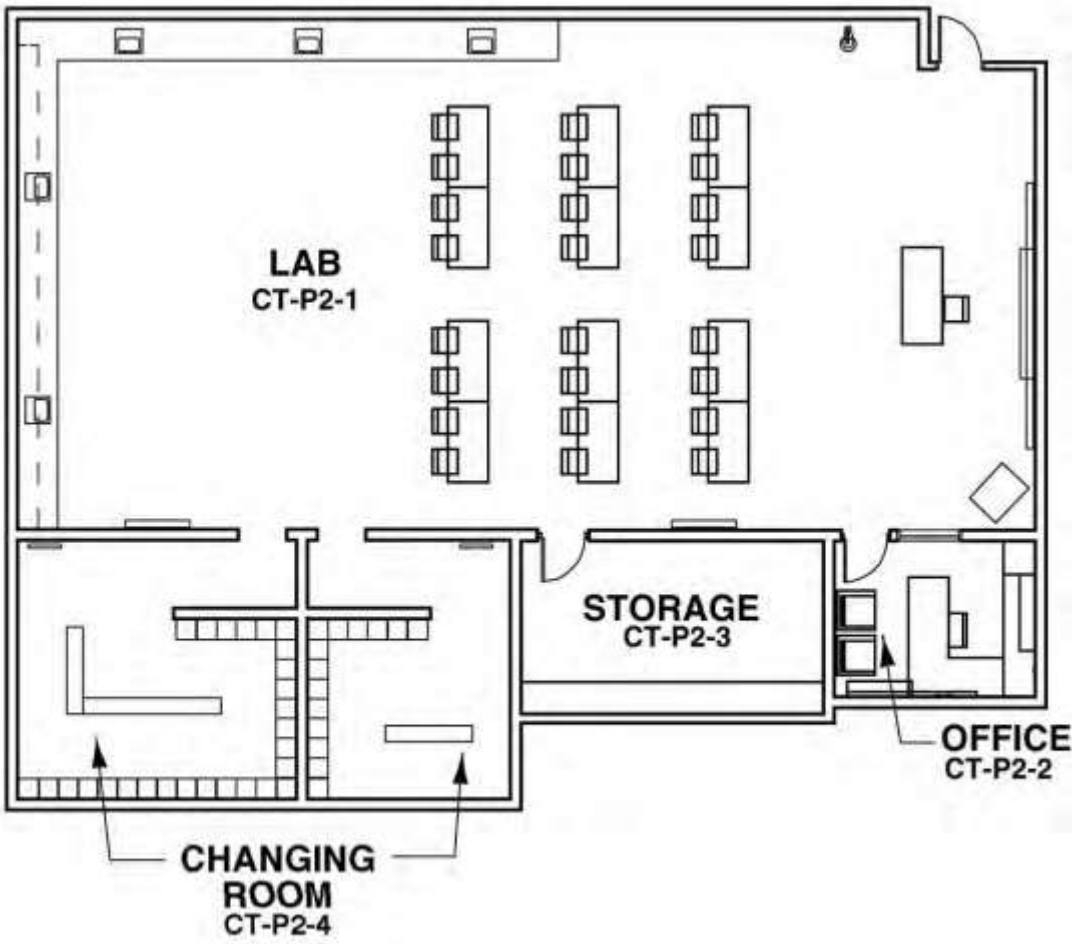


NOTES:

This is an example of how the Program Type 2 spaces in a career-technical school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Program Type 2 space plates:

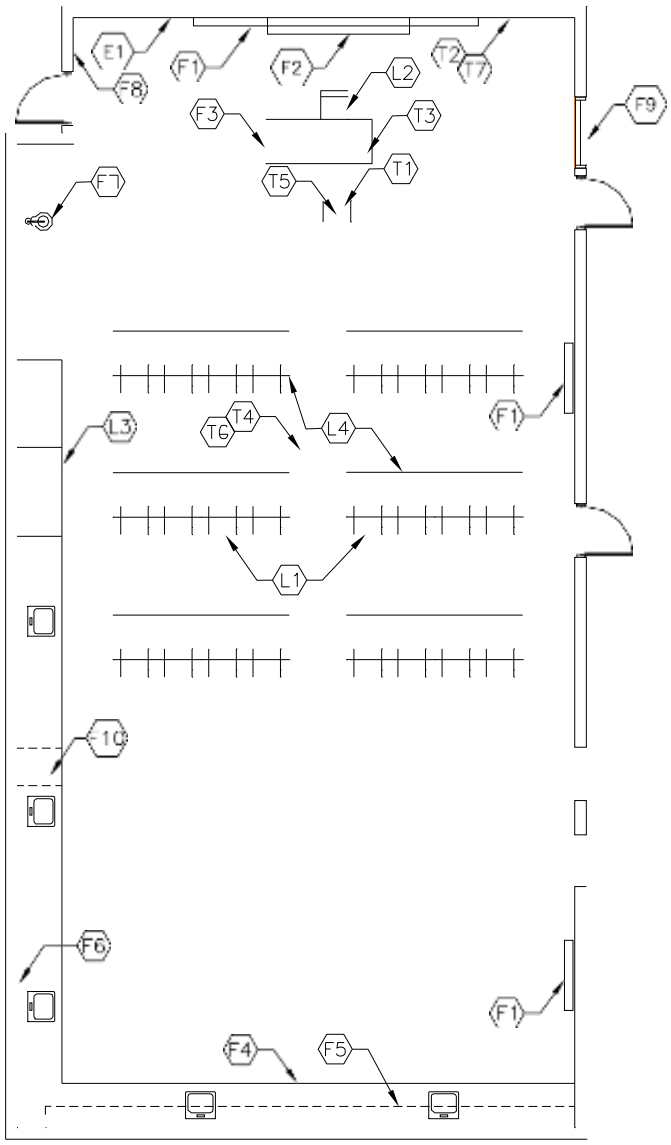
CT-P2-1 Lab
CT-P2-2 Office
CT-P2-3 Storage
CT-P2-4 Changing Room



Program Type 2
This is an example to show the possible relationships of spaces for this program type.

NOTES:

1. See lab descriptions within this section for specific lab requirements.
2. See individual space plates at the end of this section for specific requirements for the office, storage room, and changing room.



CAPACITY: 24 Students SIZE: 1,500 SF (see lab summaries for exact sizes) ANCILLARY SPACES: CT-P2-2 thru CT-P2-4	

NOTES:
1. Loose furnishings shown represent one of many possible arrangements.
2. Graphic plate is an example only. Other labs within this program are not drawn – refer to lab summaries within this program type for information on a particular lab.

PROGRAM ACTIVITIES:
- Large and small group instruction
- Group and individual work
- Demonstrations

SPATIAL RELATIONSHIPS:
- Near other related labs
- Adjacent to typical support spaces
- Proximity to large group restrooms
- Located away from noisy or public activities
- Proximity to core academic area and common use areas
- Flexibility of space

ENVIRONMENTAL CONSIDERATIONS:
- ***Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.***
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall ***only*** minimum STC ***45***
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Loose Furnishings: Refer to Lab Profiles within this section.
3. Loose Furnishings, fixed equipment, utility locations, and general footprint of room shown represent one of many possible arrangements.

PROGRAM DESCRIPTION:

Energy Science: Utilizing industry standards and a math, science, ELA and a technology framework introduces concepts of solar, wind, fossil fuel, nuclear, geothermal, biomass, and fuel cell energy and leads to post-secondary.

Pharmacy Technician: Utilizing business and industry technical standards, math, science, ELA, social studies and technology within a business process framework. Instruction includes concepts, subject matter and experiences to work in a pharmacy under the supervision of a pharmacist.

Biotechnology: A tech prep program that combines classroom and laboratory experiences in the bioprocesses of organisms, cells, or their components to create products or solve problems. Program concentrates on biomedical, environmental, pharmaceutical, bioinformatics, and bioethics.

Program Type: 2
Size Requirements: 1,500 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, rubber, sheet vinyl, linoleum,	096500
polished concrete finishing,	096516
or colored concrete finishing	033510
Optional: carpet	033519
	096816
Base: Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
- (12) Two-person work tables w/epoxy tops
- (24) Students chairs/stools
- (1) Teacher station & chair
- (4) Computer workstations
- Wastebasket

Miscellaneous: Pencil sharpener (optional)

Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24’ of marker board, tack board, and tackable wall surface	101100
40’ of base and wall cabinets	123550
8’ of counter (retail area)	123550
8’ of counter (nurse’s station)	123550
Biohazard hood	123550
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
Projection screen, 6’x8’	115213
(2) Paper towel dispensers	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Biohazard hood exhaust	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 projector video port	271543
1 voice port and phone	271513/273123
1 data port near teacher workstation	271513
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Ultra-short throw interactive projector	274119
Wireless access point (WAP) as determined by Design – refer to Note 4	272133
Classroom technology center video port	271543, 274116, 274119, 275127
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.

***A3* / 01.2000 BIOTECHNOLOGY FOR FOOD, PLANT, ANIMAL SCIENCES**
***JC* / 07.0203 MEDICAL LABORATORY TECHNOLOGY**
***P2* / 17.2815 CRIMINAL SCIENCE TECHNOLOGY**
CT-P2-1

PROGRAM DESCRIPTION:

BFPAS: Applies principles of chemistry, microbiology and genetics to plant and animal research. The focus of this research is to enhance the production and physical attributes of plants and animals, as well as to generate animal and plant products used today in transportation,

manufacturing, medicine, food production and environmental protection.

MLT: A combination of subject matter and experiences designed to prepare to work under the supervision of medical technologist, clinical pathologist, or physician to perform routine clinical laboratory procedures and specimen collection techniques including phlebotomy.

CST: Utilizing business and industry standards as framework for application of clinical and criminal laboratory science, evidentiary testing and analysis, study of society's formal control system, investigative techniques, criminal law, criminal process, administration of Justice System computer applications, record-keeping, and reconstruction techniques.

Program Type: 2

Size Requirements: 1,500 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, rubber, linoleum, sheet vinyl, polished concrete finishing, colored concrete finishing	096500 096516 or 033510 033519
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
L1 (24) Student stools/chairs
L2 (1) Teacher chair or stool
L3 (4) Computer workstations
L4 (12) 2-person work tables with epoxy tops with gas and electric
Wastebasket

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 24' of marker board, tack board, or tackable wall surface	101100
F2 Projection screen, 6'x8'	115213
F3 Demonstration table/teacher desk	123550
F4 60' of perimeter sink base cabinets with 5 sinks	123550
F5 30' of wall cabinets	123550
F6 (5) Paper towel dispensers	102813
F7 Safety shower/eyewash	224500
F8 Pencil sharpener support (optional)	062000
F9 Windows with integral blinds	085113
F10 Undercounter refrigerator	113100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
Safety shower/eyewash connections	224000
Master shut-off for gas	226313
Gas connections	226313
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Manual exhaust	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Means of egress lighting per code	265100
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
Communications:	
T1 1 projector video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port at demonstration table	271513
T4 Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 Overhead projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	272133
T7 Classroom technology center video port	271543, 274116, 274119, 275127
E1 Duplex receptacle with dedicated circuit for wireless devices	

NOTE
1. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

***J2* / 07.0906 COMMUNITY HEALTH AIDE**
***JA* / 07.0307 HOME HEALTH**
CT-P2-1

PROGRAM DESCRIPTION:

CHA: Utilizing business and industry technical standards, math, science, ELA, social studies and technology within a business process framework. Instruction includes concepts, subject matter and experience to serve as a liaison between professional health workers and the recipients of health services.

HH: Utilizing business and industry technical standards, math, science, ELA, social studies and technology within a business process framework. Introduces concepts, subject matter and experiences to assist elderly, convalescent, or handicapped in their homes for daily living needs.

Program Type: 2

Size Requirements: 1,500 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, rubber, sheet vinyl, linoleum, polished concrete finishing, or colored concrete finishing	096500 096516 033510 033519
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100
LOOSE FURNISHINGS:	
(12) Two-person work tables	
(24) Students chairs/stools	
(1) Teacher station & chair	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24’ of marker board, tack board, or tackable wall surface	101100
30’ of sink base cabinets w/2 sinks	123550
30’ of wall cabinets	123550
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
Projection screen, 6’x8’	115213
(2) Paper towel dispensers	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-4	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port	271543
1 voice port and phone	271513/273123 1
data port near teacher workstation	271513
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Ultra-short throw interactive projector	274119
Wireless access point (WAP) as determined by Design – refer to Note 4	***272133***
Classroom technology center video port	***271543, 274116, 274119, 275127***
Duplex receptacle with dedicated circuit for wireless devices	
Miscellaneous:	
Pencil sharpener (optional)	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

PROGRAM DESCRIPTION:

Utilizing business and industry technical standards, math, science, ELA, social studies and technology within a business process framework. Introduces subject matter and experiences in producing restorative appliances authorized by a dentist.

Program Type: 2

Size Requirements: 1,500 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, rubber, linoleum, sheet vinyl, polished concrete finishing, colored concrete finishing	096500 096516 or 033510 033519
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(24) Student stools/chairs
(1) Teacher chair or stool
(6) 4-person work tables with epoxy tops with gas and electric
Wastebasket

Electronic Safety and Security:

Life safety devices per code 283111

Miscellaneous:

Pencil sharpener (optional)

Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
40' of sink base cabinets with 6 sinks and natural gas	123550
40' of wall cabinets	123550
(6) Paper towel dispensers	102813
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
Projection screen, 6'x8'	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
Safety shower/eyewash connections	224000
Master shut-off for gas	226313
Gas connections	226313
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Grinding machine ventilation	Div. 23
Localized ventilation for specific lab-produced fumes	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table	8600-5
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 projector video port	271543
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Ultra-short throw interactive projector	274119
Wireless access point (WAP) as determined by Design – refer to Note 4	272133
Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

P3 / 17.2811 EMERGENCY MEDICAL TECHNICIAN - *SECONDARY*

CT-P2-1

PROGRAM DESCRIPTION:

Utilizing business and industry, math, science, and technology standards, instructs to the level of EMT-Basic. This course must include the Ohio Department of Public Safety approved EMT-Basic curriculum and be provided through an accredited ODPS provider. This course is a minimum of 450 hours with the ODPS curriculum limited to the senior level.

Program Type: 2

Size Requirements: 1,500 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, rubber, sheet vinyl, linoleum,	096500
polished concrete finishing,	096516
or colored concrete finishing	033510
Optional: carpet	033519
	096816
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(12) Two-person work tables
(24) Students chairs/stools
(1) Teacher station & chair
Wastebasket

Electronic Safety and Security:

Life safety devices per code 283111

Miscellaneous:

Pencil sharpener (optional)

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
30' of sink base cabinets w/2 sinks	123550
30' of wall cabinets	123550
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
Projection screen, 6'x8'	115213
(2) Paper towel dispensers	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port	271543
1 voice port and phone	271513/273123
1 data port near teacher workstation	271513
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Ultra-short throw interactive projector	274119
Wireless access point (WAP) as determined by Design – refer to Note 4	***272133***
Classroom technology center video port	***271543, 274116, 274119, 275127***
Duplex receptacle with dedicated circuit for wireless devices	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133***

requirements.

PROGRAM DESCRIPTION:

Utilizing business and industry technical standards and math, science, ELA, and technology framework in the study of organ systems, study of movement & associated functional response and adaptations, understanding scientific basis underlying exercise-induced physiological responses in athletic training, biomechanics, exercise physiology and nutrition for the prevention, diagnosis, and treatment of injuries.

Program Type: 2

Size Requirements: 1,500 SF Lab

Lab Requirements:

FINISHES:	Ref #
Flooring:	
ET, rubber, sheet vinyl, linoleum, polished concrete finishing, colored concrete finishing	096500 096516 or 033510
Optional: carpet	033519 096816
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(10) Training tables
(24) Students chairs/stools
(1) Teacher station & chair
Wastebasket

Electronic Safety and Security:

Life safety devices per code 283111

Miscellaneous:

Pencil sharpener (optional)

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24’ of marker board, tack board, or tackable wall surface	101100
30’ of sink base cabinets w/2 sinks	123550
30’ of wall cabinets	123550
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
Projection screen, 6’x8’	115213
(2) Paper towel dispensers	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 projector video port	271543
1 voice port and phone	271513/273123 1
data port near teacher workstation	271513
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Ultra-short throw interactive projector	274119
Wireless access point (WAP) as determined by Design – refer to Note 4	272133
Classroom technology center video port	271543, 274116, 274119, 275127
Duplex receptacle with dedicated circuit for wireless devices	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.

***J8* / 07.4840 HEALTH SUPPORT PATHWAY**
***JL* / 07.4830 THERAPEUTIC PATHWAY**
CT-P2-1

PROGRAM DESCRIPTION:

HSP: Utilizing business and industry technical standards, math, science, ELA, social studies and technology within a business process framework. Instruction includes concepts, subject matter, and experiences for health support services careers, including operation, resource management, and esthetics and aseptic procedures of the physical plant to ensure a healthy and well-equipped environment in healthcare.

TP: A clustered program utilizing business and industry technical standards, math, science, ELA, social studies and technology within a business process framework. Instruction includes concepts, subject matter and experiences in health careers that focus on care and treatment of individuals for the promotion and maintenance of wellness; and the prevention and treatment of physical, mental, and emotional disorders.

Program Type: 2

Size Requirements: 1,500 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, rubber, sheet vinyl, linoleum	096500
polished concrete finishing,	096516 or
colored concrete finishing	033510
	033519
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(12) Two-person work tables
(24) Students chairs/stools
(1) Teacher station & chair
~~Wastebasket~~

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24’ of marker board, tack board, or tackable wall surface	101100
30’ of sink base cabinets w/2 sinks	123550
30’ of wall cabinets	123550
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
Projection screen, 6’x8’	115213
(2) Paper towel dispensers	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port	271543
1 voice port and phone	271513/273123 1
data port near teacher workstation	271513
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Ultra-short throw interactive projector	274119
Wireless access point (WAP) as determined by Design – refer to Note 4	***272133***
Classroom technology center video port	***271543, 274116, 274119, 275127***
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous: Pencil sharpener (optional)	
Duplex receptacle with dedicated circuit for wireless devices	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.

PROGRAM DESCRIPTION:

HIMS: A clustered program utilizing business and industry technical standards, math, science, ELA, social studies, and technology within a business process framework. Introduces concepts, subject matter, and experiences for health careers that focus on compilation, maintenance and retrieval of records, and reports and statistical data on health services.

HUC: Utilizing business and industry technical standards, math, science, ELA, social studies, and technology within a business process framework. Introduces concepts, subject matter, and experiences to manage components of non-patient care activities in health care facilities.

Program Type: 2
Size Requirements: 1,500 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, rubber, linoleum, sheet vinyl,	096500
polished concrete finishing,	096516
or colored concrete finishing	033510
Base:	033519
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
L1 (24) Student stools/chairs
L2 (1) Teacher chair or stool
L3 (4) Computer workstations
L4 (12) 2-person work tables with epoxy tops with gas and electric
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous: Pencil sharpener (optional)

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 24' of marker board, tack board, or tackable wall surface	101100
F2 Projection screen, 6'x8'	115213
F3 Demonstration table/teacher desk	123550
F4 60' of perimeter sink base cabinets with 5 sinks	123550
F5 30' of wall cabinets	123550
F6 (5) Paper towel dispensers	102813
F7 Safety shower/eyewash	224500
F8 Pencil sharpener support (optional)	062000
F9 Windows with integral blinds	085113
F10 Undercounter refrigerator	113100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
Safety shower/eyewash connections	224000
Master shut-off for gas	226313
Gas connections	226313
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Manual exhaust	Div. 23
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles (minimum)	262726

Double duplex receptacle adjacent to each data and video port 262726
Means of egress lighting per code 265100

Communications:

T1 1 projector video port 271543
T2 1 voice port and phone 271513/273123 T3 1 data port at demonstration table 271513 T4 Wireless access point cable above ceiling 271513
Clock 275313
Central sound system 275123
Sound reinforcement system 275127
T5 Overhead projector 274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4 272133
T7 Classroom technology center video port 271543, 274116, 274119, 275127
E1 Duplex receptacle with dedicated circuit for wireless devices

JM / ALLIED HEALTH AND NURSING
JJ / 07.0302 PRACTICAL NURSING
CT-P2-1

PROGRAM DESCRIPTION:
A combination of subject matter and supervised clinical experiences designed to prepare a person to give direct nursing care under the supervision of a registered nurse, licensed physician, or dentist. Instruction includes safety and infection control, first-aid and CPR, legal and ethical responsibilities, coordinated care, goal-oriented care, environmental safety, treatments and procedures, physiological adaptation, mobility, comfort, basic care, psychosocial adaptation, growth and development, prevention and early treatment of disease, and reduction of risk potential.

Program Type: 2
Size Requirements: 1,500 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, rubber,	096500
sheet vinyl, or linoleum	096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(12) Two-person work tables
(24) Students chairs/stools
(1) Teacher station & chair
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

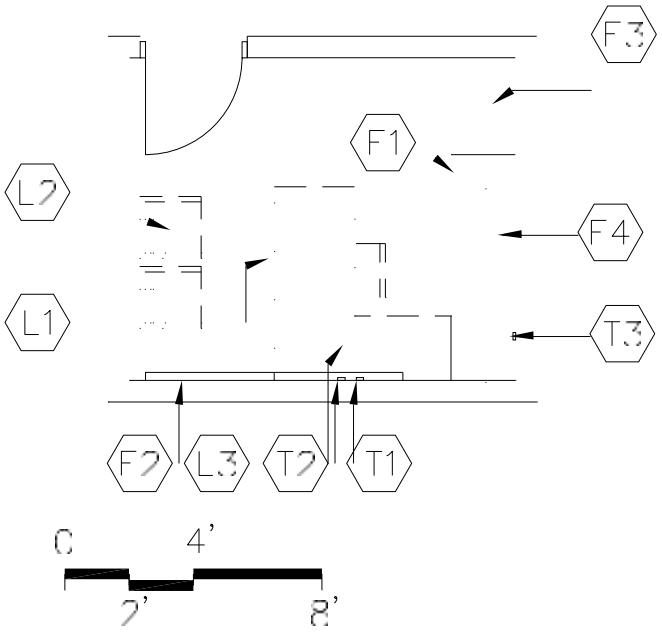
Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24’ of marker board, tack board, or tackable wall surface	101100
30’ of sink base cabinets w/2 sinks	123550
30’ of wall cabinets	123550
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
Projection screen, 6’x8’	115213
(2) Paper towel dispensers	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 projector video port	271543
1 voice port and phone	271513/273123
1 data port near teacher workstation	271513
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Ultra-short throw interactive projector	274119
Wireless access point (WAP) as determined by Design – refer to Note 4	272133
Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Based on curriculum needs, a training restroom and laundry room may be included with this program in the allotted square footage for the lab. Space plates for training restroom and laundry room can be found on pages 6314-41 and 6314-42 – Patient Care Technician.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.



PROGRAM ACTIVITIES:

- Private space for program instructor
- One-on-one conferences with academic instructors, students, etc.

SPATIAL RELATIONSHIPS:

- Near related lab
- Direct access to school circulation areas

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: 1 - 3 persons
SIZE: 120 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

OFFICE
CT-P2-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or carpet tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

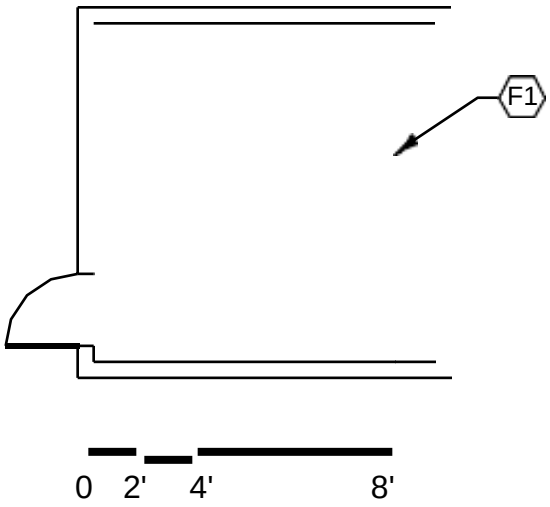
LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets above work surface	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.

STORAGE AREA
CT-P2-3



PROGRAM ACTIVITIES:
- Space for storage of lab equipment

SPATIAL RELATIONSHIPS:
- Near related lab

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	200 SF

NOTES:

STORAGE AREA
CT-P2-3

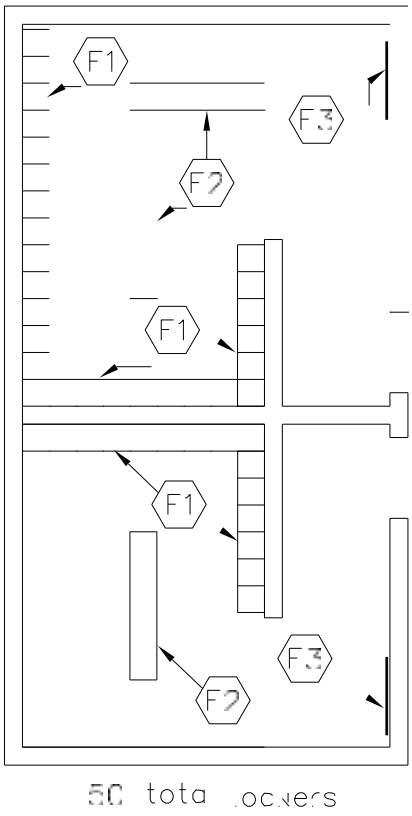
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
Resilient base	096500
Ceiling:	
Exposed structure	---
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items[1]:	
F1 8'-20' of open shelving	
Depth may vary (fixed or loose)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:

- Personal and health needs for the program Specific users.
- Changing of clothes and/or uniforms.
- Storage of personal items while students are in lab.

SPATIAL RELATIONSHIPS:

- Adjacent to related lab

ENVIRONMENTAL CONSIDERATIONS:

- Sanitary and durable finishes.
- Environmental sound control
  Wall minimum STC 40
  Ceiling minimum CAC 35, NRC 0.70

CAPACITY:	N/A
SIZE:	450 SF

NOTES:

1. Large and small changing areas are interchangeable for either males or females. Determination based on male/female ratio within each program.

CHANGING ROOM
CT-P2-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Polished concrete finishing, or	033510
colored concrete finishing	033519
Optional: linoleum or rubber	096500 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical with high impact hold down clips	095113
Walls:	
Painted concrete masonry units	042000 / 099100
LOOSE FURNISHINGS	
Wastebaskets	

FEATURES[1]:	Spec. Ref.#
Fixed Items[1]:	
F1 Student lockers	105113
F2 Locker benches	062000
F3 24" x 60" mirror	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/Return air system	Div. 23
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Individual temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
2 Duplex receptacles	262726
Means of egress lighting per code	265100
Communications:	
Clock	275313
Central Sound System	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

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E. Office Plate 6313-23

F. Storage Area Plate 6313-25

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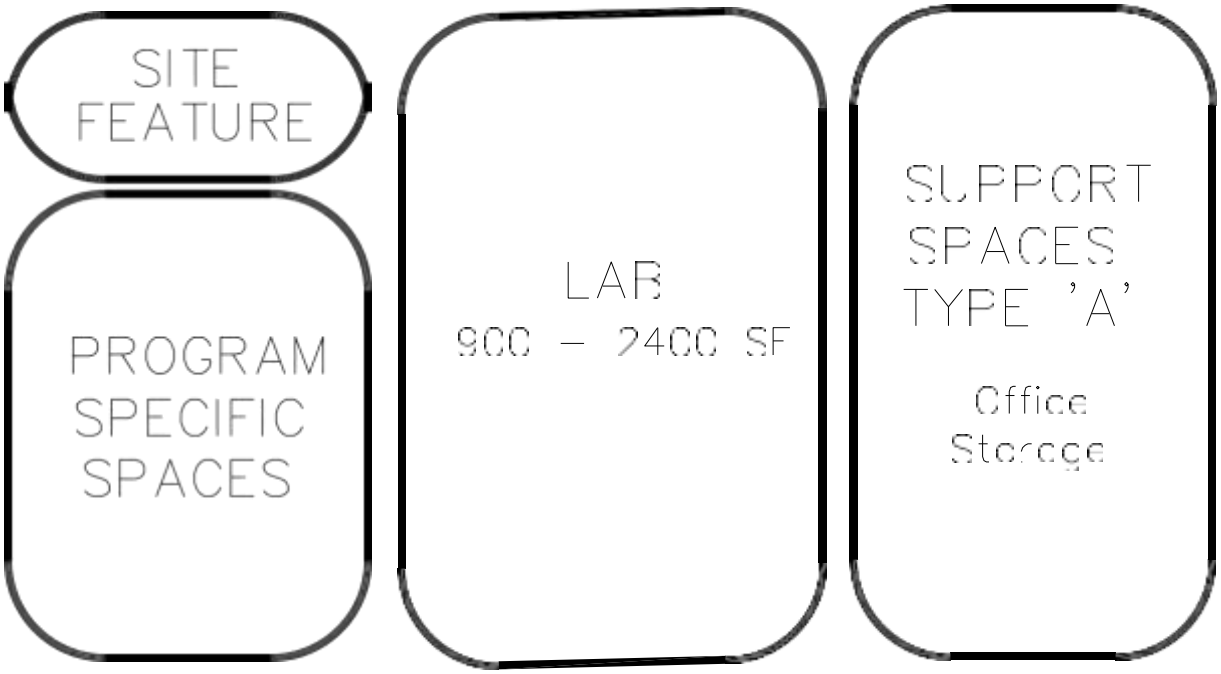
Program Type 3

Description: Small to medium sized lab space with typical support space. Additionally, this program requires specialized auxiliary spaces and possible site features.
This program is to utilize standard construction and be one-story (16' +/- tall) tall. Lab, support, and specialty spaces to have finished floor, painted walls, and suspended acoustical ceiling.

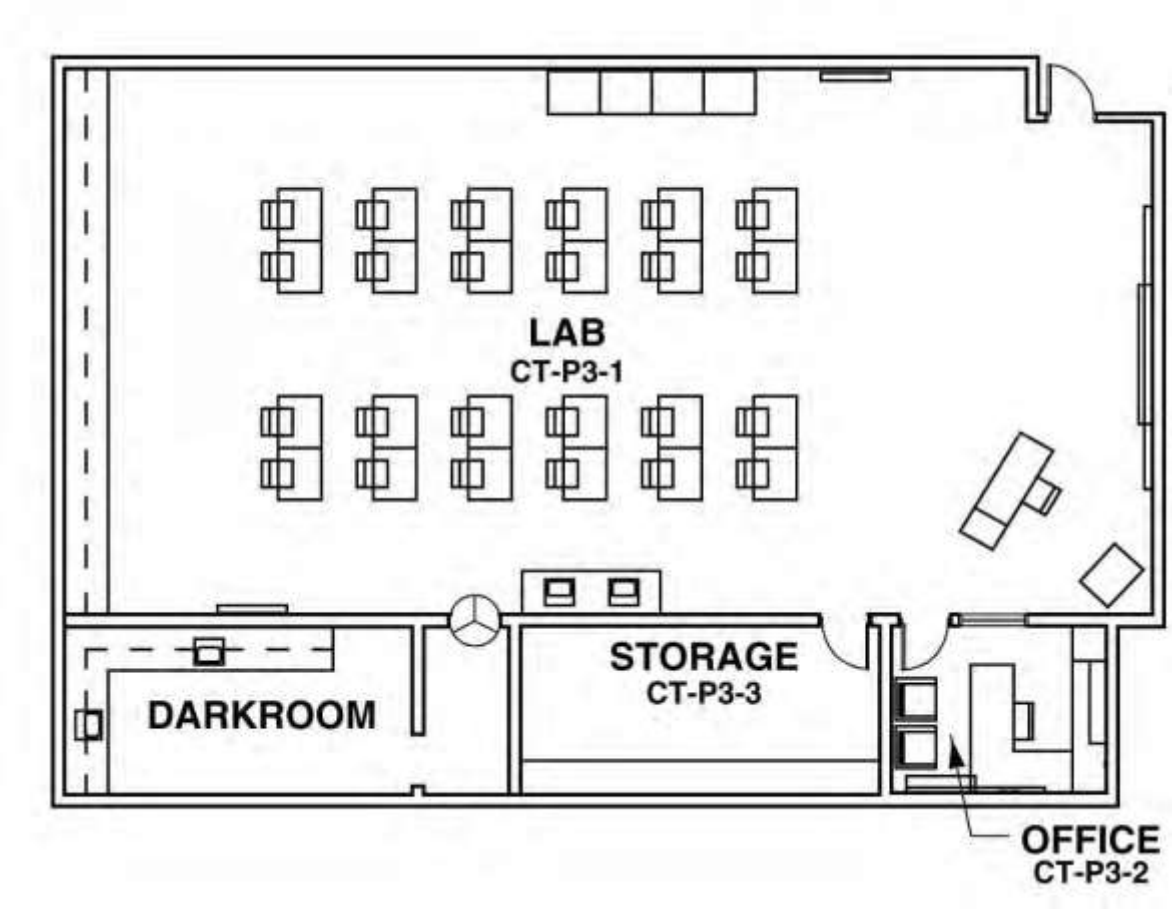


NOTES:

This is an example of how the Program Type 3 spaces in a career-technical school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Program Type 3 space plates:

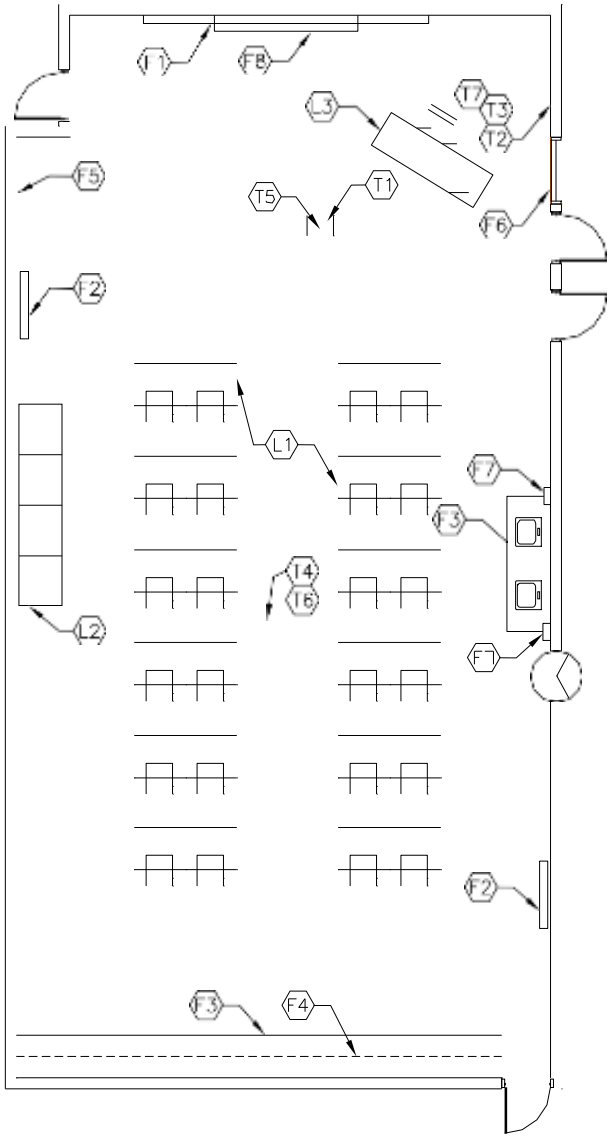
CT-P3-1 Lab
CT-P3-2 Office
CT-P3-3 Storage



Program Type 3
This is an example to show the possible relationships of spaces for this program type.

NOTES:

1. See lab descriptions within this section for specific lab requirements, including program specific rooms.
2. See individual space plates at the end of this section for specific requirements for the storage room and office.



CAPACITY: 24 Students SIZE: 900 – 2,400 SF (see lab summaries for exact sizes) ANCILLARY SPACES: CT-P3-2 and CT-P3-3	

NOTES:
1. Loose furnishings shown represent one of many possible arrangements.
2. Graphic plate is an example only. Other labs within this program are not drawn – refer to lab summaries within this program type for information on a particular lab.

PROGRAM ACTIVITIES:
- Large and small group instruction
- Group and individual work
- Demonstrations

SPATIAL RELATIONSHIPS:
- Near other related labs
- Adjacent to typical support spaces
- Proximity to large group restrooms
- Located away from noisy or public activities
- Proximity to core academic area and common use areas
- Flexibility of space

ENVIRONMENTAL CONSIDERATIONS:
- ***Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.***
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall ***only*** minimum STC ***45***
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Loose Furnishings: Refer to Lab Profiles within this section.
3. Loose Furnishings, fixed equipment, utility locations, and general footprint of room shown represent one of many possible arrangements.

PROGRAM DESCRIPTION:

Preparation for employment in childcare services, child development, and early childhood education within the childcare and guidance industries.

Program Type: 3

Size Requirements: 1,500 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
30% Carpet	096816
70% ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100
LOOSE FURNISHINGS:	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
Duplex receptacle with dedicated circuit for wireless devices	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
32’ of marker board, tack board, or tackable wall surface	101100
30’ of wall cabinets	123550
30’ of sink base cabinets with 1 sink	123550
10’ of reception counter	123550
10’ of toddler height sink base cabinets with 1 sink	123550
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
(2) Paper towel dispensers	102813
Projection screen, 6’x8’	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
Toddler height drinking fountain	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
10 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port	271543
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Ultra-short throw interactive projector	274119
Wireless access point (WAP) as determined by Design – refer to Note 2	***272133***
Classroom technology center video port	***271543, 274116, 274119, 275127***

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***

SITE FEATURES:

Playground Area

- Provide 60 SF per child served
- Follow applicable safety guidelines for different age groups.
- Plan for play activities that include rocking, swinging, balancing, climbing, and sliding.
- Locate equipment with moving parts, such as swings, at the perimeter of the play area. Use fence or planting beds to prevent children from inadvertently stepping into path of moving equipment.
- Surfacing is to be resilient and installed at a sufficient depth to meet current safety guidelines. It should be a non-splintering surface where children may be crawling. Avoid using black surfacing.
- Provide edging to keep loose soft surfacing within bounds of the play area. Depress soft surfacing material below edging. Provide underground drain system and geotextile below soft surfacing.
- Increase the depth of soft surface material in areas of high use such as the base of swings and slides.
- Possible play equipment includes the following: swing set, modular play structure, tot track, four square, and hop scotch.
- Protect entire play area with fencing.

Program Type: 3

Size Requirements: 120 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Carpet	096816
Option: Rubber	096500
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
5 stools

ENVIRONMENTAL CONSIDERATIONS:
- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Interior window with one-way glass	081113/088000
18” counter – length of window	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
2 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

***E0* / 35.0201 EARLY CHILDHOOD EDUCATION**

Infants Room

Program Type: 3

Size Requirements: 700 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Carpet	096816
ET, sheet vinyl	096500
or linoleum at sink	096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

Staff chair
12' of bookcases
3 playpens
12 cribs
2 rocking chairs

Table 18"x24"x18"
Stool
File cabinet
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
14' of base cabinets w/1 sink	123550
4' of baby changing area w/3" high edges and pad	123550
10' of wall cabinets	123550
Interior window	088000/081113
28' of marker board, tack board, or tackable wall surface	101100
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
Baby washing sink	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
10 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port	271543
1 voice port and phone	271513/273123
1 data port	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

Program Type: 3

Size Requirements: 250 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
- 2 Work tables
- Staff table and chairs
- Refrigerator/freezer
- Range and oven
- Microwave
- Dishwasher

ENVIRONMENTAL CONSIDERATIONS:
- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
30’ of base cabinets w/1 sink	123550
30’ of tall storage cabinets	123550
9’ of wall cabinets	123550
1 Coiling counter door	083300
4’ of tack board	101100
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Kitchen exhaust system	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
1 voice port and phone	271513/273123
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

E0 / 35.0201 EARLY CHILDHOOD EDUCATION
Work Room

Program Type: 3

Size Requirements: 150 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500
Optional: carpet	096516 096816
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100
LOOSE FURNISHINGS:	
Wastebasket	

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
13’ of base cabinets w/1 sink	123550
12’ of tall storage cabinets	123550
10’ of mail cubicles	123550
10’ of wall cabinets	123550
10’ of open base cabinets	123550
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
1 voice port and phone	271513/273123
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

Program Type: 3

Size Requirements: 60 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Rubber, linoleum, ET, or	096500
sheet vinyl	096516
Optional: ceramic mosaic tile, porcelain tile base, or resinous flooring	093000 096723
Base:	
Resilient	096500
Optional ceramic mosaic tile base, porcelain tile base, or resinous flooring	093000 096723
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:

- Wall minimum STC 48
- Ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Paper towel dispenser	102813
Soap dispenser	102813
36” and 42” grab bars	102813
24”x60” mirror	102813
Toilet paper holder	102813
Baby changing station	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Toddler height sink	
Toddler height toilet	
Plumbing connections	221116/221119/224000
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

E0 / 35.0201 EARLY CHILDHOOD EDUCATION

Reception

Program Type: 3

Size Requirements: 500 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Carpet	096816
Rubber in vestibule	096500
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

Visitor chairs
End table

ENVIRONMENTAL CONSIDERATIONS:

- Wall minimum STC 48
- Ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Interior windows	088000/081113
4’ of tack board	101100
Literary display cabinet	123550
Doors with power assist	087100
Windows with integral blinds	085113
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
2 duplex receptacles	262726
Means of egress lighting per code	265100
Communications:	
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

***S1* / 04.4110 ENTREPRENEURSHIP**
***S3* / 04.0815 MARKETING COMMUNICATIONS**
***S4* / 04.0810 MARKETING MANAGEMENT**
S0* / 04.1900 *SUPPLY CHAIN MANAGEMENT

PROGRAM DESCRIPTION:

E: Preparation for starting new ventures that create, power, and change business activity – meaning new markets, new products, new production methods, and new businesses.

MC: Preparation for careers that inform, remind, and/or persuade a target audience including advertising, public relations, and multimedia marketing communications.

MM: Educational programs in marketing management prepare learners for careers requiring broad, cross-functional knowledge of marketing and management. These functions include supply-chain management, marketing-information management, pricing product/service management, marketing communications, and selling.

SCM: Preparation for the strategic operation and management of marketing systems with emphasis on logistics components, including purchasing and warehousing.

Program Type: 3

Size Requirements:

1,000 SF Lab – Entrepreneurship
1,000 SF Lab – Marketing Comm.
900 SF Lab – Marketing Management
900 SF Lab – ***Supply Chain Management***

Lab Requirements:	Spec.
FINISHES:	Ref #
Flooring: Carpet	096816
Optional: ET,	096500
sheet vinyl, or linoleum	096516
Base: Resilient	096500
Ceiling: Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(24) Computer workstation furniture & chairs
(1) Teacher station & chair
Wastebasket

Electronic Safety and Security:	
Life safety devices per code	283111

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
32’ of marker board, tack board, or tackable wall surface	101100
30’ of wall cabinets	123550
30’ of sink base cabinets w/1 sink	123550
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
Paper towel dispenser	102813
Projection screen, 6’x8’	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
10 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123 T3
1 data port near teacher workstation	271513 T4
26 data ports	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 ***Ultra-short throw interactive*** projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	***272133***
T7 Classroom technology center video port	***271543, 274116, 274119, 275127***
Wireless access point cable above ceiling	***271513***
Miscellaneous: Pencil sharpener (optional)	
E1 Duplex receptacle with dedicated circuit for wireless devices	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Supply Chain Management*** may be taught in high bay lab if curriculum supports.
3. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133***

requirements.

***S1* / 04.4110 ENTREPRENEURSHIP**
***S3* / 04.0815 MARKETING COMMUNICATIONS**
***S4* / 04.0810 MARKETING MANAGEMENT**

Bookstore

Program Type: 3

Size Requirements: 800 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Carpet	096816
Optional: ET,	096500
sheet vinyl, or linoleum	096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:
- Stool
- Wastebasket

ENVIRONMENTAL CONSIDERATIONS:
- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
8’ of plastic laminate counter	062000
75’ of base cabinet	123550
75’ of adjustable display wall system	060565
Interior window	088000/081113
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Track lighting	265100
Multilevel switching	262726
6 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data port	262726
Communications:	
2 data ports	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

04.4110 ENTREPRENEURSHIP
04.0815 MARKETING COMMUNICATIONS
04.0810 MARKETING MANAGEMENT

Display

Program Type: 3

Size Requirements: 100 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Rubber	096500
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:
N/A

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
10’ of adjustable shelving	062000
Interior window	088000/081113
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
Track lighting	265100
4 duplex receptacles	262726
Double duplex receptacle adjacent to data port	262726
Communications:	
1 data port	271523
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

04.4110 ENTREPRENEURSHIP
04.0815 MARKETING COMMUNICATIONS
04.0810 MARKETING MANAGEMENT
Display

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PROGRAM DESCRIPTION:

This program is geared toward the Airport Environment and activities concerning the ground support of commercial aircraft, terminal and hanger activities.

Program Type: 3

Size Requirements: 1,500 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Carpet	096816
Option: ET,	096500
sheet vinyl, or linoleum	096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(24) Student stools/chairs

(12) 2-person work tables w/epoxy tops

Wastebasket

Electronic Safety and Security:

Life safety devices per code 283111

Miscellaneous:

Pencil sharpener (optional)

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
30' of wall cabinets	123550
30' of sink base cabinets w/2 sinks	123550
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
(2) Paper towel dispensers	102813
Projection screen 6'x8'	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
20 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port	271543
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Ultra-short throw interactive projector	274119
Wireless access point (WAP) as determined by Design – refer to Note 2	***272133***
Classroom technology center video port	***271543, 274116, 274119, 275127***

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133***

requirements

T5 / 17.0403 GROUND OPERATIONS
Reference Room

Program Type: 3

Size Requirements: 150 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Carpet	096816
Option: ET,	096500
sheet vinyl, or linoleum	096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
- Student chairs
- Wastebasket

ENVIRONMENTAL CONSIDERATIONS:
- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
34’ of plastic laminate counter	062000
27’ of adjustable shelving	062000
Interior window	088000/081113
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
2 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Communications:	
6 data ports	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

PROGRAM DESCRIPTION:
Educational programs in lodging prepare learners for careers in the management, marketing and operations of lodging facilities.

Program Type: 3
Size Requirements: 1,500 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Carpet	096816
Optional: ET,	096500
sheet vinyl, or linoleum	096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(8) Work stations
(24) Student stools/chairs
(1) Teacher station & chair
Wastebasket

Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	

E1 Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):
Wireless access point (WAP) as determined by Design – refer to Note 3 272133
Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of wall cabinets	123550
24' of sink base cabinets w/2 sinks	123550
14' of reception counter	123550
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
(2) Paper towel dispensers	102813
(2) Garbage disposals	113100
(2) Dishwashers	113100
(2) Ovens	113100
(2) Refrigerators	113100
(2) Microwave ovens	113100
(1) Washer and Dryer	113100
Projection screen, 6'x8'	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
1 Utility sink	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Localized exhaust at laundry/ linen area and oven area	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
20 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port	271543
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Ultra-short throw interactive projector	274119

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Based on curriculum needs, a training restroom and laundry room may be included with this program in the allotted square footage for the lab. Space plates for training restroom and laundry room can be found on pages 6314-41 and 6314-42 – Patient Care Technician.

3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

***L1* / 33.0010 LODGING**

Banquet Room

Program Type: 3

Size Requirements: 800 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Carpet	096816
Option: ET,	096500
sheet vinyl, or linoleum	096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

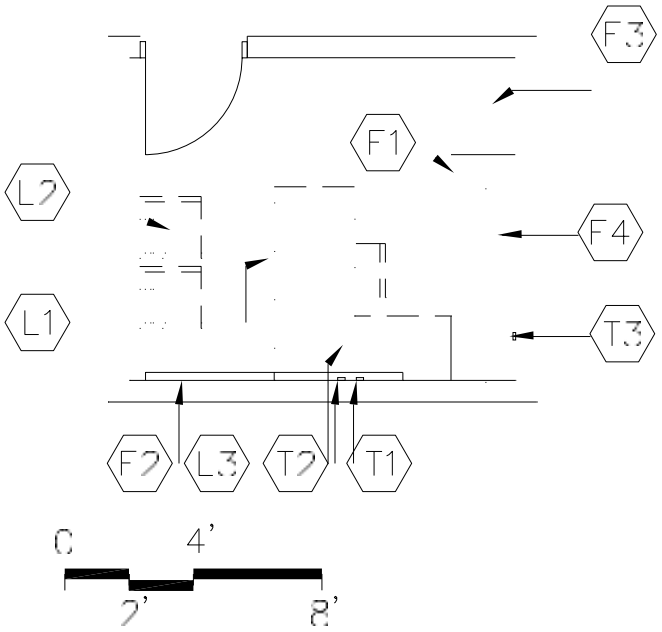
LOOSE FURNISHINGS:
N/A

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
8’ of base cabinets	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Communications:	
2 data ports	271513
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:

- Private space for program instructor
- One-on-one conferences with academic instructors, students, etc.

SPATIAL RELATIONSHIPS:

- Near related lab
- Direct access to school circulation areas

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: 1 - 3 persons
SIZE: 120 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

OFFICE
CT-P3-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or carpet tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

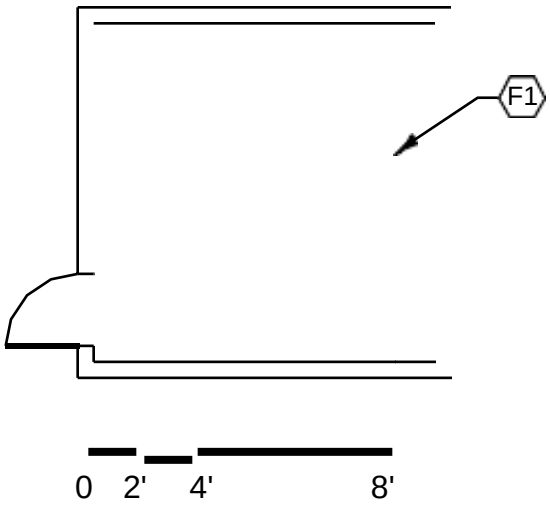
LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets above work surface	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271523
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.

STORAGE AREA
CT-P3-3



PROGRAM ACTIVITIES:
- Space for storage of lab equipment

SPATIAL RELATIONSHIPS:
- Near related lab

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	200 SF

NOTES:

STORAGE AREA
CT-P3-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
Resilient base	096500
Ceiling:	
Exposed structure	---
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items[1]:	
F1 8'-20' of open shelving	
Depth may vary (fixed or loose)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

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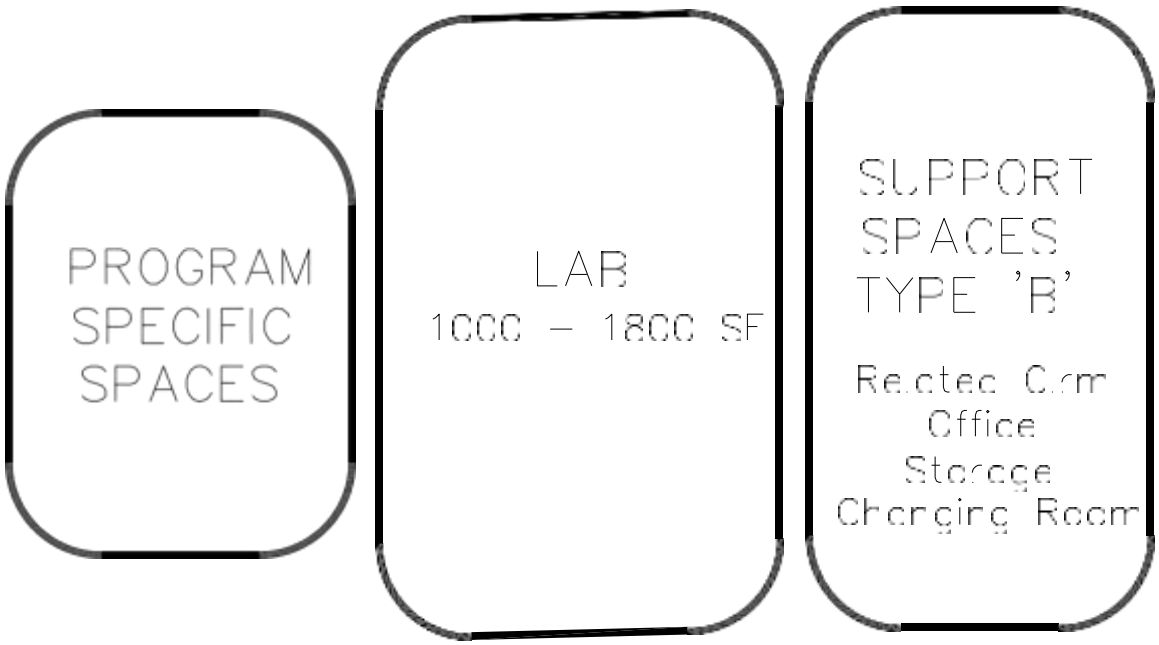
Program Type 4

Description: Small to medium sized lab space with typical support space. Additionally, this program requires specialized auxiliary spaces. This program is to utilize standard construction and be one-story (12' +/-) tall. Lab, support, and specialized space to have finished floor, painted walls, and suspended acoustical ceiling. ***Where necessary, include emergency shut-off switch for equipment.***



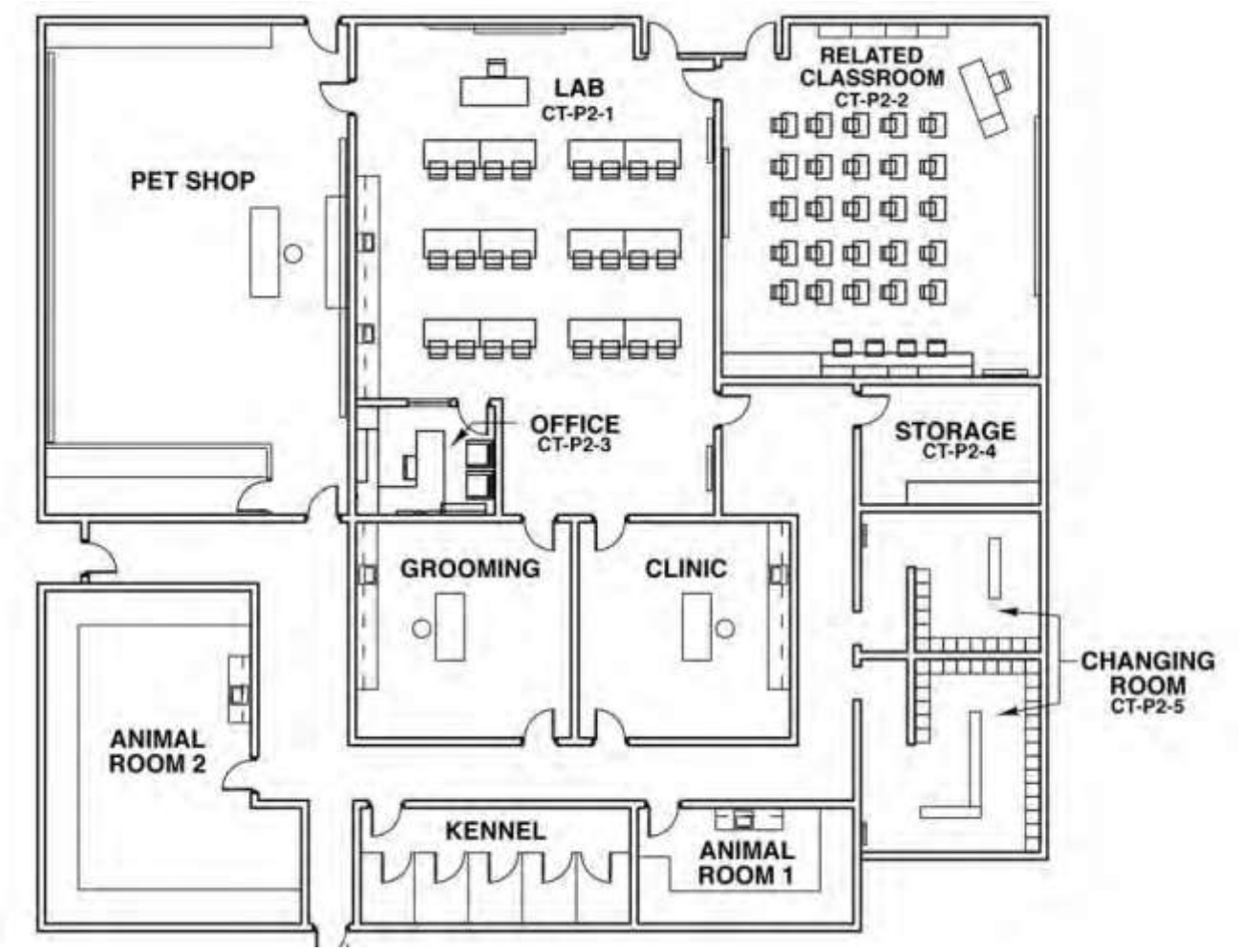
NOTES:

This is an example of how the Program Type 4 spaces in a career-technical school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Program Type 4 space plates:

CT-P4-1 Lab
CT-P4-2 Related Classroom
CT-P4-3 Office
CT-P4-4 Storage
CT-P4-5 Changing Room

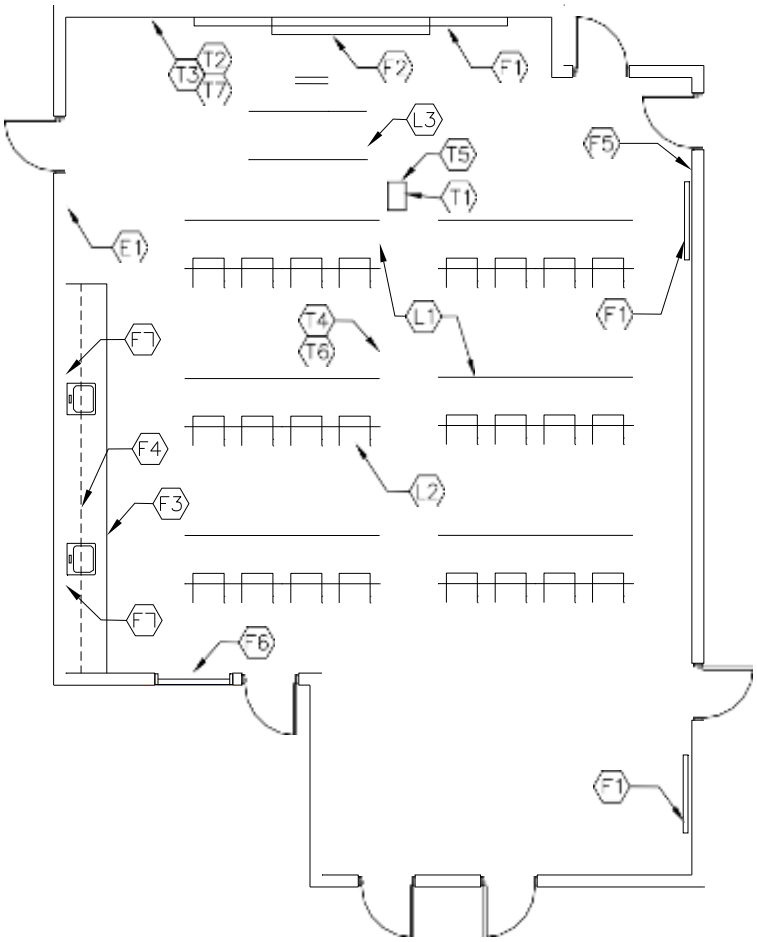
PROGRAM TYPE 4
EXAMPLE



Program Type 4: Animal Science and Management (small animal)
This is an example to show the possible relationships of spaces for this program type.

NOTES:

1. See lab descriptions within this section for specific lab requirements.
2. See individual space plates at the end of this section for specific requirements.



CAPACITY: 24 Students SIZE: 1,000 – 1,800 SF (see lab summaries for exact sizes) ANCILLARY SPACES: CT-P4-2 thru CT-P4-5	

NOTES:
1. Loose furnishings shown represent one of many possible arrangements.
2. Graphic plate is an example only. Other labs within this program are not drawn – refer to lab summaries within this program type for information on a particular lab.

PROGRAM ACTIVITIES:
- Large and small group instruction
- Group and individual work
- Demonstrations

SPATIAL RELATIONSHIPS:
- Near other related labs
- Adjacent to typical support spaces
- Proximity to large group restrooms
- Located away from noisy or public activities
- Proximity to core academic area and common use areas
- Flexibility of space

ENVIRONMENTAL CONSIDERATIONS:
- ***Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.***
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall ***only*** minimum STC ***45***
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Loose Furnishings: Refer to Lab Profiles within this section.
3. Loose Furnishings, fixed equipment, utility locations, and general footprint of room shown represent one of many possible arrangements.

PROGRAM DESCRIPTION:
Applies principles of animal anatomy, physiology, genetics, behavior and nutrition to the research and development, selection and reproduction, health, and management of animals in a domestic and/or natural environment.

Program Type: 4

Size Requirements: 1,000 SF Lab

Lab Requirements:

FINISHES:	Ref #
Flooring:	
ET,	096500
sheet vinyl, linoleum,	096516
polished concrete finishing,	033510 or
colored concrete finishing	033519
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
L1 (12) Two-person work tables
L2 (24) Student chairs/stools
L3 (1) Teacher station & chair
Wastebasket
Miscellaneous:
Pencil sharpener (optional)

SITE FEATURE:
Plan for a dog kennel if required by school curriculum requirements.

FEATURES[1]:		Spec. Ref.#
Fixed Items:		
F1	24' of marker board, tack board, or tackable wall surface	101100
F2	Reserved	
F3	20' of sink base cabinets w/2 sinks	123550
F4	20' of wall cabinets	123550
F5	Pencil sharpener support (optional)	062000
F6	Windows with integral blinds	085113
F7	(2) Paper towel dispenser	102813
F8	Projection screen, 6'x8'	115213
Fire Suppression:		
	Fire suppression system	211000
Plumbing:		
	Plumbing connections	221116/221119/224000
	Handwashing lavatory	224000
HVAC:		
	Supply/return air system	Div. 23
	Independent temperature control	230923
Electrical:		
	Fluorescent lighting	265100
	Illumination level: See Table 8600-5	
	Multilevel switching	262726
	10 duplex receptacles	262726
	Double duplex receptacle adjacent to each data and video port	262726
Communications:		
T1	1 ***projector*** video port	271543
T2	1 voice port and phone	271513/273123
T3	***Wireless access point cable above ceiling***	271513
	Clock	275313
	Central sound system	275123
	Sound reinforcement system	275127
T4	***Ultra-short throw interactive*** projector	274119
T5	***Wireless access point (WAP) as determined by Design – refer to Note 2***	***272133***
T6	***Classroom technology center video port***	***271543, 274116, 274119, 275127***
Electronic Safety and Security:		
	Life safety devices per code	283111

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

A2 / 01.0901 ANIMAL SCIENCE AND MANAGEMENT (small animal)

Pet Shop

Program Type: 4

Size Requirements: 1,200 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, linoleum, polished concrete finishing, colored concrete finishing	096500 096516 or 033510 033519
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

Stool
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
8’ of counter	123550
30’ of base cabinets	123550
60’ of adjustable wall display system	060565
Glass enclosed animal display wall	084113
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
Handwashing lavatory	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Independent ventilation	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
Track lighting	265100
9 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Communications:	
1 voice port and phone	271513/273123
2 data ports	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

Program Type: 4

Size Requirements: 350 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, linoleum,	096500
polished concrete finishing,	096516
or colored concrete finishing	033510
	033519
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
Stool
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
15’ of base cabinets w/1 sink	123550
15’ of wall cabinets	123550
6’ examination island	123550
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Independent ventilation	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Communications:	
2 data ports	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

A2 / 01.0901 ANIMAL SCIENCE AND MANAGEMENT (small animal)

Grooming

Program Type: 4

Size Requirements: 350 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, linoleum,	096500
polished concrete finishing,	096516
or colored concrete finishing	033510
	033519
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

Stool
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
15’ of base cabinets w/1 sink	123550
15’ of wall cabinets	123550
6’ grooming island	123550
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Independent ventilation	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Communications:	
2 data ports	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

Program Type: 4

Size Requirements: 200 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, linoleum, polished concrete finishing, colored concrete finishing	096500 096516 or 033510 033519
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
6’ of base cabinets w/1 sink	123550
6’ of wall cabinets	123550
20’ of animal cage shelving	062000
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
Handwashing lavatory	224000
HVAC:	
Supply/return air system	Div. 23
Independent ventilation	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

***A2* / 01.0901 ANIMAL SCIENCE AND MANAGEMENT (small animal)**

Animal Room #2

Program Type: 4

Size Requirements: 600 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, linoleum, polished concrete finishing, colored concrete finishing	096500 096516 or 033510 033519
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

Stool
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
6’ of base cabinets w/1 sink	123550
6’ of wall cabinets	123550
50’ of animal cage shelving	062000
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
Handwashing lavatory	224000
HVAC:	
Supply/return air system	Div. 23
Independent ventilation	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:

N/A

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

Kennel

Program Type: 4

Size Requirements: 250 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
60' of chain link fencing w/5 gates	323113
(5) exterior animal access doors	323113
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
Keyed hose bibb	224000
Floor drain	224000
HVAC:	
Supply/return air system	Div. 23
Independent ventilation	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

***P0* / 17.2810 CAREER PATHS FOR THE LAW PROFESSION**
***P1* / 17.2802 CRIMINAL JUSTICE**
***P5* / 17.2808 PRIVATE SECURITY**
CT-P4-1

PROGRAM DESCRIPTION:

CPLP: Introduction of career major courses and application of knowledge and skills to prepare students for entry level, technical and professional career options within the law and public administration professions.

CJ: Utilizing business and industry, math, science and technology standards. Introduces concept of training provided by officially designated law enforcement agencies. The program must be certified by the Ohio Peace Officers Training Commission.

PS: A one-year program utilizing business and industry, math, science and technology standards. Introduces concept of physical and personal security, internal loss, and facility access.

Program Type: 4
Size Requirements: 1,200 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Carpet	096816
Option: ET,	096500
sheet vinyl, or linoleum	096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(12) Two-person work tables
(24) Student chairs/stools
(1) Teacher station & chair
Wastebasket

Miscellaneous:
Pencil sharpener (optional)

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
32’ of marker board, tack board, or tackable wall surface	101100
30’ of sink base cabinets w/1 sink	123550
30’ of wall cabinets	123550
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
Paper towel dispenser	102813
Projection screen, 6’x8’	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
20 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port	271543
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Ultra-short throw interactive projector	274119
Wireless access point (WAP) as determined by Design – refer to Note 2	***272133***
Classroom technology center video port	***271543, 274116, 274119, 275127***
Electronic Safety and Security:	
Life safety devices per code	283111
Duplex receptacle with dedicated circuit for wireless devices	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***

Program Type: 4

Size Requirements: 800 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500
Option: Sealed concrete	096516 033000
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
N/A

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

***P0* / 17.2810 CAREER PATHS FOR THE LAW PROFESSION**
***P1* / 17.2802 CRIMINAL JUSTICE**
***P5* / 17.2808 PRIVATE SECURITY**

Interrogation Room

Program Type: 4

Size Requirements: 150 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(1) Table
(4) Chairs

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to data port	262726
Communications:	
1 data port	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

PROGRAM DESCRIPTION:

MA: A combination of subject matter and experiences designed to prepare a person to perform functions and follow procedures concerned with the diagnosis and treatment of patients under the supervision of a physician in a physician's office or clinic. Instruction covers physical examinations, laboratory tests, infection control and hazard material management, quality assurance, medical ethics, patient education, medical emergencies, general office procedures, insurance, and medications.

CHCS: Combined with specialized competencies, and utilizing business and industry technical standards within a math, science, ELA, social studies and technology framework. Involves changing the health status of a patient/client over time through performance of tests or evaluations to identify the presence or absence of illness or injury that creates a picture of the health status of an individual at a single point of time.

NA: A combination of subject matter and experiences designed to prepare a person to perform routine tasks involved in the care of individuals receiving nursing service under the supervision of a nurse.

Program Type: 4

Size Requirements: 1,200 SF Lab

Lab Requirements:	Spec. Ref #
FINISHES:	
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base: Resilient	096500
Ceiling: Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100
LOOSE FURNISHINGS:	
(12) Two-person work tables	
(24) Student chairs/stools	
(1) Teacher station & chair	
Wastebasket	
Miscellaneous:	
Pencil sharpener (optional)	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board or tack board or tackable wall surface	101100
40' of sink base cabinets w/3 sinks	123550
40' of wall cabinets	123550
10' of reception counter	123550
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
(3) Paper towel dispensers	102813
Projection screen, 6'x8'	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting Illumination level: See Table 8600-5	265100
Multilevel switching	262726
20 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123 1
data port near teacher workstation	271513
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Wireless access point (WAP) as determined by Design – refer to Note 2	***272133***
Classroom technology center video port	***271543, 274116, 274119, 275127***
Electronic Safety and Security:	
Life safety devices per code	283111
Duplex receptacle with dedicated circuit for wireless devices	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133***

requirements.

***J1* / 07.1100 CLINICAL HEALTH CARE SERVICES**
***JD* / 07.0303 NURSE ASSISTING**
JB* / 07.0904 *MEDICAL ASSISTANT

Training Restroom

Program Type: 4

Size Requirements: 120 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Rubber, linoleum, ET, or	096500
sheet vinyl	096516
Option: ceramic mosaic tile,	093000
porcelain tile base, or	096723
resinous flooring	
Base:	
Resilient	096500
Option: ceramic mosaic tile base,	093000
porcelain tile base, or	096723
resinous flooring	
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 48
- Ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
3’ vanity with sink	123550
Paper towel dispenser	102813
Soap dispenser	102813
36” and 42” grab bars	102813
16”x24” mirror	102813
Toilet paper holder	102813
Bathtub grab bars	102813
Bath curtain rod	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Tank-type toilet	224000
Residential bathtub	224000
Plumbing connections	221116/221119/224000
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
2 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

Program Type: 4

Size Requirements: 120 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
- Clothes washer
- Electric clothes dryer
- Wastebasket

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 45
- Ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
6’ of base cabinets	123550
6’ of adjustable shelving	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
Washer/dryer connections	224000
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Dryer vent system	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

***M1* / 17.2602 COSMETOLOGY**
CT-P4-1

PROGRAM DESCRIPTION:
Utilizing business and industry technical standards, math, science, ELA, social studies and technology within a business process framework. Instruction includes a variety of beauty treatments including care and beautification of the hair, complexion, hands, and feet.

Program Type: 4

Size Requirements: 1,600 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
- Portable demonstration table (8'x8')
- Coat rack
- Wastebasket

Electronic Safety and Security:
- Life safety devices per code 283111

Miscellaneous:
- Pencil sharpener (optional)
- ***Duplex receptacle with dedicated circuit for wireless devices***

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
8' of tack board	101100
24' of base and wall cabinets	123550
16' of reception counter	123550
8' of adjustable display shelving	062000
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
(24) Student hair stations (base cabinet, countertop, mirror, styling chair)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
6 Hair washing sinks	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Specialized ventilation for pedicure odors	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
40 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Wireless access point (WAP) as determined by Design – refer to Note 2	***272133***
Classroom technology center video port	***271543, 274116, 274119, 275127***

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***

Program Type: 4

Size Requirements: 175 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:

- Wall minimum STC 45
- Ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
27' lockable cabinets	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent ventilation	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

M1 / 17.2602 COSMETOLOGY
Laundry Room

Program Type: 4

Size Requirements: 150 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

Clothes washer
Electric clothes dryer
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:

- Wall minimum STC 45
- Ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
20’ of base cabinets w/1 sink	123550
20’ of adjustable shelving	062000
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
Washer/dryer connections	224000
HVAC:	
Supply/return air system	Div. 23
Independent ventilation	Div. 23
Dryer vent system	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

Program Type: 4

Size Requirements: 200 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 40
- Ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
4' of base cabinets w/1 sink	123550
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent ventilation	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

M1 / 17.2602 COSMETOLOGY
Manicure Room

Program Type: 4

Size Requirements: 200 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
- Wastebasket

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 45
- Ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
4’ of base cabinets w/1 sink	123550
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent ventilation	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

Program Type: 4

Size Requirements: 60 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Rubber, linoleum, ET, or sheet vinyl	096500 096516
Option: ceramic mosaic tile, porcelain tile base, or resinous flooring	093000 096723
Base:	
Resilient	096500
Option: ceramic mosaic tile base, porcelain tile base, or resinous flooring	093000 096723
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 48
- Ceiling minimum CAC 35, NRC 0.40

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Paper towel dispenser	102813
Soap dispenser	102813
36” and 42” grab bars	102813
24”x60” mirror	102813
Toilet paper holder	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Wall mounted water closet	
Wall mounted lavatory	
Plumbing connections	221116/221119/224000
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
2 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

L0 / 33.0005 CULINARY AND FOOD SERVICE OPERATIONS

CT-P4-1

PROGRAM DESCRIPTION:
Educational programs in Culinary and Food Service Operations prepare learners for careers in the art and science of food preparation and presentation.

Program Type: 4

Size Requirements: 1,800 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Quarry tile	093000
Base:	
Quarry tile base	093000
Ceiling:	
Cleanable, suspended acoustical	095113
Walls:	
Epoxy painted concrete masonry units	042000/099100
Option: ceramic wall tile	093000
or latex paint	099100

LOOSE FURNISHINGS:
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
8' of tack board	101100
Food service equipment (for new construction only)	114000
(3) Paper towel dispensers	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
Connections to food service eqpt	224000
Gas connections	226313
Hand washing lavatory	224000
Quick release gas connections	226313
Master gas shut-off valve	226313
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Kitchen canopy exhaust system	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
Single level switching	262726
10 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Connections for food service eqpt	262726
Means of egress lighting per code	265100
220V service	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Wireless access point (WAP) as determined by Design – refer to Note 2	***272133***
Classroom technology center video port	***271543, 274116, 274119, 275127***

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

Program Type: 4

Size Requirements: 1,500 SF

Requirements:

FINISHES:	Ref #
Flooring:	
Carpet	096816
Option: ET,	096500
sheet vinyl, or linoleum	096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Paint	099100

LOOSE FURNISHINGS:
Wastebasket
Tables and chairs for 24 students

ENVIRONMENTAL CONSIDERATIONS:
- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
6’ of base cabinets	123550
6’ of cashier’s station	123550
Interior window	088000/081113
Projection screen, 6’x8’	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
Multilevel switching	262726
Fluorescent or LED can lighting around perimeter of room	265100
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Communications:	
1 voice port and phone	271513/273123
2 data ports	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

L0 / 33.0005 CULINARY AND FOOD SERVICE OPERATIONS

Dry Storage

Program Type: 4

Size Requirements: 150 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Linoleum, ET, or sheet vinyl	096500
Option: Quarry tile	093000 096516
Base:	
Resilient base	096500
Option: Quarry tile	093000
Ceiling:	
Cleanable, suspended, acoustical	095113
Walls:	
Epoxy-painted concrete masonry units	042000/099100
Option: Ceramic wall tile or latex paint	093000 099100

LOOSE FURNISHINGS:

20’ Commercial grade kitchen shelving

ENVIRONMENTAL CONSIDERATIONS:

- Continuous conditioning of air
- Cleanable building surfaces

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supply/return air system	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-6	
1 duplex receptacle	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

PROGRAM DESCRIPTION:

Utilizing business and industry technical standards, math, science, ELA, social studies and technology within a business process framework. Instruction includes concepts, subject matter, and laboratory experience to assist the dentist in the dental operatory, clerical functions, and selected dental laboratory work.

Program Type: 4

Size Requirements: 1,500 SF Lab

Lab Requirements:

FINISHES:	Ref #
Flooring:	
ET*,* sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:

(6) 4-person epoxy-top student tables w/electric and gas
(24) Student chairs/stools
(1) Teacher station & chair
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24’ of marker board, tack board, or tackable wall surface	101100
40’ of sink base cabinets w/6 sinks and natural gas	123550
40’ of wall cabinets	123550
10’ of reception counter	123550
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
(6) Paper towel dispensers	102813
Projection screen, 6’x8’	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
Natural gas connections	226313
Master gas shut-off valve	226313
Safety shower/eye wash	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Localized ventilation for specific lab-produced fumes	Div. 23
Electrical:	
Fluorescent lighting Illumination level: See Table 8600-5	265100
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Wireless access point (WAP) as determined by Design – refer to Note 2	***272133***
Classroom technology center video port	***271543, 274116, 274119, 275127***

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***

J3 / 07.0101 DENTAL ASSISTANT
X-ray Room

Program Type: 4

Size Requirements: 80 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(1) Chair

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 48
- Ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

Program Type: 4

Size Requirements: 80 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, linoleum, polished concrete finishing, colored concrete finishing	096500 096516 or 033510 033519
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 45
- Ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
10’ of base cabinets w/1 sink	123550
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Dark room safelight	265100
Communications:	
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

***J5* / 07.4820 DIAGNOSTIC PATHWAY**
CT-P4-1

PROGRAM DESCRIPTION:
A clustered program utilizing business and industry technical standards, math, science, ELA, social studies and technology within a business process framework. Instruction includes concepts, subject matter, and experience in health careers that focus on diagnostic procedures to determine status of body functions/systems, cause and nature of diseases and disorders.

Program Type: 4

Size Requirements: 1,200 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(12) Two-person work tables
(24) Student chairs/stools
(1) Teacher station & chair
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (support)

Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
20' of sink base cabinets w/1 sink	123550
20' of wall cabinets	123550
10' of reception counter	123550
Pencil sharpener support (support)	062000
Windows with integral blinds	085113
(1) Paper towel dispenser	102813
Projection screen, 6'x8'	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
Safety shower/eyewash	224500
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
20 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123 1
data port near teacher workstation	271513
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Wireless access point (WAP) as determined by Design – refer to Note 2	***272133***
Classroom technology center video port	***271543, 274116, 274119, 275127***

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***

Program Type: 4

Size Requirements: 200 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(1) stool per room
(1) wastebasket per room

ENVIRONMENTAL CONSIDERATIONS:
- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
4' of base cabinets w/1 sink per room	123550
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles per room	262726
Double duplex receptacle adjacent to each data port	262726
Communications:	
1 data port per room	271513
1 clock per room	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

PROGRAM DESCRIPTION:
Specialized classroom and practical experiences concerned with the preparation of paid, full-time firefighters.

Program Type: 4

Size Requirements: 1,500 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref.#
Flooring:	
Carpet	096816
Option: ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(24) Student chairs/stools

(2) Trash basket

(12) Two person work tables

(1) Teacher station & chair

Electronic Safety and Security:

Life safety devices per code 283111

Miscellaneous:

Pencil sharpener (optional)

Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
32’ of marker board, tack board, or tackable wall surface	101100
30’ of sink base cabinets w/1 sink	123550
30’ of wall cabinets	123550
Pencil sharpener support (optional)	062000
Paper towel dispenser	102813
Windows with integral blinds	085113
Projection screen, 6’x8’	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Illumination level: See Table 8600-5	
Fluorescent lighting	265100
Multilevel switching	262726
20 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
1 projector video port	271543
Communications:	
Wireless access point cable above ceiling	
1 voice port and phone	271513/275123
Central sound system	275123
Sound reinforcement system	275123
Wireless access point (WAP) as determined by Design – refer to Note 2	272133
Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

Program Type: 4

Size Requirements: 800 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500
Option: Sealed concrete	096516 033000
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
N/A

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 48
- Ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to data port	262726
Communications:	
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

***B0* / 34.0015 MEDIA ARTS**
CT-P4-1

PROGRAM DESCRIPTION:
Programs that focus on the use of still and motion photography in journalism. Communications, business principles, and leadership skill development related to the industry are essential to the program. Specialization areas include journalism, photography, and digital media.

Program Type: 4

Size Requirements: 1,500 SF Lab

Studio Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sheet vinyl or linoleum	096516 096500
Base:	
Resilient	096500
Ceiling:	
Pipe grid – 14' to bottom	116135
Walls:	
Painted concrete masonry units	042000/ 099100
Acoustical wall treatment	098000
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Duplex receptacle with dedicated circuit for wireless devices	

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Overhead metal pipe grid (48" o.c., both ways) to support studio lights & accessories	055000
Cyclorama curtain & track, min. of 2 walls	116143
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Track lighting	265100
Multilevel switching	262726
20 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Emergency lighting	265100
Communications:	
1 ***projector*** video port	271543
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Cable management system	
Special A/V Cabling Conveyance	
Special A/V Cabling	
Wireless access point (WAP) as determined by Design – refer to Note 2	***272133***
Classroom technology center video port	***271543, 274116, 274119, 275127***

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***

Program Type: 4

Size Requirements: 450 SF

FINISHES[1]:	Spec. Ref.#
Flooring:	
Linoleum, ET, or sheet vinyl	096516 096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical (9'-0" high)	095113
Walls:	
Painted gypsum wallboard	092116/099100
Acoustical wall treatment	098000

LOOSE FURNISHINGS:
(6) Chairs
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Duplex receptacle with dedicated circuit for wireless devices

FEATURES:	Spec. Ref.#
Fixed Items:	
10'-20' of equipment/work surface	123550
6'-8' of tack board or marker board	101100
Window	085113
8' of base cabinet	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting: overhead	265100
Illumination level: See Table 8600-5	
Dimmable task lighting on work surface	265100
Single level switching	262726
8 duplex receptacles	262726
Provisions for hard-wired equipment	260519/260533
Studio dimming system control panel	265561
Telecommunications Grounding	270526/260526
Communications:	
1 voice port and phone	271513/273123
2 projector video ports	271543
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Specialized A/V equipment	
Wireless access point (WAP) as determined by Design – refer to Note 2	272133
Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements

***B0* / 34.0015 MEDIA ARTS**
Vestibule

Program Type: 4

Size Requirements: 84 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical (9'-0" high)	095113
Walls:	
Painted concrete masonry units	042000/ 099100
Acoustical wall treatment	098000

ENVIRONMENTAL CONSIDERATIONS:

- Wall only minimum STC 45
- Ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Doors to receive light-tight perimeter seal	
4' of tack board	101100
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-4	
Single level switching	262726
1 duplex receptacle	262726
Warning light to control room	265100
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

PROGRAM DESCRIPTION:
A combination of subject matter and experiences designed to train a person to prepare, assemble and/or fit corrective lenses prescribed by a physician or optometrist. These occupations may include optical surfacing, optical finishing, optical stylist, and/or optical dispensing.

Program Type: 4

Size Requirements: 1,200 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(6) 4-person epoxy-top student tables with electric & natural gas
(24) Student chairs/stools
(1) Teacher station & chair
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
30' of sink base cabinets w/2 sinks	123550
30' of wall cabinets	123550
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
(2) Paper towel dispensers	102813
Projection screen, 6'x8'	115213
Fume hood	115313
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
12 Compressed air connections	221500
Safety shower/eyewash	224000
Master gas shut-off valve	226313
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Fume hood exhaust	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
220V service	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123
1 data port near teacher workstation	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Ultra-short throw interactive projector	274119
Wireless access point (WAP) as determined by Design – refer to Note 2	***272133***
Classroom technology center video port	***271543, 274116, 274119, 275127***

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

JE / 07.0603 OPTOMETRIC OCCUPATIONS

Exam Room

Program Type: 4

Size Requirements: 100 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

2 stools

ENVIRONMENTAL CONSIDERATIONS:

- Wall minimum STC 48
- Ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
4’ of base cabinets	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to data port	262726
Communications:	
1 data port	271513
1 voice port and phone	271513/273123
1 clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

PROGRAM DESCRIPTION:
Subject matter and laboratory experiences to provide students with the knowledge and skills in the care of patients of all ages under the direction and supervision of a registered nurse or licensed practical nurse and for advance nursing skills.

Program Type: 4

Size Requirements: 1,500 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(12) Two-person work tables
(24) Student chairs/stools
(1) Teacher station & chair
Wastebasket

Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
Pencil sharpener (optional)

Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
16’ of marker board, tack board, or tackable wall surface	101100
30’ of sink base cabinets w/2 sinks	123550
30’ of wall cabinets	123550
10’ of reception counter	123550
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
(2) Paper towel dispensers	102813
Projection screen, 6’x8’	115213
100’ of cubicle track and curtains	102123
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
20 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port, monitor, and brackets	271543/274119
1 voice port and phone	271513/273123
1 data port near teacher workstation	271513
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Ultra-short throw interactive projector	274119
Wireless access point (WAP) as determined by Design – refer to Note 2	***272133***
Classroom technology center video port	***271543, 274116, 274119, 275127***

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***

JF / 07.0994 PATIENT CARE TECHNICIAN
Training Restroom

Program Type: 4

Size Requirements: 120 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Rubber, linoleum, ET, or	096500
sheet vinyl	096515
Option: ceramic mosaic tile, porcelain tile base, or resinous flooring	093000 096723
Base:	
Resilient	096500
Option: ceramic mosaic tile base, porcelain tile base, or resinous flooring	093000 096723
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

Wastebasket

ENVIRONMENTAL CONSIDERATIONS:

- Wall minimum STC 48
- Ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
3’ vanity with sink	123550
Paper towel dispenser	102813
Soap dispenser	102813
36” and 42” grab bars	102813
16”x24” mirror	102813
Toilet paper holder	102813
Bathtub grab bars	102813
Bath curtain rod	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Tank-type toilet	224000
Residential bathtub	224000
Plumbing connections	221116/221119/224000
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
2 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

Program Type: 4

Size Requirements: 120 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

Clothes washer
Electric clothes dryer
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:

- Wall minimum STC 45
- Ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
6’ of base cabinets	123550
6’ of adjustable shelving	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
Washer/dryer connections	224000
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Dryer vent system	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

***B1* / 34.0020 PERFORMING ARTS**
CT-P4-1

PROGRAM DESCRIPTION:
Programs that focus on the creation, interpretation, and performance of works that use auditory, kinesthetic, and visual phenomena to express ideas and emotions in various forms. Communications, business principles, and leadership skill development related to the industry are essential to the program. Specialization areas includes music, dance, and theater.

Program Type: 4

Size Requirements:
1,500 SF Dance/Music Room

FINISHES:	Spec. Ref #
Flooring:	
Hardwood	096000
Base:	
Resilient	096500
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100
Acoustical wall treatment	098000

LOOSE FURNISHINGS:
(25) Student stools/chairs

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
8’ of tack board	101100
16’ length of 60” high mirrors	088300
16’ of ballet bars	116615
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Drinking water cooler	224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Track lighting	265100
Multilevel switching	262726
10 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port	271543
1 voice port and phone	271513/273123
Clock	275313
Central sound system	275123
Sound reinforcement system	275125
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

Program Type: 4

Size Requirements: 150 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Optional: carpet	096816
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical Absorptive 25%, reflective 25%, diffusive 50%	095113
Walls:	
Painted concrete masonry units	042000/ 099100
Acoustical wall treatment (varies with geometry of room)	098000

LOOSE FURNISHINGS:
L1 Music Stands
L2 Music chairs

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
1 voice port and phone	271513/273123
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Interior window	081113/088000

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

***JK* / 07.0305 SURGICAL TECHNOLOGY**
CT-P4-1

PROGRAM DESCRIPTION:
A combination of subject matter and experiences designed to prepare a person to serve as a general assistant on the surgical team in the operating unit.

Program Type: 4

Size Requirements: 1,000 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(12) Two-person work tables
(24) Student chairs/stools
(1) Teacher station & chair
Wastebasket

Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:

Pencil sharpener (optional)

Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' marker board, tack board, or tackable wall surface	101100
20' of sink base cabinets w/1 sink	123550
20' of wall cabinets	123550
Pencil sharpener support (optional)	062000
Windows with integral blinds	085113
Paper towel dispenser	102813
Projection screen, 6'x8'	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
10 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123 1
data port near teacher workstation	271513
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
Wireless access point (WAP) as determined by Design – refer to Note 2	***272133***
Classroom technology center video port	***271543, 274116, 274119, 275127***

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

Program Type: 4

Size Requirements: 800 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:

- Wall minimum STC 48
- Ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
4' of base cabinets w/1 sink	123550
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to data port	262726
Communications:	
1 data port per room	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

Program Type: 4

Size Requirements: 700 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 45
- Ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
20’ of base cabinets w/1 sink	123550
10’ of wall cabinets	123550
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
6 duplex receptacles	262726
Double duplex receptacle adjacent to data port	262726
Communications:	
1 data port per room	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

Program Type: 4

Size Requirements: 500 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sheet vinyl or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 45
- Ceiling minimum CAC 35, NRC 0.70

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
12' of base and wall cabinets	123550
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
2 scrub sinks	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
6 duplex receptacles	262726
Communications:	
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

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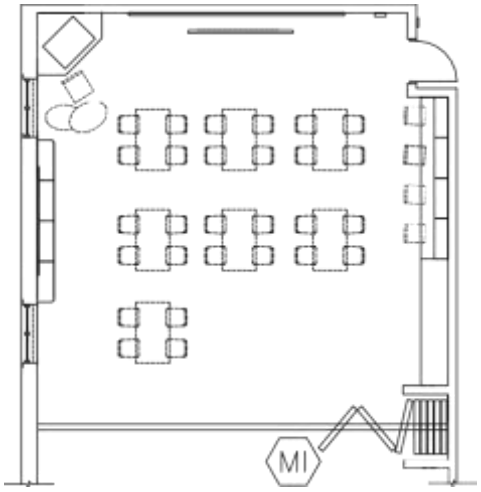
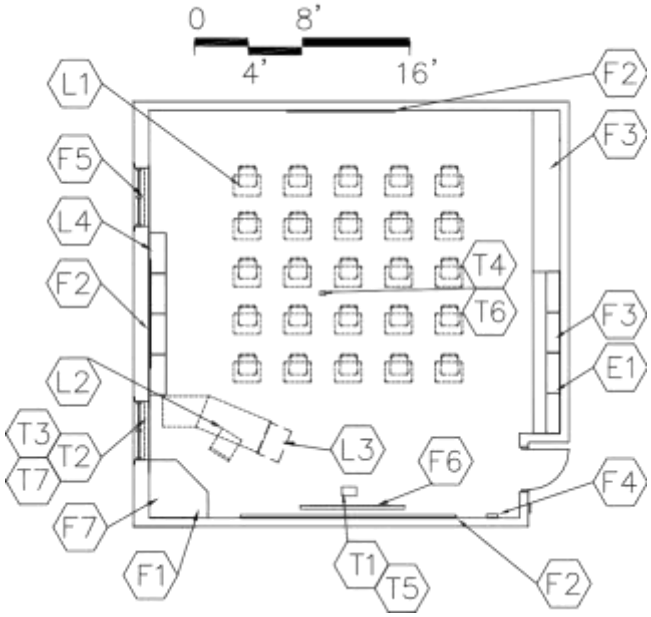


CLASSROOM WITH OPTIONAL FOLDING WALL



TYPICAL CLASSROOM

CAPACITY: 25 students
SIZE: 900 SF

PROGRAM ACTIVITIES:

- Large group, small group, and individual instruction
- Group and individual work
- Demonstrations
- Accommodates any of the core academic disciplines

SPATIAL RELATIONSHIPS:

- ☐ Near other related lab
- ☐ Near teacher prep area/workroom
- ☐ Classrooms should be located in academic "zone" that is away from noisy or public activities
- ☐ Classrooms with access to media center and administrative services
- ☐ Flexibility of space
- ☐ Proximity to main corridor to accommodate other students without interrupting lab

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be placed in this classroom or could be placed in a teacher prep area/workroom.

RELATED CLASSROOM
CT-P4-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or carpet tile	096816
Optional: linoleum, ET,	096516
or sheet vinyl	096500
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:

L1 Student desks and chairs
L2 Teacher desk or workstation/computer support and chair
L3 File cabinet
L4 9' of low bookcases (fixed or mobile)
Wastebasket

Miscellaneous:
Pencil sharpener ***(optional)***

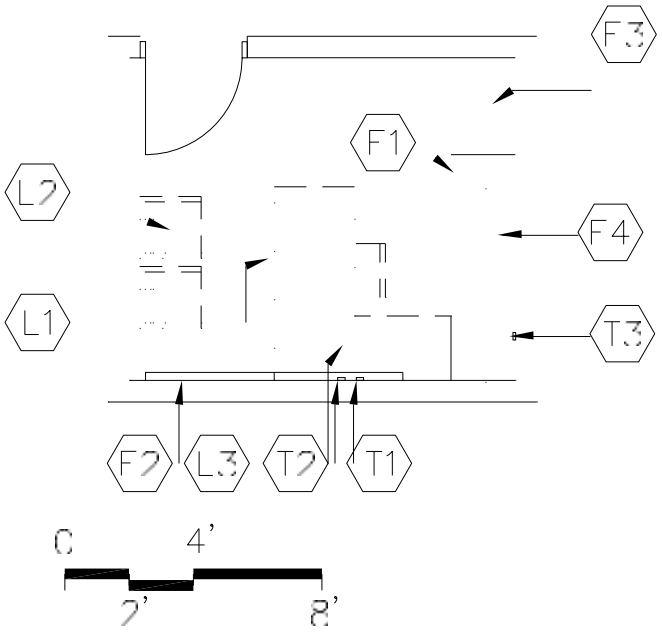
M1 Operable partitions between classrooms are optional 02226

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123550
F2 20'-32' combination marker board, tack board and tackable wall surface	101100
F3 18'-24' combination base and wall cabinets	123550
F4 Pencil sharpener support (optional)	062000
F5 Windows with integral blinds	085113
F6 Projection screen (optional)	115213
F7 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 ***Wireless access point cable above ceiling***	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 ***Ultra-short throw interactive*** projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	***272133***
T7 Classroom technology center video port	***271543, 274116, 274119, 275127***
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Where appropriate, some casework may be mobile to add flexibility and become part of the loose furnishings.
4. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***



PROGRAM ACTIVITIES:

- Private space for program instructor
- One-on-one conferences with academic instructors, students, etc.

SPATIAL RELATIONSHIPS:

- Near related lab
- Direct access to school circulation areas

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: 1 - 3 persons
SIZE: 120 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

OFFICE
CT-P4-3

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or carpet tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

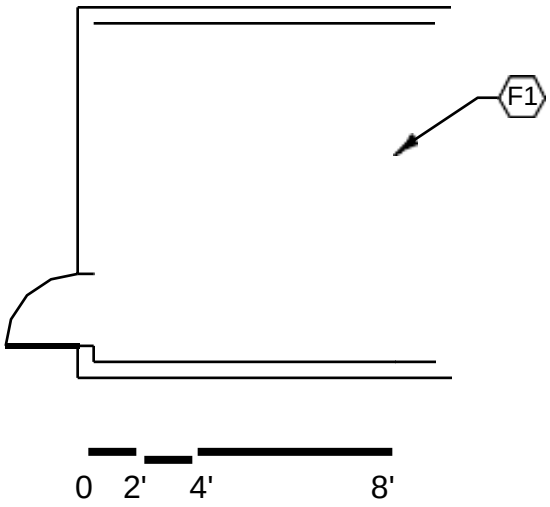
LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets above work surface	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.

STORAGE AREA
CT-P4-4



PROGRAM ACTIVITIES:
- Space for storage of lab equipment

SPATIAL RELATIONSHIPS:
- Near related lab

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	200 SF

NOTES:

STORAGE AREA
CT-P4-4

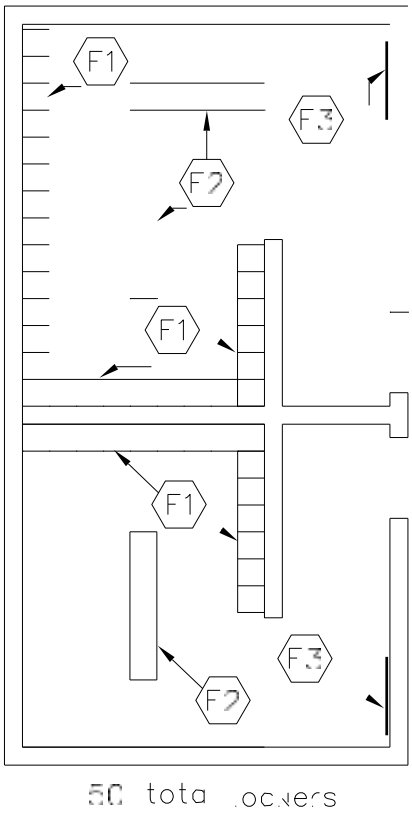
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
Resilient base	096500
Ceiling:	
Exposed structure	---
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items[1]:	
F1 8'-20' of open shelving	
Depth may vary (fixed or loose)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:

- Personal and health needs for the program Specific users.
- Changing of clothes and/or uniforms.
- Storage of personal items while students are in lab.

SPATIAL RELATIONSHIPS:

- Adjacent to related lab

ENVIRONMENTAL CONSIDERATIONS:

- Sanitary and durable finishes.
- Environmental sound control
  Wall minimum STC 40
  Ceiling minimum CAC 35, NRC 0.70

CAPACITY:	N/A
SIZE:	450 SF

NOTES:

1. Large and small changing areas are interchangeable for either males or females. Determination based on male/female ratio within each program.

CHANGING ROOM
CT-P4-5

FINISHES[1]:	Spec. Ref.#
Flooring:	
Polished concrete finishing, or	033510
colored concrete finishing	033519
Optional: linoleum or rubber	096500 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical with high impact hold down clips	095113
Walls:	
Painted concrete masonry units	042000 / 099100
LOOSE FURNISHINGS	
Wastebaskets	

FEATURES[1]:	Spec. Ref.#
Fixed Items[1]:	
F1 Student lockers	105113
F2 Locker benches	062000
F3 24" x 60" mirror	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/Return air system	Div. 23
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Individual temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
2 Duplex receptacles	262726
Means of egress lighting per code	265100
Communications:	
Clock	275313
Central Sound System	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

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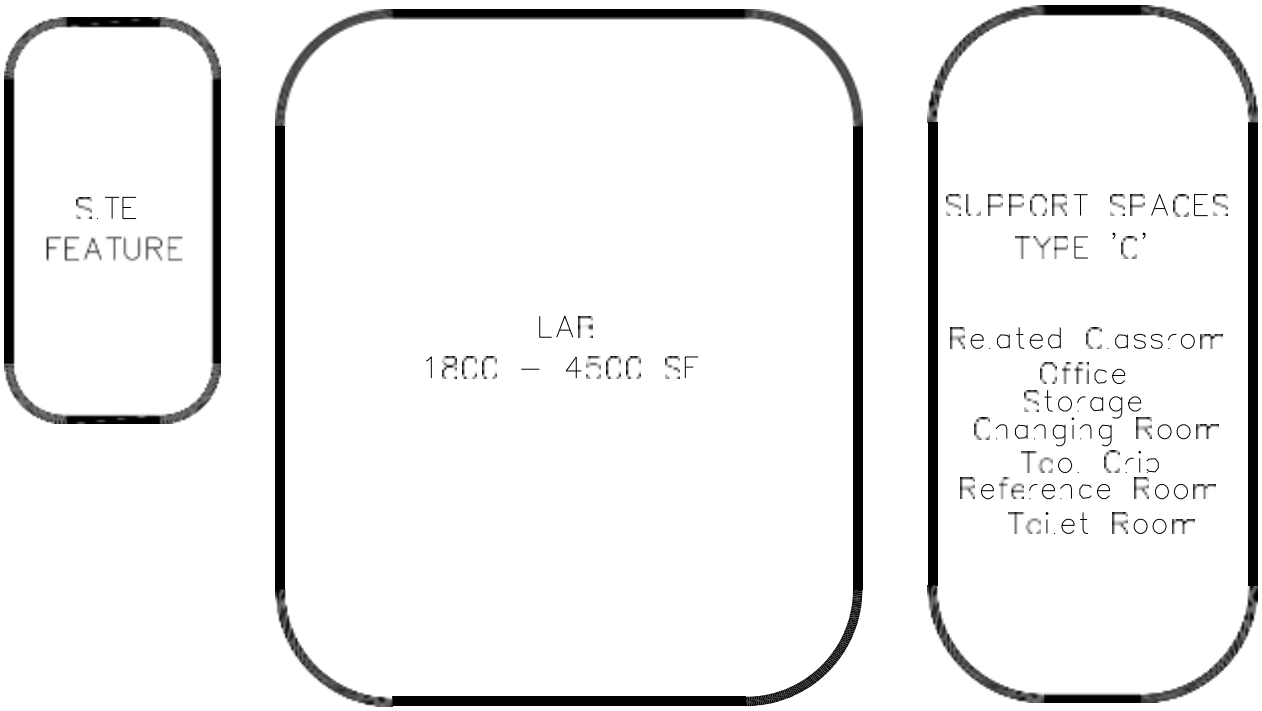
Program Type 5

Description: Medium to large sized lab space with enhanced support space.
Lab space to be "high-bay" (18' min. clearance) with exposed building structure.
Lab to utilize standard construction with the following exception – lab floor slab to be 8" thick.
Support space to be finished with sealed concrete or vinyl composition tile, paint, and suspended acoustical ceiling. Lab may have possible site feature.
Related classroom office, changing room, reference room, and toilet room may be air-conditioned. The high bay labs have no air conditioning unless noted otherwise.
Where necessary, include emergency shut-off switch for equipment.



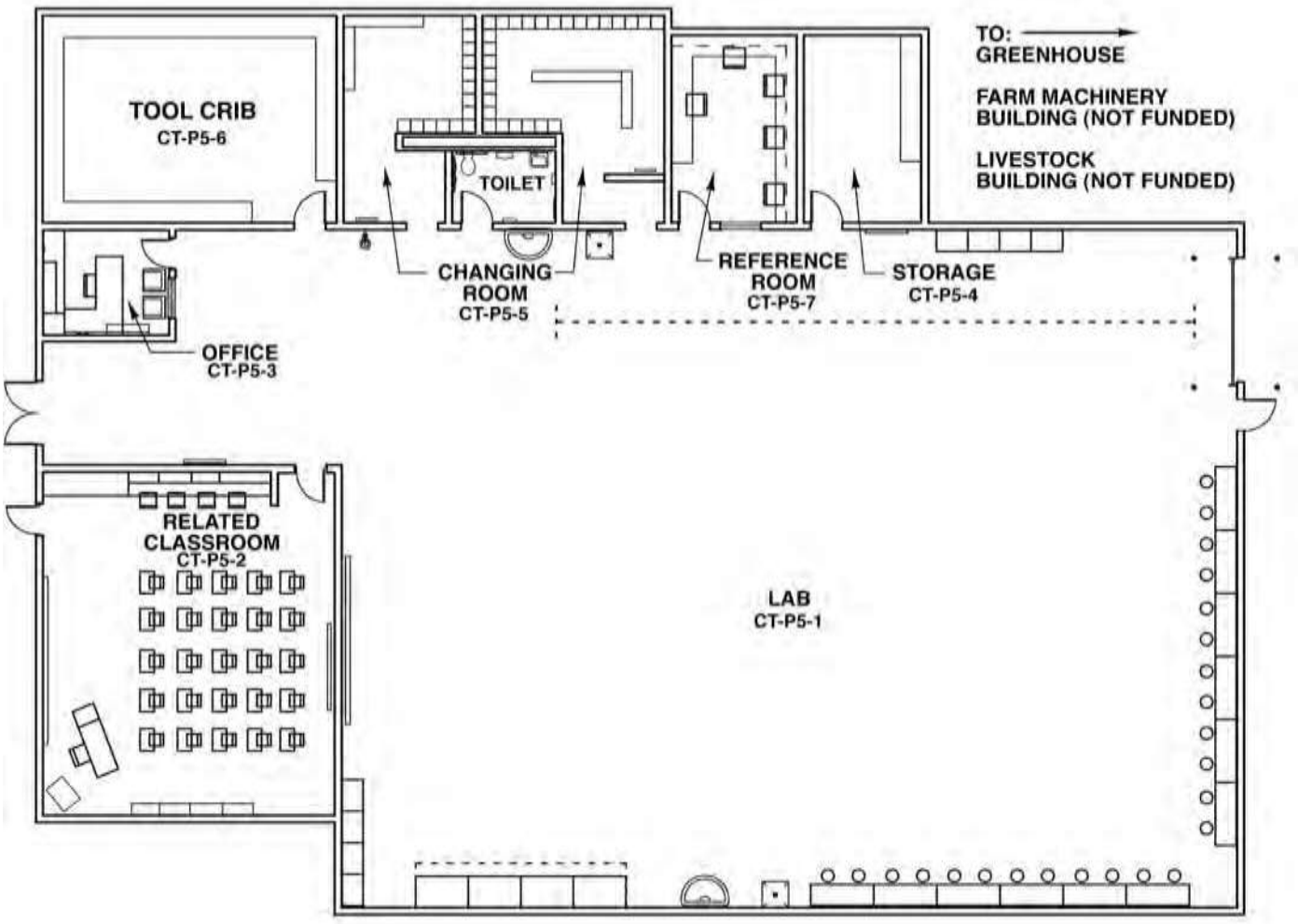
NOTES:

This is an example of how the Program Type 5 spaces in a career-technical school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Program Type 5 space plates:

CT-P5-1	Lab
CT-P5-2	Related Classroom
CT-P5-3	Office
CT-P5-4	Storage
CT-P5-5	Changing Room
CT-P5-6	Tool Crib
CT-P5-7	Reference Room
CT-P5-8	Toilet Room

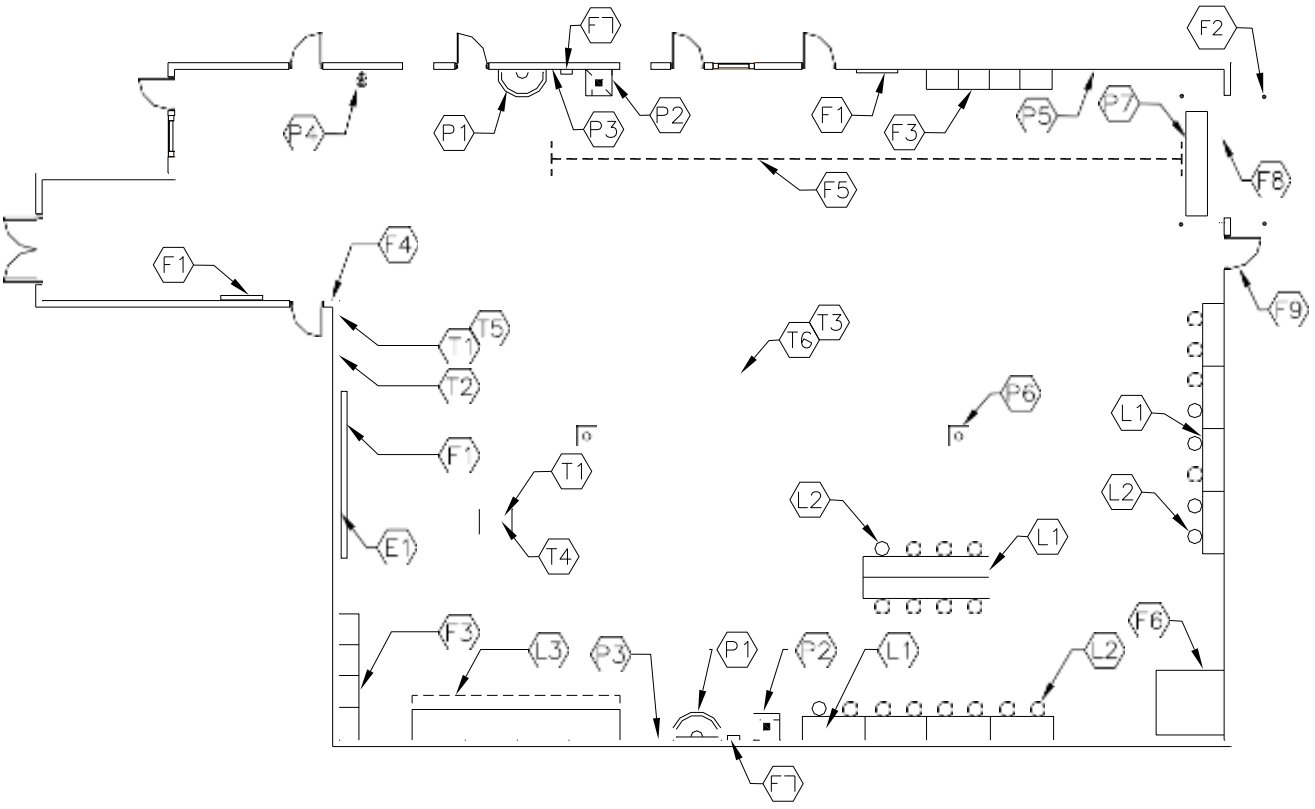
PROGRAM TYPE 5
EXAMPLE



Program Type 5
This is an example to show the possible relationships of spaces for this program type.

NOTES:

1. See lab descriptions within this section for specific lab requirements.
2. See individual space plates at the end of this section for specific requirements.



CAPACITY: 24 Students SIZE: 1,800 – 4,500 SF (see lab summaries for exact sizes) ANCILLARY SPACES: CT-P5-2 thru CT-P5-8	

NOTES:
1. Loose furnishings shown represent one of many possible arrangements.
2. Graphic plate is an example only. Other labs within this program are not drawn – refer to lab summaries within this program type for information on a particular lab.

PROGRAM ACTIVITIES:
- Large and small group instruction
- Group and individual work
- Demonstrations

SPATIAL RELATIONSHIPS:
- Near other related labs
- Adjacent to typical support spaces
- Proximity to large group restrooms
- Located away from noisy or public activities
- Proximity to core academic area and common use areas
- Flexibility of space

ENVIRONMENTAL CONSIDERATIONS:
- ***Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.***
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall ***only*** minimum STC ***45***
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Loose Furnishings: Refer to Lab Profiles within this section.
3. Loose Furnishings, fixed equipment, utility locations, and general footprint of room shown represent one of many possible arrangements.

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A0 / 01.0301 *AGRIBUSINESS AND PRODUCTION*
CT-P5-1

PROGRAM DESCRIPTION:
Applies principles of economics, business management and marketing in both an entrepreneur/manager and an employee role to the leadership, planning, development, and analyzing of business enterprises related to agriculture, food, and natural resources.

Program Type: 5
Size Requirements: 4,500 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
L1 (12) Workbenches with heavy-duty metal tops
L2 (24) Stools or chairs
L3 (4) Welding tables
Wastebasket

SITE FEATURES:
Greenhouse - 1000 SF 133413
- Concrete flooring (with drains)
- Minimum of one 8'x10' overhead door
- Provide electrical, plumbing, and heating/ ventilation systems as per greenhouse manufacturer's recommendations
- Minimum of 2 hose bibs
- Fire suppression system if required

Plan for the following if required by school curriculum requirements:
- Farm machinery building
- Livestock building
- Overhead chain hoist

Miscellaneous: Pencil sharpener (optional)

Electronic Safety and Security:
Life safety devices per code 283111

E1 Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):

T6 Wireless access point (WAP) as determined by Design – refer to Note 2 272133

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 24' of marker board, tack board, or tackable wall surface	101100
F2 Steel bollards at overhead door, both sides cabinets	055000
F3 24' of tall storage	123550
F4 Pencil sharpener support (optional)	062000
F5 Overhead chain hoist	412223
F7 (4) Paper towel dispensers	102813
F8 12'x14' motorized overhead sectional door to exterior	083613
F9 3'x7' hollow metal service door to exterior	081113
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
P1 2 washfountains (minimum)	224000
P2 2 utility sinks (minimum)	224000
P3 2 hose bibbs (minimum)	224000
P4 Safety shower/eyewash	224500
P5 6 compressed air connections	221513
P6 2 floor drains	224000
P7 1 trench drain	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Welding hood exhaust	Div. 23
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
(6) 220 volt receptacles	262726
Communications:	
T1 1 projector video port and video display device	271543/274119
T2 1 voice port and phone	271513/273123
T3 Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123

T5 Classroom technology center video port 271543, 274116, 274119, 275127

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

PROGRAM DESCRIPTION:
Specialized learning experiences that involve more intensive training in a single automotive system. Examples may include Automotive Detailing, Custom Car Prep, High Performance, Alternative Fuel, Engine Repair, and Transmission Service.

Program Type: 5

Size Requirements: 3,500 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(8) Workbenches with heavy-duty metal tops
(24) Stools or chairs
Wastebasket

The following items to be funded by the School District:

Car lifts

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous: Pencil sharpener (optional)

Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):
Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(4) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
2 washfountains (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
2 floor drains	224000
1 trench drain	224000
6 compressed air connections	221513
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Vehicle exhaust system	Div. 23
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
(6) 220 volt receptacles	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Wireless access point (WAP) as determined by Design – refer to Note 2	***272133***

NOTES:

1 Finishes/Features: Refer to Chapter 9 for specification references

2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

D0 / 17.1004 BRICK, BLOCK, and CEMENT MASONRY

CT-P5-1

PROGRAM DESCRIPTION:

Specialized classroom and laboratory experiences concerned with the cutting, chipping, and fixing in position of brick and concrete block. Included is instruction in the care and use of tools, equipment, and materials for the preparation and performance of masonry construction; the selection and preparation of materials used in the laying of brick and block; and training in blueprint reading, record keeping, estimating, and safety.

Program Type: 5

Size Requirements: 3,500 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(12) Workbenches with heavy-duty metal tops

(24) Stools or chairs

Wastebasket

Electronic Safety and Security:

Life safety devices per code 283111

Miscellaneous:

Pencil sharpener (optional)

Duplex receptacle with dedicated circuit for wireless devices

Communications(cont'd):

Wireless access point (WAP) as determined by Design – refer to Note 2 272133

Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(4) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
2 washfountains (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
2 floor drains	224000
1 trench drain	224000
4 compressed air connections	221500
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to	262726
(2) 220 volt receptacles	262726
Room safety push button	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

PROGRAM DESCRIPTION:
Organized learning experiences in the classroom and laboratory concerned with the skills necessary to keep the physical structure of an office building, factory, apartment building, house, or similar structure in good repair. Included is instruction in carpentry; roofing application and repair; ceramic tile and masonry application and repair; electrical installation and repair; painting and wallpapering; and plumbing.

Program Type: 5
Size Requirements: 3,000 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(12) Workbenches with heavy-duty metal tops
(24) Stools or chairs
(2) Welding tables
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)
Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):
Wireless access point cable above ceiling 271513
Clock 275313
Central sound system 275123
Wireless access point (WAP) as determined by Design – refer to Note 2 ***272133***
Classroom technology center video port ***271543, 274116, 274119, 275127***

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(3) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
1 washfountain (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
2 floor drains	224000
1 trench drain	224000
6 compressed air connections	221500
2 natural gas connections	226313
Master gas shut-off valve	226313
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Welding hood and exhaust	Div. 23
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
(2) 220 volt receptacles	262726
(2) 277 volt receptacles	262726
(2) 408 volt receptacles	262726
Room safety push-button	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

***D6* / 17.1100 CUSTODIAL SERVICES**

CT-P5-1

PROGRAM DESCRIPTION:

Utilizes industry standards and a math, science, ELA, and technology framework to introduce concepts of layout, assembly, installation, testing, and maintenance of electrical fixtures and apparatus, and the wiring used in electrical systems.

Program Type: 5

Size Requirements: 2,500 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(12) Workbenches with heavy-duty metal tops
(24) Stools or chairs
Wastebasket

Electronic Safety and Security:

Life safety devices per code 283111

Miscellaneous:

Pencil sharpener (optional)

Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(3) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
1 washfountain (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
2 floor drains	224000
1 trench drain	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
(6) 220 volt receptacles	262726
Communications:	
1 ***projector*** video port	271543
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Wireless access point (WAP) as determined by Design – refer to Note 2	***272133***
Classroom technology center video port	***271543, 274116, 274119, 275127***

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***

PROGRAM DESCRIPTION:

Specialized classroom and laboratory experiences concerned with the layout, assembly, installation, testing, and maintenance of electrical fixtures and apparatus, and the wiring used in electrical systems. Instruction is provided in worksite safety; electrical principles; the application of codes and standards; residential, commercial, and industrial installations including motors and specialized systems; and the reading, interpretation, and application of blueprints and wiring diagrams. A one year program option is available with an exit in residential wiring, or with an exit in commercial/industrial wiring upon the recommendation of the local advisory committee and the approval of the local board of education.

Program Type: 5

Size Requirements: 3,000 SF Lab

Lab Requirements:	Spec. Ref #
FINISHES:	
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100
LOOSE FURNISHINGS:	
(12) Workbenches with heavy-duty non-conductive tops	
(24) Stools or chairs	
Wastebasket	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
Duplex receptacle with dedicated circuit for wireless devices	
Communications(cont'd):	
Clock	275313
Central sound system	275123
Wireless access point (WAP) as determined by Design – refer to Note 2	***272133***
Classroom technology center video port	***271543, 274116, 274119, 275127***

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(3) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
1 washfountain (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
2 floor drains	224000
1 trench drain	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
208v 3-phase service	262726
480v 3-phase service	262726
100 amp 208v 3-phase bus duct	262726
100 amp 480v 3-phase bus duct	262726
Fiber optic service	262726
Cat 5 service	262726
Room safety push-button	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

D8* / 17.0100 *ENVIRONMENTAL CONTROL TECHNOLOGIES

CT-P5-1

PROGRAM DESCRIPTION:

Classroom and laboratory experiences that enable the student to become proficient in the installation, repair, and maintenance of residential, commercial, and industrial air-conditioning systems. Included is instruction related to electrical principles; electric motors; controls; refrigeration, heating and air-conditioning principles and practices; and piping systems.

Program Type: 5

Size Requirements: 3,000 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(8) Workbenches with heavy-duty metal tops
(24) Stools or chairs
(4) Welding tables
Wastebasket

Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Pencil sharpener (optional)	
Duplex receptacle with dedicated circuit for wireless devices	
Communications (cont'd):	
Wireless access point (WAP) as determined by Design – refer to Note 2	272133
Classroom technology center video port	271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(3) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
1 washfountain (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
2 floor drains	224000
1 trench drain	224000
6 natural gas connections	226313
Master gas shut-off valve	226313
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Welding hood and exhaust	Div. 23
Electrical:	
High intensity lighting or fluorescent lighting Illumination level: See Table 8600-5	265100
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
(2) 220 volt receptacles	262726
(2) 227 volt receptacles	262726
(2) 408 volt receptacles	262726
Communications:	
1 projector video port	271543
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

PROGRAM DESCRIPTION:

Classroom and practical work experiences concerned with the operation, maintenance, and repair of heavy-duty construction equipment, such as bulldozers, backhoes, cranes, graders, tractors, concrete mixers, crawler-mounted shovels, trailer-mounted compressors, and the gasoline or diesel engines powering the equipment.

Program Type: 5
Size Requirements: 4,500 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(8) Workbenches with heavy-duty metal tops
(24) Stools or chairs
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)
Duplex receptacle with dedicated circuit for wireless device

Communications (cont'd):
Wireless access point (WAP) as determined by Design – refer to Note 2 272133
Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(3) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
1 washfountain (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
2 floor drains	224000
1 trench drain	224000
6 compressed air connections	221500
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
(2) 220 volt receptacles	262726
Communications:	
1 projector video port	271543
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

R2 / 17.1012 INTEGRATED SYSTEMS TECHNOLOGY
CT-P5-1

PROGRAM DESCRIPTION:

Organized learning experiences in the classroom and shop concerned with the maintenance of machinery and mechanical equipment of an industrial plant or factory. Inspection, disassembly, repair, and reassembly of machines and equipment is included in the training experience. Skill training in the use of tools in several trades is also included.

Program Type: 5
Size Requirements: 3,500 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(12) Workbenches with heavy-duty metal tops
(24) Stools or chairs
(4) Welding tables
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):
Central sound system 275123
Wireless access point (WAP) as determined by Design – refer to Note 2 272133

Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of chalk/marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(4) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
both sides	055000
Steel bollards at overhead door,	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
2 washfountains (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
2 floor drains	224000
1 trench drain	224000
6 compressed air connections	221500
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Welding hood and exhaust	Div. 23
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
(4) 220 volt receptacles	262726
208v 3-phase service	262726
480v 3-phase service	262726
Room safety push-button	262726
Communications:	
1 ***projector*** video port	271543
1 voice port and phone	271513/273123

Wireless access point cable above ceiling 271513
Clock 275313

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

2. This lab may be air-conditioned.

3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

PROGRAM DESCRIPTION:

Utilizes industry standards and a math, science, ELA, and technology framework to introduce concepts of the interior construction industry; including painting, wallpapering, flooring, tiling, drywall, trim, lighting, and more.

Program Type: 5
Size Requirements: 3,000 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(12) Workbenches with heavy-duty metal tops
(24) Stools or chairs
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111
Miscellaneous:
Pencil sharpener (optional)
Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):
Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of chalk/marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(4) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
2 washfountains (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
2 floor drains	224000
1 trench drain	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
High intensity lighting or fluorescent lighting Illumination level: See Table 8600-5	265100
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 projector video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Wireless access point (WAP) as determined by Design – refer to Note 2	272133

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

R3 / 17.1300 MANUFACTURING DESIGN AND DEVELOPMENT

CT-P5-1

PROGRAM DESCRIPTION:

Mfg Design & Development: Utilizing business and industry, math, English, science, and technology standards, introduces concepts of Design and Development Technologies: Design Process, Teamwork and Project Management, Marketing, Technical Applications, Modeling, Materials and Quality Assurance.

Program Type: 5
Size Requirements: 4,500 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(12) Workbenches with heavy-duty metal tops
(24) Stools or chairs

Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):
Central sound system 275123
Wireless access point (WAP) as determined by Design – refer to Note 2 272133
Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(3) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
1 washfountain (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
2 floor drains	224000
1 trench drain	224000
6 compressed air connections	221500
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
(4) 220 volt receptacles	262726
208v 3-phase service	262726
480v 3-phase service	262726
Room safety push-button	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

PROGRAM DESCRIPTION:

Applies science to management and protection of renewable and non-renewable resources; includes fundamentals of land use, watersheds, wildlife, fisheries and forestry. Communications, business principles and leadership skill development are essential to the program.

Program Type: 5

Size Requirements: 3,000 SF Lab

Lab Requirements:	Spec.
FINISHES:	Ref #
Flooring: Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(12) Workbenches with heavy-duty metal tops
(24) Stools or chairs
(2) Welding tables
Wastebasket

Miscellaneous:

Pencil sharpener (optional)

SITE FEATURES:

Greenhouse – 1,000 SF 133413

- ½ earth flooring, ½ concrete flooring (with floor drains)
- Minimum of one 8'x10' overhead door
- Provide electrical, plumbing, and heating/ventilation systems as per greenhouse manufacturer's recommendations.
- Minimum of 4 hose bibbs
- Fire suppression system if required

Electronic Safety and Security:

Life safety devices per code 283111

Communications (cont'd):

Duplex receptacle with dedicated circuit for wireless devices
Wireless access point (WAP) as determined by Design – refer to Note 2 272133
Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(3) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
1 washfountain (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
2 floor drains	224000
1 trench drain	224000
6 compressed air connections	221500
4 natural gas connections	226313
Master gas shut-off valve	226313
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Welding hood and exhaust	Div. 23
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
(4) 220 volt receptacles	262726
Communications:	
1 ***projector*** video port and video display Device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133***

requirements.

***DB* / 17.1007 PLUMBING AND PIPEFITTING**

CT-P5-1

PROGRAM DESCRIPTION:

Specialized classroom and laboratory experiences concerned with layout, assembly, installation, alteration, and repair of piping systems and related fixtures and fittings. Included is instruction in the use of pipe-cutting, bending, grooving, and threading tools; the maintenance and use of welding, soldering, and brazing equipment; the care and safe use of hand and power tools and equipment; and the reading, interpretation, and application of blueprints and piping diagrams.

Program Type: 5
Size Requirements: 3,000 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(12) Workbenches with heavy-duty metal tops
(24) Stools or chairs
(4) Welding tables
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)
Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):
Wireless access point cable above ceiling 271513
Clock 275313
Central sound system 275123
Wireless access point (WAP) as determined by Design – refer to Note 2 ***272133***
Classroom technology center video port ***271543, 274116, 274119, 275127***

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(3) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
1 washfountain (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
2 floor drains	224000
1 trench drain	224000
6 compressed air connections	221500
6 natural gas connections	226313
Master gas shut-off valve	226313
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Welding hood and exhaust	Div. 23
Individual exhaust system for each gas-fired piece of equipment	Div. 23
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
(6) 220 volt receptacles	262726
Room safety push-button	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.

PROGRAM DESCRIPTION:

Training in this program focuses on 2 and 4 cycle gasoline powered engines and their use in outdoor power and recreational equipment. This includes the basic service and preventative maintenance of equipment.

Program Type: 5

Size Requirements: 3,500 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(12) Workbenches with heavy-duty metal tops
(24) Stools or chairs
(2) Welding tables
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)
Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):
Wireless access point (WAP) as determined by Design – refer to Note 2 272133
Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(4) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
2 washfountains (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
4 floor drains	224000
1 trench drain	224000
6 compressed air connections	221500
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Welding hood and exhaust	Div. 23
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
(6) 220 volt receptacles	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.

***F4* / 17.1402 POWER TRANSMISSION**
CT-P5-1

PROGRAM DESCRIPTION:
Specialized classroom and laboratory experiences concerned with erecting and maintaining power lines and circuits for transmission and distribution of electrical power, and assembling and erecting related equipment and structures.

Program Type: 5

Size Requirements: 3,500 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(12) Workbenches with heavy-duty metal tops
(24) Stools or chairs
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)
Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):
Wireless access point (WAP) as determined by Design – refer to Note 2 272133
Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(4) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Provide (6) holes in floor to accommodate utility poles. Provide removable metal covers when not in use.	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
1 washfountain (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
2 floor drains	224000
1 trench drain	224000
6 compressed air connections	221500
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

PROGRAM DESCRIPTION:

Utilizing business and industry, math, science, and technology standards, introduces concepts of metal welding, brazing, and flame cutting.

Program Type: 5
Size Requirements: 3,500 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(20) Welding tables with heavy-duty metal tops
(24) Stools or chairs
(4) 4'x4' metal worktables
(1) Steel tube storage rack
(1) Sheet steel storage rack
Wastebasket

Electronic Safety and Security:

Life safety devices per code 283111

Miscellaneous:

Pencil sharpener (optional)

The following item may be funded by the school district:

Overhead hoist crane

Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):

Central sound system 275123

Wireless access point (WAP) as determined by Design – refer to Note 2 272133

Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(3) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
1 washfountain (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
2 floor drains	224000
1 trench drain	224000
6 compressed air connections	221500
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Welding hood and exhaust	Div. 23
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
(6) 220 volt receptacles	262726
480v 3-phase service	262726
Room safety push-button	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133***

requirements.

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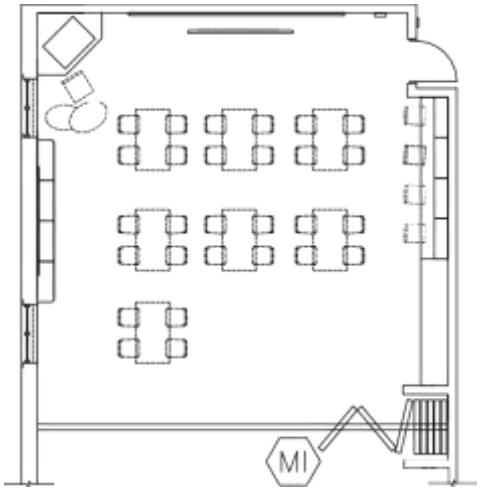
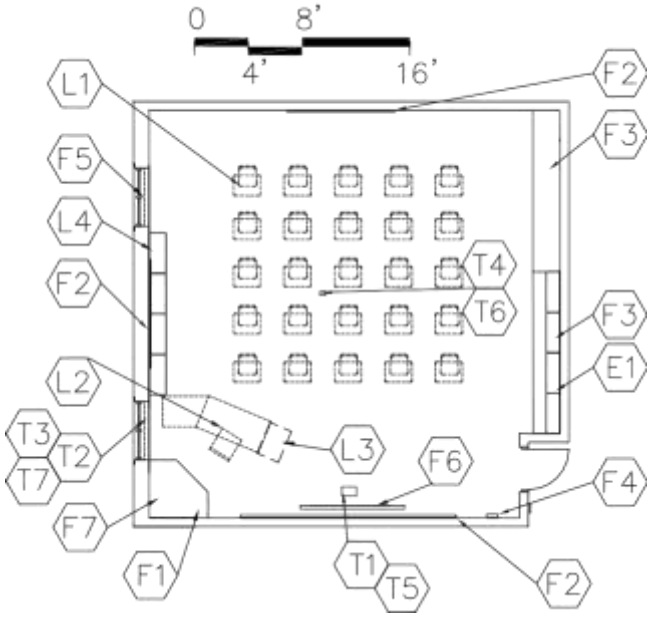


CLASSROOM WITH OPTIONAL FOLDING WALL



TYPICAL CLASSROOM

CAPACITY: 25 students
SIZE: 900 SF

PROGRAM ACTIVITIES:

- Large group, small group, and individual instruction
- Group and individual work
- Demonstrations
- Accommodates any of the core academic disciplines

SPATIAL RELATIONSHIPS:

- ☐ Near other related lab
- ☐ Near teacher prep area/workroom
- ☐ Classrooms should be located in academic "zone" that is away from noisy or public activities
- ☐ Classrooms with access to media center and administrative services
- ☐ Flexibility of space
- ☐ Proximity to main corridor to accommodate other students without interrupting lab

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be placed in this classroom or could be placed in a teacher prep area/workroom.

RELATED CLASSROOM
CT-P5-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or carpet tile	096816
Optional: linoleum, ET,	096516
or sheet vinyl	096500
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:

L1 Student desks and chairs
L2 Teacher desk or workstation/computer support and chair
L3 File cabinet
L4 9' of low bookcases (fixed or mobile)
Wastebasket

Miscellaneous:
Pencil sharpener ***(optional)***

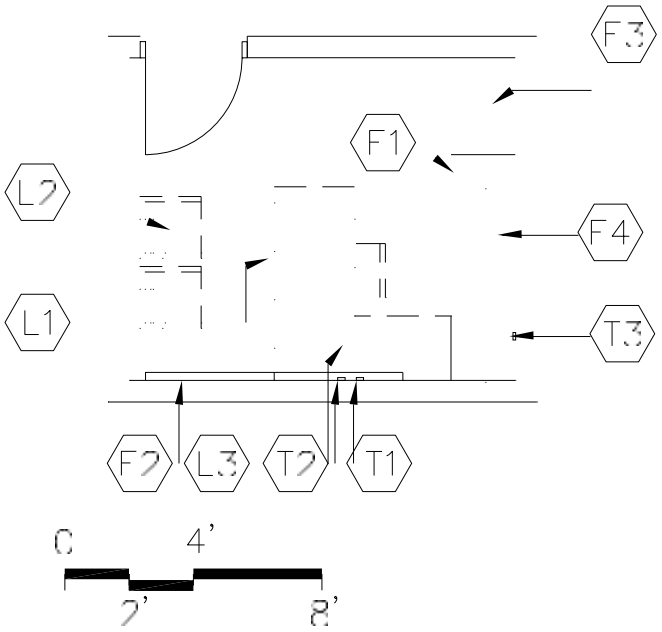
M1 Operable partitions between classrooms are optional 02226

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123550
F2 20'-32' combination marker board, tack board and tackable wall surface	101100
F3 18'-24' combination base and wall cabinets	123550
F4 Pencil sharpener support (optional)	062000
F5 Windows with integral blinds	085113
F6 Projection screen (optional)	115213
F7 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 ***Wireless access point cable above ceiling***	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 ***Ultra-short throw interactive*** projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	***272133***
T7 Classroom technology center video port	***271543, 274116, 274119, 275127***
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Where appropriate, some casework may be mobile to add flexibility and become part of the loose furnishings.
4. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***



PROGRAM ACTIVITIES:

- Private space for program instructor
- One-on-one conferences with academic instructors, students, etc.

SPATIAL RELATIONSHIPS:

- Near related lab
- Direct access to school circulation areas

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: 1 - 3 persons
SIZE: 120 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

OFFICE
CT-P5-3

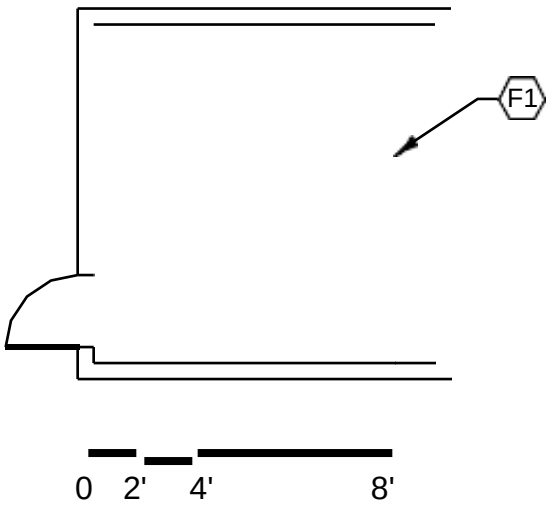
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or carpet tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets above work surface	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.



CAPACITY: N/A
SIZE: 200 SF

PROGRAM ACTIVITIES:
- Space for storage of lab equipment

SPATIAL RELATIONSHIPS:
- Near related lab

ENVIRONMENTAL CONSIDERATIONS:
N/A

NOTES:

STORAGE AREA
CT-P5-4

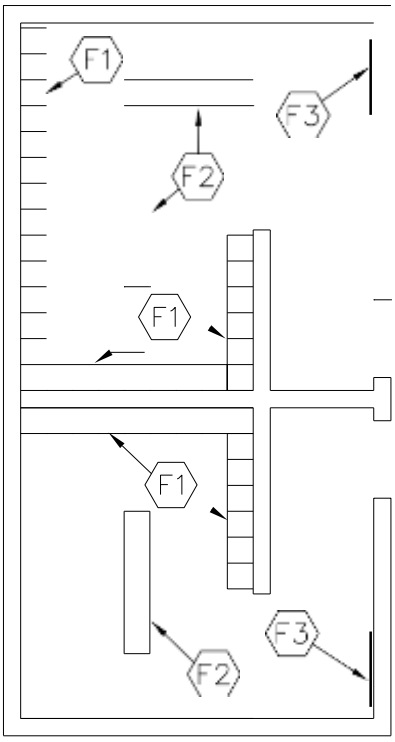
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
Resilient base	096500
Ceiling:	
Exposed structure	---
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items[1]:	
F1 8'-20' of open shelving	
Depth may vary (fixed or loose)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Personal and health needs for the program Specific users.
- Changing of clothes and/or uniforms.
- Storage of personal items while students are in lab.

SPATIAL RELATIONSHIPS:
- Adjacent to related lab

ENVIRONMENTAL CONSIDERATIONS:
- Sanitary and durable finishes.
- Environmental sound control
  Wall minimum STC 40
  Ceiling minimum CAC 35, NRC 0.70

CAPACITY: N/A
SIZE: 9 SF per student (see Note 2)

NOTES:
1. Large and small changing areas are interchangeable for either males or females. Determination based on male/female ratio within each program.
2. Student count determined by total number of approved program spaces Types 5, 6, and 7 times 30.

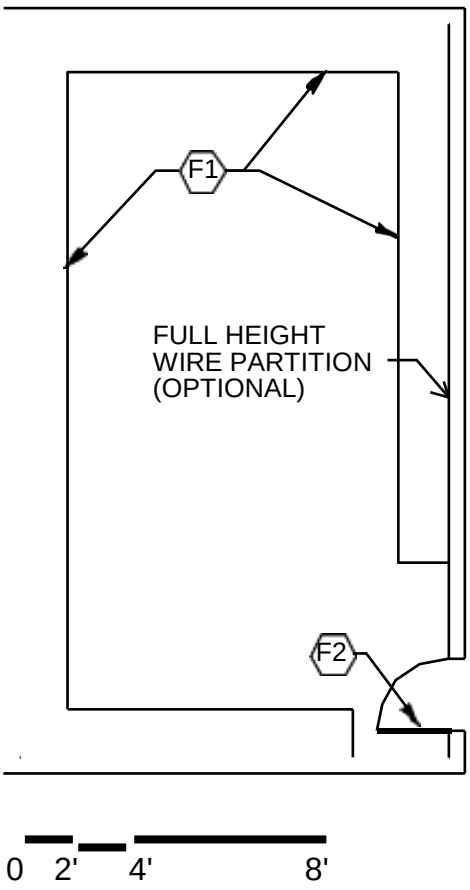
CHANGING ROOM
CT-P5-4

FINISHES[1]:	Spec. Ref.#
Flooring:	
Polished concrete finishing, or	033510
colored concrete finishing	033519
Optional: linoleum, or rubber	096500 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical with high impact hold down clips	095113
Walls:	
Painted concrete masonry units	042000 / 099100
LOOSE FURNISHINGS	
Wastebaskets	

FEATURES[1]:	Spec. Ref.#
Fixed Items[1]:	
F1 Student lockers	105113
F2 Locker benches	062000
F3 24" x 60" mirror	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/Return air system	Div. 23
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Individual temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
2 Duplex receptacles	262726
Means of egress lighting per code	265100
Communications:	
Clock	275313
Central Sound System	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



CAPACITY: N/A
SIZE: 550 SF
ANCILLARY SPACES:

PROGRAM ACTIVITIES:
- Storage of program related tools and instruments.
- Storage of students' tools.

SPATIAL RELATIONSHIPS:
- Adjacent to related lab

ENVIRONMENTAL CONSIDERATIONS:
- Sanitary and durable finishes

TOOL CRIB
CT-P5-6

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Optional: linoleum, or rubber	096500 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000 / 099100

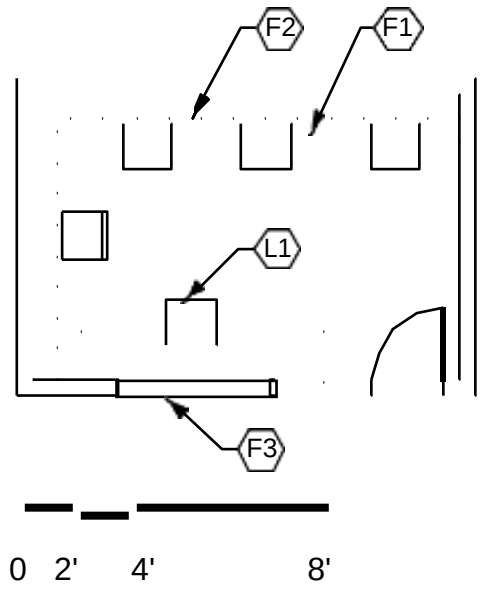
LOOSE FURNISHINGS
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items[1]:	
F1 80' of open metal shelving (total), Depth may vary (fixed or loose)	105613
F2 Dutchdoor	105613
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
4 Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

REFERENCE ROOM
CT-P5-7



PROGRAM ACTIVITIES:
- Individual computer research.
- Reference program specific manuals.
- Small group meetings.

SPATIAL RELATIONSHIPS:
- Adjacent to related lab

ENVIRONMENTAL CONSIDERATIONS:
- Sanitary and durable finishes
- Environmental sound control
  - Wall minimum STC 45
  - Ceiling minimum CAC 35, NRC 0.70

CAPACITY: N/A
SIZE: 200 SF

NOTES:

REFERENCE ROOM
CT-P5-7

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000 / 099100

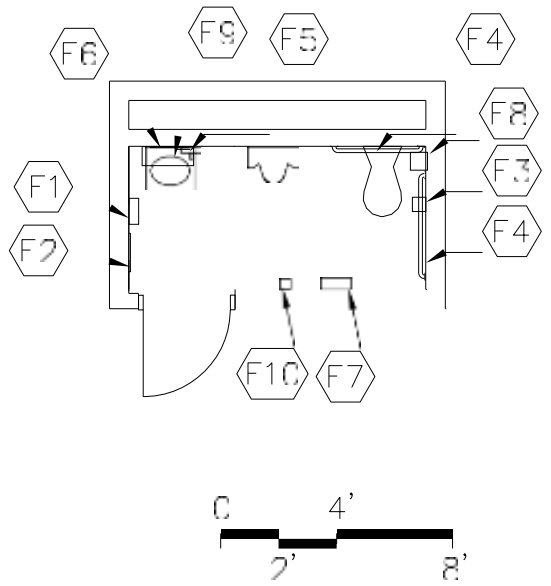
LOOSE FURNISHINGS
L3 Student chairs
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 34' of plastic lam. counter	062000
F2 27' of adjustable shelving	062000
F3 Interior window	081113/088000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
2 Duplex receptacles	262726
Duplex receptacle adjacent to Each data and video port	262726
Communications:	
T1 6 data ports	271513
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

TOILET ROOM
CT-P5-8



PROGRAM ACTIVITIES:
- Personal and health needs for the program
- Specific users
- Changing of clothes and/or uniforms.

SPATIAL RELATIONSHIPS:
- Adjacent to related lab

ENVIRONMENTAL CONSIDERATIONS:
- Sanitary and durable finishes.
- Environmental sound control
  Wall minimum STC 48
  Ceiling minimum CAC 35, NRC 0.70

CAPACITY: N/A
SIZE: 68 SF

NOTES:

TOILET ROOM
CT-P5-8

FINISHES[1]:	Spec. Ref.#
Sealed concrete	033000
Optional: rubber	096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000 / 099100

LOOSE FURNISHINGS
Wastebaskets

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 24” x 60” mirror	102813
F3 Toilet tissue holder	102813
F4 36” and 42” grab bars	102813
F5 Soap dispenser	102813
F6 16” x 24” mirror	102813
F7 Sanitary product dispenser	102813
F8 Sanitary product receptacle	102813
F9 Stainless steel shelf (optional)	102813 F10
Coat hook	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Individual temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
2 Duplex receptacles	262726
Means of egress lighting per code	265100
Communications:	
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

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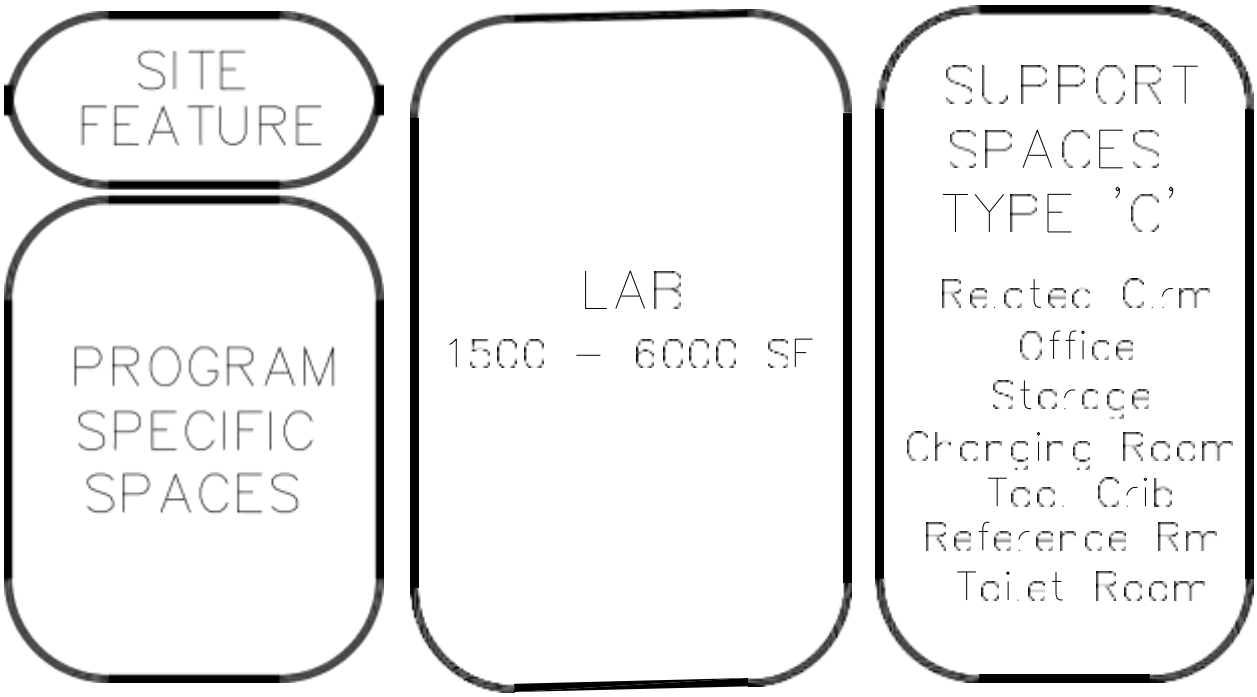
J. Reference Room Plate 6316-49

K. Toilet Room Plate 6316-51

Program Type 6

Description: Medium to large sized lab space with enhanced support space.
Lab space to be "high-bay" (18' min. clearance) with exposed building structure.
Lab to utilize standard construction with the following exception – lab floor slab to be 8" thick.
Support space to be finished with sealed concrete or vinyl composition tile, paint, and suspended acoustical ceiling. Lab may have possible site feature.
Related classroom, office, changing room, reference room, and toilet room may be air-conditioned. Program specific spaces may be air-conditioned if the space is self-contained and curriculum and use require air-conditioning. High bay labs have no air-conditioning unless noted otherwise.
Where necessary, include emergency shut-off switch for equipment.



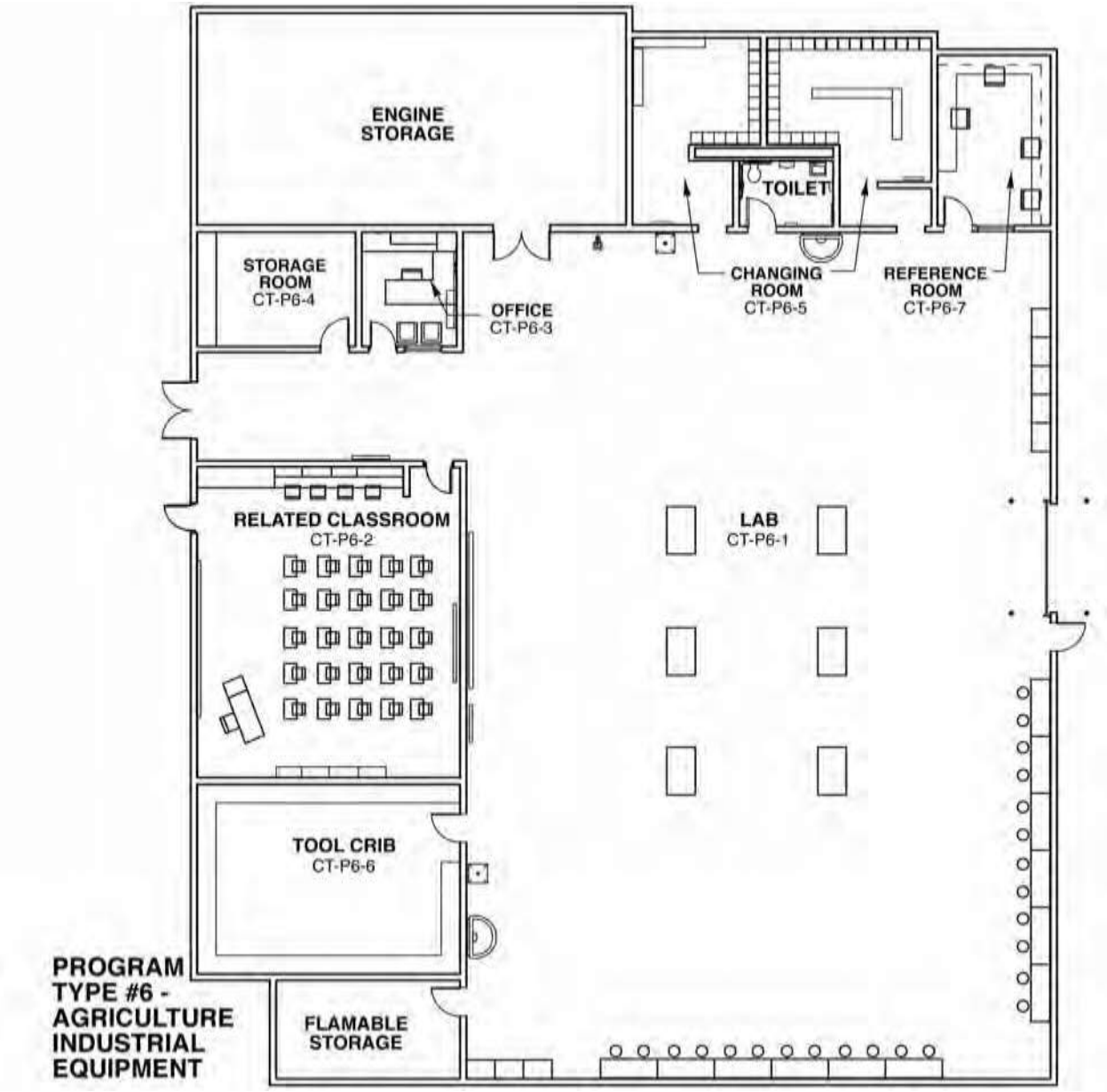
NOTES:

This is an example of how the Program Type 6 spaces in a career-technical school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Program Type 6 space plates:

CT-P6-1	Lab
CT-P6-2	Related Classroom
CT-P6-3	Office
CT-P6-4	Storage
CT-P6-5	Changing Room
CT-P6-6	Tool Crib
CT-P6-7	Reference Room
CT-P6-8	Toilet Room

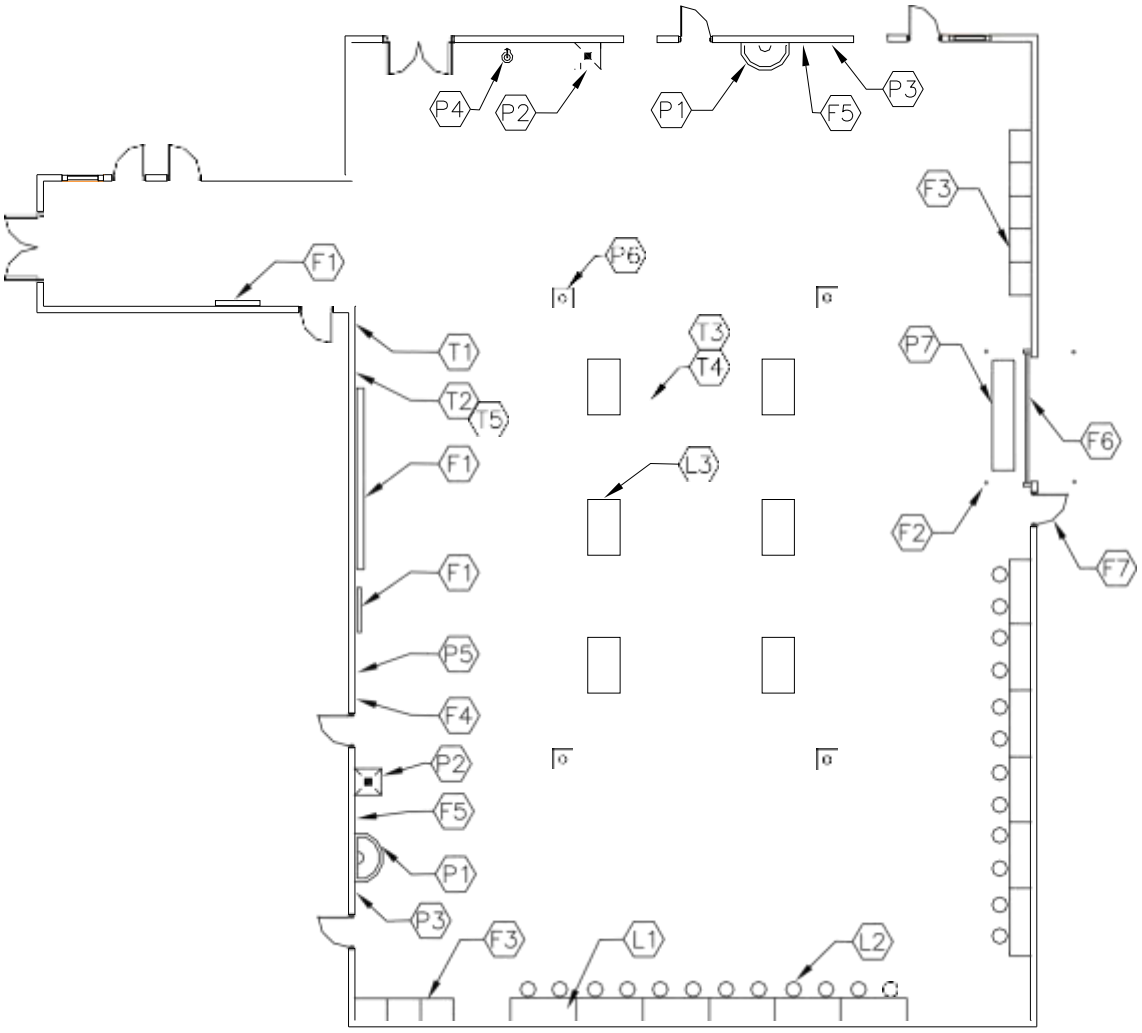
PROGRAM TYPE 6
EXAMPLE



Program Type 6
This is an example to show the possible relationships of spaces for this program type.

NOTES:

1. See lab descriptions within this section for specific lab requirements.
2. See individual space plates at the end of this section for specific requirements.



CAPACITY: 24 Students SIZE: 1,500 – 6,000 SF (see lab summaries for exact sizes) ANCILLARY SPACES: CT-P6-2 thru CT-P6-8	

NOTES:
1. Loose furnishings shown represent one of many possible arrangements.
2. Graphic plate is an example only. Other labs within this program are not drawn – refer to lab summaries within this program type for information on a particular lab.

PROGRAM ACTIVITIES:
- Large and small group instruction
- Group and individual work
- Demonstrations

SPATIAL RELATIONSHIPS:
- Near other related labs
- Adjacent to typical support spaces
- Proximity to large group restrooms
- Located away from noisy or public activities
- Proximity to core academic area and common use areas
- Flexibility of space

ENVIRONMENTAL CONSIDERATIONS:
- ***Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.***
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall ***only*** minimum STC ***45***
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Loose Furnishings: Refer to Lab Profiles within this section.
3. Loose Furnishings, fixed equipment, utility locations, and general footprint of room shown represent one of many possible arrangements.

PROGRAM DESCRIPTION:

Programs provide instruction in the operations or processes concerned with the selection, operation maintenance, and use of agricultural power, agricultural machinery and equipment, structures and utilities, soil and water management.

Program Type: 6
Size Requirements: 5,000 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

L1 (12) Workbenches with heavy-duty metal tops
L2 (24) Stools or chairs
L3 (6) Welding tables
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)
E1 Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):
Clock 275313
Central sound system 275123
T4 Wireless access point (WAP) as determined by Design – refer to Note 2 272133
T5 Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
F2 Steel bollards at overhead door, both sides	055000
F3 24' of tall storage cabinets	123550
F4 Pencil sharpener support (optional)	062000
F5 (4) Paper towel dispensers	102813
F6 12'x14' motorized overhead sectional doors to exterior	083613
F7 3'x7' hollow metal service door to exterior	081113
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
P1 2 washfountains (minimum)	224000
P2 2 utility sinks (minimum)	224000
P3 2 hose bibbs (minimum)	224000
P4 Safety shower/eyewash	224000
P5 6 compressed air connections	221500
P6 4 floor drains	224000
P7 1 trench drain	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Welding hood and exhaust	Div. 23
Vehicle exhaust system	Div. 23
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
(6) 220 volt receptacles	262726
Communications:	
T1 1 projector video port and video display device	271543/274119
T2 1 voice port and phone	271513/273123
T3 Wireless access point cable above ceiling	271513

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.

A1 / 01.0201 *INDUSTRIAL POWER TECHNOLOGY*

Engine Storage

Program Type: 6

Size Requirements: 1,000 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Suspended, acoustical	095113
Option: painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

N/A

ENVIRONMENTAL CONSIDERATIONS:

- Wall only minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Pair of doors	081113
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supplemental heat as required	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

Program Type: 6

Size Requirements: 200 SF

Requirements:

FINISHES:	Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Fire-rated gypsum wallboard	092113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
N/A

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supplemental heat as required	Div. 23
Independent ventilation	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
2 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

***T1* / 17.0301 AUTO COLLISION REPAIR**
CT-P6-1

PROGRAM DESCRIPTION:
Specialized learning experiences concerned with all phases of the repair of damaged vehicle bodies and frames. Areas of instruction may include: Painting and Refinishing, Mechanical/Electrical Repair, Structural and Non-Structural Repair.

Program Type: 6
Size Requirements: 5,000 SF Lab
Lab Requirements:

FINISHES:	Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(6) Workbenches with heavy-duty metal tops
(24) Stools or chairs
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):

Wireless access point (WAP) as determined by Design – refer to Note 2 272133

Classroom technology center video port 271543, 274116, 274119, 275127

The following items are to be funded by the School District:
Car lifts
Frame racks

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(4) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
2 washfountains (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
8 compressed air connections	221500
4 floor drains	224000
1 trench drain	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
(4) 220 volt receptacles	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.

Program Type: 6

Size Requirements: 300 SF

Requirements:

FINISHES:	Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
N/A

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
30' of heavy duty adjustable steel shelving	105613
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supplemental heat as required	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

T9 GROUND TRANSPORTATION
T3 / 17.0302 AUTO TECHNOLOGY
CT-P6-1

PROGRAM DESCRIPTION:
Learning experiences involving the service and repair of the mechanical components of the vehicle. The focus of the program will be in the ASE areas of Electrical/Electronic Systems, and Suspension and Steering, Brakes and Engine Performance.

Program Type: 6
Size Requirements: 5,000 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(6) Workbenches with heavy-duty metal tops
(24) Stools or chairs
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111
Miscellaneous:
Pencil sharpener (optional)

The following items are to be funded by the School District:
Car lifts
Frame racks

Communications (cont'd):
Wireless access point (WAP) as determined by Design – refer to Note 2 272133
Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(4) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
2 washfountains (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
8 compressed air connections	221500
4 floor drains	224000
1 trench drain	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Vehicle exhaust system	Div. 23
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
(6) 220 volt receptacles	262726
Communications:	
1 projector video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.

Program Type: 6

Size Requirements: 800 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Suspended, acoustical	095113
Option: painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
N/A

ENVIRONMENTAL CONSIDERATIONS:

- Wall minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Pair of doors	081113
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supplemental heat as required	Div. 23
Independent ventilation	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

T9 GROUND TRANSPORTATION
T3 / 17.0302 AUTO TECHNOLOGY
Machine Room

Program Type: 6

Size Requirements: 900 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Suspended, acoustical	095113
Option: painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(4) Work tables
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:

- Wall only minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
16' of tall cabinets	123550
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Utility sink	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supplemental heat as required	Div. 23
Independent ventilation	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
220 v service	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:

N/A

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

Program Type: 6

Size Requirements: 60 SF

Requirements:

FINISHES:	Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Fire-rated gypsum drywall	092113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
N/A

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
3' of heavy duty adjustable steel shelving	105613
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supplemental heat as required	Div. 23
Independent ventilation	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
2 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

PROGRAM DESCRIPTION:
Classroom and laboratory experiences involving the layout, construction, and repair of residential and commercial structures. Included is instruction in the care and use of power tools, equipment, and materials used in the construction process; floor, wall, ceiling, and roof framing; the installation of insulation and roofing; and interior and exterior finish detail.

Program Type: 6
Size Requirements: 4,000 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(12) Workbenches with wooden tops and heavy-duty vises

(24) Stools or chairs

Miscellaneous:
Pencil sharpener (optional)

Duplex receptacle with dedicated circuit for wireless projector

Electronic Safety and Security:
Life safety devices per code 283111

Communications(cont'd):

determined by Design – refer to Note 2
Wireless access point (WAP) as 272133
Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(3) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
(2) Lumber storage racks	061000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
1 washfountain (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
6 compressed air connections	221500
2 floor drains	224000
1 trench drain	224000
Plumbing connections	221116/221119/224000
HVAC: Supply/return air system	Div. 23
Dust collection system	230923
Individual space temperature control device	230923
Electrical: High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multi-level switching	262726
20 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Room safety push-button	262726
Communications:	
1 voice port and phone	271513/276123
1 video port and video display	271513/274123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

Program Type: 6

Size Requirements: 500 SF

Requirements:

FINISHES:	Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(2) Work tables

ENVIRONMENTAL CONSIDERATIONS:
- Wall only minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
16' of pegboard	060565
Pair of doors	081113
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supplemental heat as required	Div. 23
Independent ventilation	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

D3 / 17.1001 CARPENTRY
Material Storage

Program Type: 6

Size Requirements: 800 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
N/A

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supplemental heat as required	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

CONSTRUCTION (2 clusters) D4 / 17.1805 Design/Build ▪ D5 / 17.1806 Management
DD - STRUCTURAL SYSTEMS; DE - MECHANICAL,ELECTRICAL AND PLUMBING
DF - CONSTRUCTION DESIGN AND MANAGEMENT

PROGRAM DESCRIPTION:

C-D/B: Utilizes industry standards and a math, science, ELA, and technology framework to introduce concepts of designing, planning, managing, building and maintaining the built environment.

C-M: Classroom and laboratory experiences combining advanced academics and the skills and knowledge essential to the construction industry. Focus is on supervision, planning, and management of the construction process. The program will follow the state TCP and culminate in

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(3) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Life safety devices per code	283111
Multilevel switching	262726
determined by Design – refer to Note 2	272133
Classroom technology center video port	271543, 274116, 274119, 275127

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. This lab may be air-conditioned.
3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133.

requirements.

CONSTRUCTION (2clusters) *D4* / 17.1805 Design/Build ▪ *D5* / 17.1806 Management
DD - STRUCTURAL SYSTEMS; DE - MECHANICAL, ELECTRICAL AND PLUMBING
DF - CONSTRUCTION DESIGN AND MANAGEMENT

CAD Room

Program Type: 6

Size Requirements: 400 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, rubber,	096500
sheet vinyl, or linoleum	096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(10) 2-person tables
(20) Student chairs
(1) Teacher station & chair
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:

- Wall only minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
6' of marker board	101100
8' of tall storage cabinets	123550
Projection screen, 6'x8'	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	
computer aided lenses:	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Communications:	
1 projector video port	271543
1 data port near teacher workstation	271513
Wireless access point cable above ceiling	271513
Central sound system	275123
Ultra-short throw interactive projector	274119
Wireless access point (WAP) as determined by Design – refer to Note 2	272133
Classroom technology center video port	271543, 274116, 274119, 275127
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
Duplex receptacle with dedicated circuit for wireless devices	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

PROGRAM DESCRIPTION:

Combined with the first course in the pathway and utilizing business and industry technical standards and within a math, science, ELA, technology framework. Introduces concepts of engineering related to mechanical, electrical, and industrial engineering and leads to post-secondary education.

Program Type: 6
Size Requirements: 1,500 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(12) Workbenches with heavy-duty metal tops
(24) Stools or chairs

(4) Welding tables
Wastebasket

Electronic Safety and Security:

Life safety devices per code	283111

Miscellaneous:

Pencil sharpener (optional)
Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):

Wireless access point (WAP) as determined by Design – refer to Note 2 272133
Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(3) Paper towel dispensers	102813
12'-0" motorized overhead	083613
3'x7' hollow metal service door	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
1 washfountain (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
6 compressed air connections	221500
2 floor drains	224000
1 trench drain	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Welding hood and exhaust	233515
Electrical:	
High intensity lighting or fluorescent lighting Illumination level: See Table 8600-5	265100
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
(6) 220 volt receptacles	262726
Communications:	
1 projector video port and video display Device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. This program has the option of being located in high bay or low bay (Type 3) space with associated features adjusted for the needs of the space, building type, and curriculum with OFCC approval.
3. This lab may be air-conditioned.

4. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

F3 / 17.1810 ENGINEERING *TECHNOLOGY*
CAD Room

Program Type: 6

Size Requirements: 400 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, rubber,	096500
sheet vinyl, or linoleum	096516
Base:	
Resilient	096500
Ceiling:	
Suspended acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(10) 2-person tables
(20) Student chairs
(1) Teacher station & chair
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:

- Wall only minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

Miscellaneous:
Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
6' of marker board	101100
8' of tall storage cabinets	123550
Projection screen, 6'x8'	115213
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting,	
computer aided lenses:	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Communications:	
1 data port near teacher workstation	271513
Wireless access point cable above ceiling	271513
Central sound system	275123
Ultra-short throw interactive projector	274119
Wireless access point (WAP) as determined by Design – refer to Note 2	272133
Classroom technology center video port	271543, 274116, 274119, 275127
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

PROGRAM DESCRIPTION:
Applies principles of biology, chemistry, and physics to the research and development, production, processing, and distribution of food products meeting quality assurance standards in a system that is safe and secure.

Program Type: 6
Size Requirements: 2,000 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Option: Epoxy, resinous flooring	096723
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100
Option: Fiberglass reinforced plastic panels	

LOOSE FURNISHINGS:
(8) Workbenches with heavy-duty stainless steel tops
(24) Stools or chairs (stainless steel)
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)

Communications (cont'd):
Duplex receptacle with dedicated circuit for wireless devices
Wireless access point (WAP) as determined by Design – refer to Note 2 272133
Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
Pencil sharpener support (optional)	062000
(3) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Overhead hoist system between lab, freezer, and cooler	412223
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
1 washfountain (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
2 floor drains	224000
1 trench drain	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
20 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
(2) 220 volt receptacles	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

A4 / 01.1001 FOOD SCIENCE AND TECHNOLOGY

Freezer

Program Type: 6

Size Requirements: 400 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Quarry tile	093000
Ceiling:	
Quarry tile base	093000
Walls:	
Manufactured insulated panel	114000

LOOSE FURNISHINGS:
N/A

ENVIRONMENTAL CONSIDERATIONS:
- Ventilation for refrigeration machinery
- Cleanable building surfaces
- Floor to be flush with adjacent kitchen floor

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Overhead hoist system	412223
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system for compressors	Div. 23
Electrical:	
Incandescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
Electrical connections to freezer Refrigeration equipment	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

Program Type: 6

Size Requirements: 400 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Quarry tile	093000
Ceiling:	
Quarry tile base	093000
Walls:	
Manufactured insulated panel	114000

LOOSE FURNISHINGS:
N/A

ENVIRONMENTAL CONSIDERATIONS:
- Ventilation for refrigeration machinery
- Cleanable building surfaces
- Floor to be flush with adjacent kitchen floor

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Overhead hoist system	412223
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system for compressors	Div. 23
Electrical:	
Incandescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
Electrical connections to cooler refrigeration equipment	262726
Communications:	
N/A	
Electronic Safety and Security:	
N/A	
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

A4 / 01.1001 FOOD SCIENCE AND TECHNOLOGY
Retail

Program Type: 6

Size Requirements: 400 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
12' of solid surface counter with storage below	062000
Cashier's station	123550
Paper towel dispenser	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
1 utility sink	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting Illumination level: See Table 8600-5	265100
Single level switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Communications:	
1 data ports	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

PROGRAM DESCRIPTION:

Applies principles of plant anatomy, nutrition, reproduction, genetics, health and artistic design to production, management, processing, and marketing of ornamental plants, landscapes, and floral designs. Communications, business principles and leadership skill development are essential to the program.

Program Type: 6
Size Requirements: 2,000 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(12) Workbenches with heavy-duty metal tops
(24) Stools or chairs
Wastebasket

SITE FEATURES:
Greenhouse – 3,000 SF 133413
½ earth flooring, ½ concrete flooring (w/drains)
Minimum of one 8'x10' overhead door
Provide electrical, plumbing, and heating/ ventilation systems as per greenhouse manufacturer's recommendations
Minimum of 4 hose bibs
Fire suppression system if required

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)
Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(3) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
1 washfountain (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
2 floor drains	224000
1 trench drain	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271523
Clock	275313
Central sound system	275123
Wireless access point (WAP) as determined by Design – refer to Note 2	***272133***
Classroom technology center video port	***271543, 274116, 274119, 275127***

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133***

requirements.

A5 / 01.0601 HORTICULTURE
Retail

Program Type: 6

Size Requirements: 400 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
ET, sheet vinyl, or linoleum	096500 096516
Base:	
Resilient	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 40
- Ceiling minimum CAC 35
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
10' of base cabinets	123550
4' of cashier's station	123550
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
1 utility sink	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
Communications:	
1 data port	271513
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

PROGRAM DESCRIPTION:

This program focuses on the service and repair of trucks. Instruction includes the diagnosis, maintenance, and repair of diesel engines operational systems. ASE areas of concentration are: Diesel Engines, Suspension and Steering, Brakes, Electrical/Electronic Systems and Preventative Maintenance Inspection.

Program Type: 6
Size Requirements: 6,000 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(8) Workbenches with heavy-duty metal tops
(24) Stools or chairs
Wastebasket

Miscellaneous:

Pencil sharpener (optional)
Duplex receptacle with dedicated circuit for wireless devices

The following items are to be funded by the School District:

Truck lifts
Frame rack

Electronic Safety and Security:
Life safety devices per code 283111

Communications(cont'd):
Wireless access point (WAP) as determined by Design – refer to Note 2 272133
Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(4) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
2 washfountains (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
8 compressed air connections	221500
4 floor drains	224000
1 trench drain	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Vehicle exhaust system	Div. 23
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
(6) 220 volt receptacles	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

T7 / 17.1200 MEDIUM/HEAVY TRUCK TECHNICIAN
Engine Storage

Program Type: 6

Size Requirements: 800 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Suspended, acoustical	095113
Option: painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
N/A

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
Pair of doors	081113
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supplemental heat as required	Div. 23
Independent ventilation	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

Program Type: 6

Size Requirements: 60 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Fire-rated gypsum drywall	092113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

N/A

ENVIRONMENTAL CONSIDERATIONS:

- Wall minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
3' of heavy duty adjustable steel shelving	105613
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supplemental heat as required	Div. 23
Independent ventilation	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
2 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

T7 / 17.1200 MEDIUM/HEAVY TRUCK TECHNICIAN

Machine Room

Program Type: 6

Size Requirements: 900 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Suspended, acoustical	095113
Option: painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(4) Work tables
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:

- Wall only minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
16' of tall cabinets	123550
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Utility sink	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supplemental heat as required	Div. 23
Independent ventilation	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
220 v service	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:

N/A

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

PROGRAM DESCRIPTION:
Utilizing business and industry, math, science and technology standards, introduces concepts related to set-up and operation; and the control of various metal working equipment.

Program Type: 6
Size Requirements: 3,500 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(6) Workbenches with heavy-duty metal tops
(24) Stools or chairs
Wastebasket

Miscellaneous:
Pencil sharpener (optional)
Duplex receptacle with dedicated circuit for wireless devices

Electronic Safety and Security:
Life safety devices per code 283111

Communications (cont'd):
Central sound system 275123
Wireless access point (WAP) as determined by Design – refer to Note 2 272133
Classroom technology center video port ~~271543, 274116, 274119, 275127~~

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(4) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
2 washfountains (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
20 compressed air connections	221500
Flat floor – no floor drains	
1 trench drain	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
220v 3-phase service	262726
480v 3-phase service	262726
Room safety push-button	262726
Communications:	
1 projector video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	~~271513~~
Clock	275313

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. This lab may be air-conditioned.

3. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.

R5 / 17.2302 PRECISION MACHINING
R7 MANUFACTURING OPERATIONS
CNC Room

Program Type: 6

Size Requirements: 900 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Suspended, acoustical	095113
Option: painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(4) Chairs

ENVIRONMENTAL CONSIDERATIONS:
- Wall only minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
20' of plastic laminate counter	123550
20' of adjustable shelving	062000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supplemental heat as required	Div. 23
Independent ventilation (see note 2)	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data port	262726
220v service	262726
Communications:	
Central sound system	275123
6 data ports	271513
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Room may be cooled from central HVAC system, but all air must be exhausted and not returned.

Program Type: 6

Size Requirements: 150 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Suspended, acoustical	095113
Option: painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(1) Work table

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
4' of tall storage	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supplemental heat as required	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

2. This room may be air-conditioned.

DC / 17.3601 WOOD PRODUCT TECHNOLOGIES

CT-P6-1

PROGRAM DESCRIPTION:

Utilizing business and industry, math, science, and technology standards, introduces concepts of wood product materials and technologies; design and production of window frames, molding, trims and panels; and wood crafting skills including the design and manufacture of wood products such as furniture, moldings, trim, fixtures, and cabinetry.

Program Type: 6

Size Requirements: 3,000 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

(12) Workbenches with heavy-duty wooden tops
(24) Stools or chairs
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)
Duplex receptacle with dedicated circuit for wireless devices

Communications (cont'd):
Wireless access point (WAP) as determined by Design – refer to Note 2 272133
Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
24' of marker board, tack board, or tackable wall surface	101100
24' of tall storage cabinets	123550
Pencil sharpener support (optional)	062000
(3) Paper towel dispensers	102813
12'x14' motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
1 washfountain (minimum)	224000
2 utility sinks (minimum)	224000
2 hose bibbs (minimum)	224000
Safety shower/eyewash	224000
2 floor drains	224000
1 trench drain	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Dust collection system	233513
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
30 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
1 ***projector*** video port and video display device	271543/274119
1 voice port and phone	271513/273123
Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123
Room safety push-button	262726

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.

Program Type: 6

Size Requirements: 500 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Suspended, acoustical	095113
Option: painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(2) Work tables

ENVIRONMENTAL CONSIDERATIONS:
- Wall only minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
16' of pegboard	060565
Pair of doors	081113
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supplemental heat as required	Div. 23
Independent ventilation	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

DC / 17.3601 WOOD PRODUCT TECHNOLOGIES

Material Storage

Program Type: 6

Size Requirements: 800 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Suspended, acoustical	095113
Option: painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:

N/A

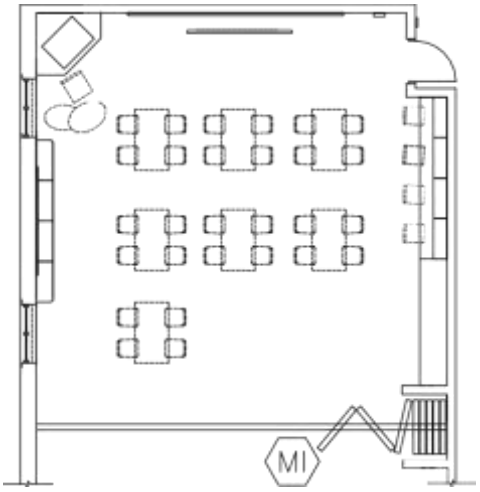
ENVIRONMENTAL CONSIDERATIONS:

- Wall minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

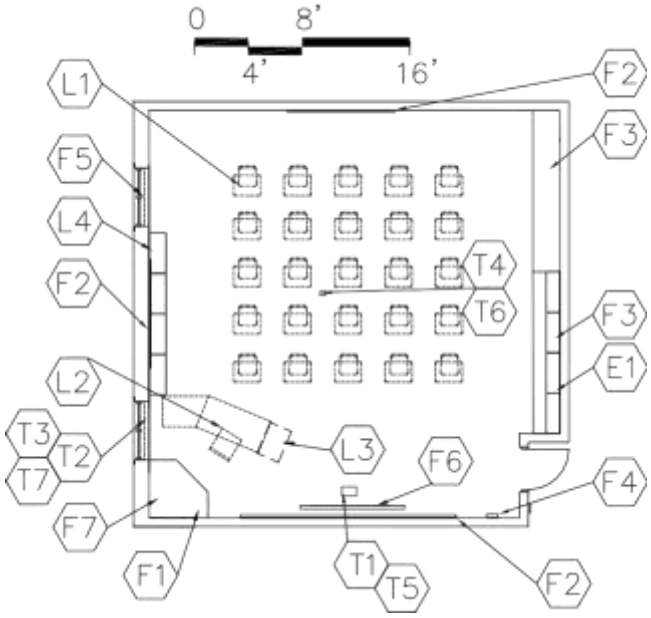
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supplemental heat as required	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



CLASSROOM WITH OPTIONAL FOLDING WALL



TYPICAL CLASSROOM

CAPACITY: 25 students
SIZE: 900 SF

PROGRAM ACTIVITIES:

- Large group, small group, and individual instruction
- Group and individual work
- Demonstrations
- Accommodates any of the core academic disciplines

SPATIAL RELATIONSHIPS:

- ☐ Near other related lab
- ☐ Near teacher prep area/workroom
- ☐ Classrooms should be located in academic "zone" that is away from noisy or public activities
- ☐ Classrooms with access to media center and administrative services
- ☐ Flexibility of space
- ☐ Proximity to main corridor to accommodate other students without interrupting lab

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be placed in this classroom or could be placed in a teacher prep area/workroom.

RELATED CLASSROOM
CT-P6-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or carpet tile	096816
Optional: linoleum, ET,	096516
or sheet vinyl	096500
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:

L1 Student desks and chairs
L2 Teacher desk or workstation/computer support and chair
L3 File cabinet
L4 9' of low bookcases (fixed or mobile)
Wastebasket

Miscellaneous:
Pencil sharpener ***(optional)***

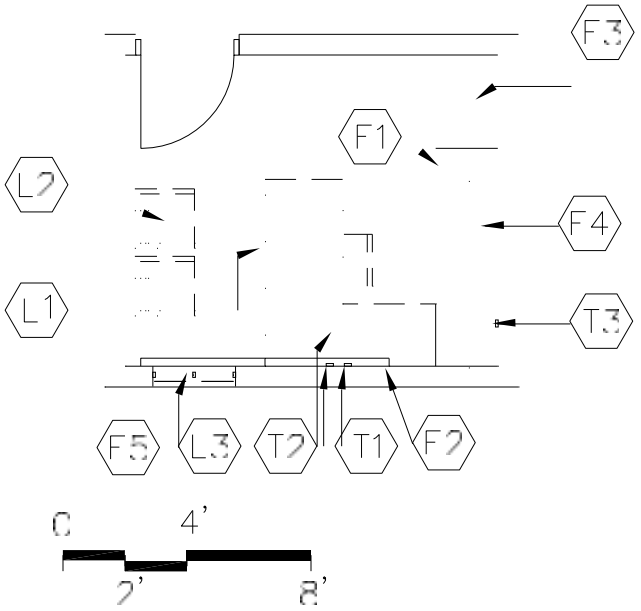
M1 Operable partitions between classrooms are optional 02226

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123550
F2 20'-32' combination marker board, tack board and tackable wall surface	101100
F3 18'-24' combination base and wall cabinets	123550
F4 Pencil sharpener support (optional)	062000
F5 Windows with integral blinds	085113
F6 Projection screen (optional)	115213
F7 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 ***Wireless access point cable above ceiling***	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 ***Ultra-short throw interactive*** projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	***272133***
T7 Classroom technology center video port	***271543, 274116, 274119, 275127***
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Where appropriate, some casework may be mobile to add flexibility and become part of the loose furnishings.
4. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***



PROGRAM ACTIVITIES:
- Private space for program instructor
- One-on-one conferences with academic instructors, students, etc.

SPATIAL RELATIONSHIPS:
- Near related lab
- Direct access to school circulation areas

ENVIRONMENTAL CONSIDERATIONS:
- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: 1 - 3 persons
SIZE: 120 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

OFFICE
CT-P6-3

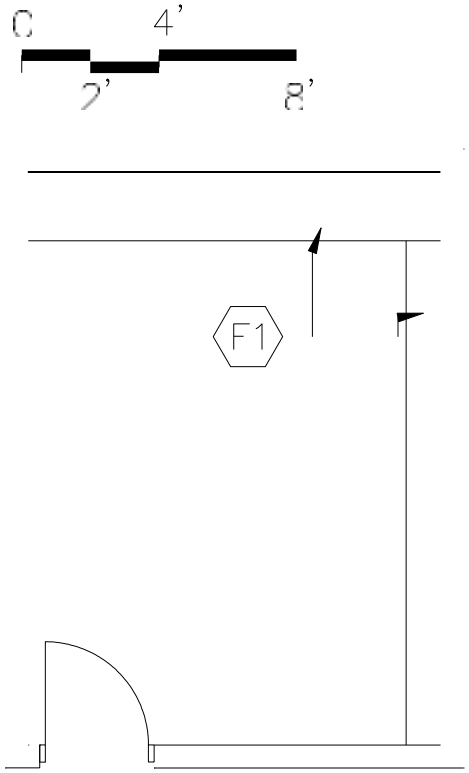
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or carpet tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets above work surface	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.



PROGRAM ACTIVITIES:
- Space for storage of lab equipment

SPATIAL RELATIONSHIPS:
- Near related lab

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY:	N/A
SIZE:	200 SF

NOTES:

STORAGE AREA
CT-P6-4

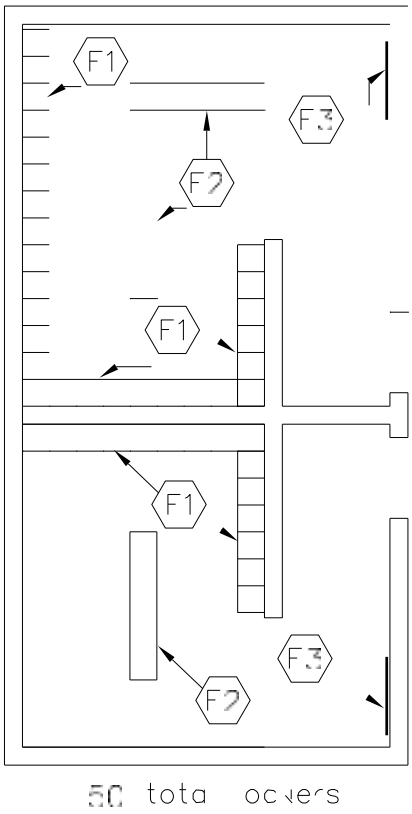
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
Resilient base	096500
Ceiling:	
Exposed structure	---
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items[1]:	
F1 8'-20' of open shelving	
Depth may vary (fixed or loose)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Personal and health needs for the program Specific users.
- Changing of clothes and/or uniforms.
- Storage of personal items while students are in lab.

SPATIAL RELATIONSHIPS:
- Adjacent to related lab

ENVIRONMENTAL CONSIDERATIONS:
- Sanitary and durable finishes.
- Environmental sound control
  Wall minimum STC 40
  Ceiling minimum CAC 35, NRC 0.70

CAPACITY: N/A
SIZE: 9 SF per student (see Note 2)

NOTES:
1. Large and small changing areas are interchangeable for either males or females. Determination based on male/female ratio within each program.
2. Student count determined by total number of approved program spaces Types 5, 6, and 7 times 30.

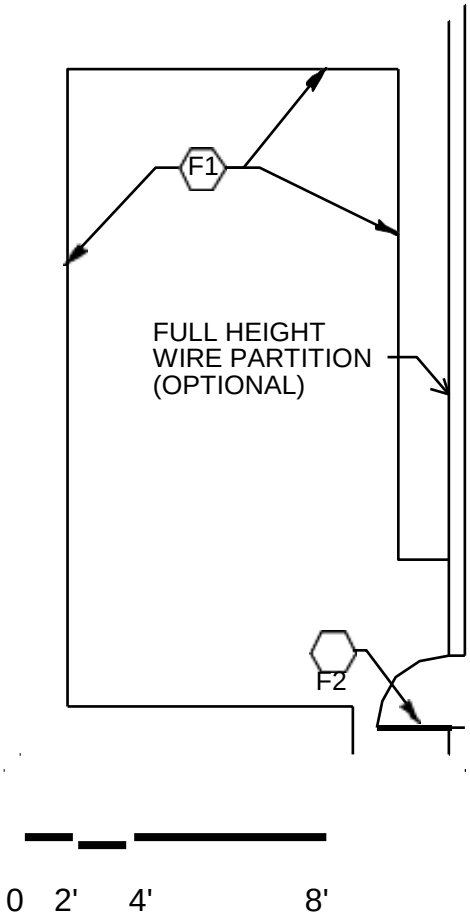
CHANGING ROOM
CT-P6-5

FINISHES[1]:	Spec. Ref.#
Flooring:	
Polished concrete finishing, or	033510
colored concrete finishing	033519
Optional: linoleum or rubber	096500 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical with high impact hold down clips	095113
Walls:	
Painted concrete masonry units	042000 / 099100
LOOSE FURNISHINGS	
Wastebaskets	

FEATURES[1]:	Spec. Ref.#
Fixed Items[1]:	
F1 Student lockers	105113
F2 Locker benches	062000
F3 24" x 60" mirror	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/Return air system	Div. 23
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Individual temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
2 Duplex receptacles	262726
Means of egress lighting per code	265100
Communications:	
Clock	275313
Central Sound System	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Storage of program related tools and instruments.
- Storage of students' tools.

SPATIAL RELATIONSHIPS:
- Adjacent to related lab

ENVIRONMENTAL CONSIDERATIONS:
- Sanitary and durable finishes

CAPACITY: N/A
SIZE: 550 SF
ANCILLARY SPACES:

NOTES:

TOOL CRIB
CT-P6-6

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Optional: linoleum, or rubber	096500 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000 / 099100

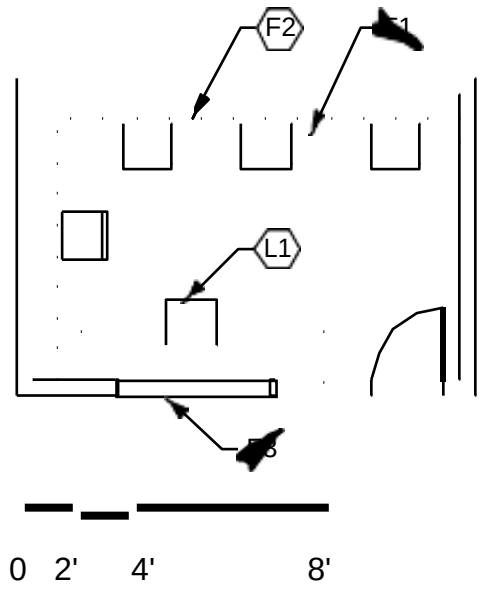
LOOSE FURNISHINGS
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items[1]:	
F1 80' of open metal shelving (total), Depth may vary (fixed or loose)	105613
F2 Dutch door	105613
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
4 Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

REFERENCE ROOM
CT-P6-7



PROGRAM ACTIVITIES:
- Individual computer research.
- Reference program specific manuals.
- Small group meetings.

SPATIAL RELATIONSHIPS:
- Adjacent to related lab

ENVIRONMENTAL CONSIDERATIONS:
- Sanitary and durable finishes
- Environmental sound control
  Wall ***only*** minimum STC ***45***
  Ceiling minimum CAC 35, NRC 0.70

CAPACITY: N/A
SIZE: 200 SF

NOTES:

REFERENCE ROOM
CT-P6-7

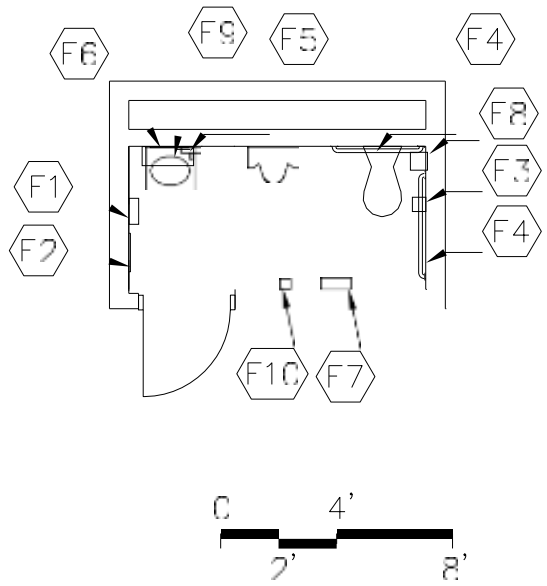
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Optional: rubber	096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000 / 099100

LOOSE FURNISHINGS
L3 Student chairs
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 34' of plastic lam. counter	062000
F2 27' of adjustable shelving	062000
F3 Interior window	081113/ 088000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
2 Duplex receptacles	262726
Duplex receptacle adjacent to Each data and video port	262726
Communications:	
T1 6 data ports	271513
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Personal and health needs for the program
- Specific users
- Changing of clothes and/or uniforms.

SPATIAL RELATIONSHIPS:
- Adjacent to related lab

ENVIRONMENTAL CONSIDERATIONS:
- Sanitary and durable finishes.
- Environmental sound control
  Wall minimum STC 48
  Ceiling minimum CAC 35, NRC 0.70

CAPACITY: N/A
SIZE: 68 SF

NOTES:

TOILET ROOM
CT-P6-8

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	***093000***
Optional: Rubber	096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000 / 099100

LOOSE FURNISHINGS
Wastebaskets

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 24” x 60” mirror	102813
F3 Toilet tissue holder	102813
F4 36” and 42” grab bars	102813
F5 Soap dispenser	102813
F6 16” x 24” mirror	102813
F7 Sanitary product dispenser	102813
F8 Sanitary product receptacle	102813
F9 Stainless steel shelf (optional)	102813 F10
Coat hook	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Individual temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
2 Duplex receptacles	262726
Means of egress lighting per code	265100
Communications:	
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

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  - Parts Storage 6317-9
  - Hazardous Material Storage 6317-10
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  - ***Parts Storage 6317-9***
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F. Office Plate 6317-*15*

G. Storage Area Plate 6317-*17*

H. Changing Room Plate 6317-19

I. Tool Crib Plate 6317-21

J. Reference Room Plate 6317-23

K. Toilet Room Plate 6317-25

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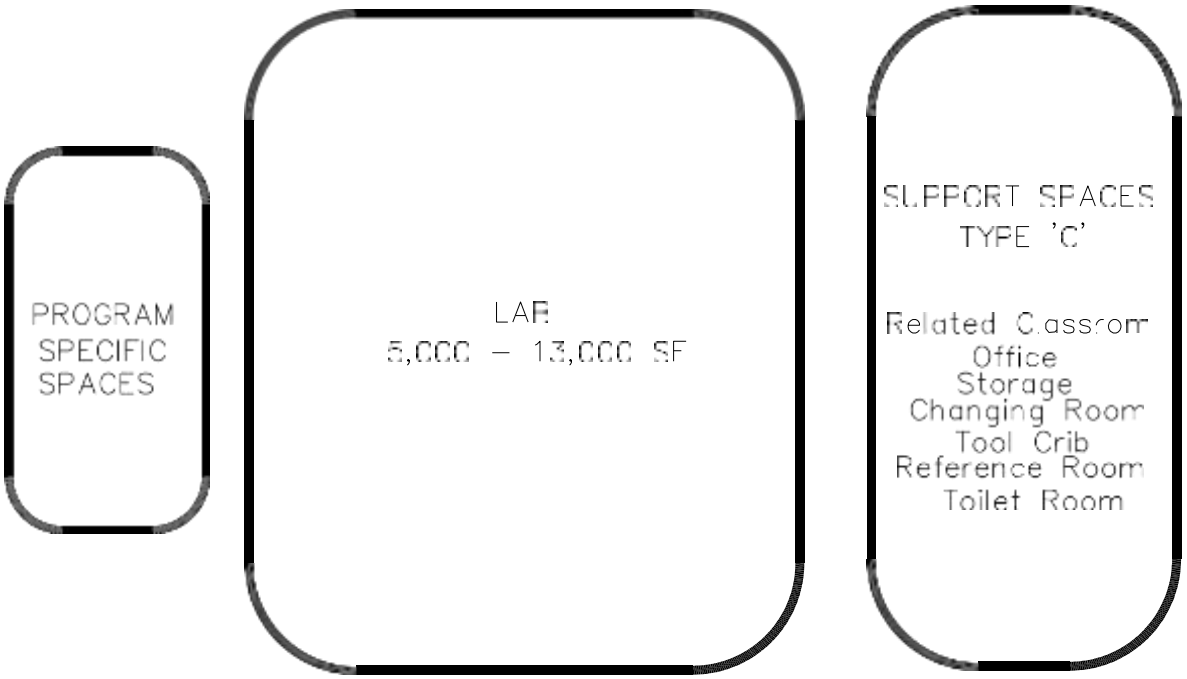
Program Type 7

Description: Large to very large-sized lab space with enhanced support space.
Lab space to be "high-bay" (18' min. clearance) with exposed building structure.
Lab to utilize standard construction with the following exception – lab floor slab to be 8" thick.
Support space to be finished with sealed concrete or vinyl composition tile, paint, and suspended acoustical ceiling.
Related classroom, office, changing room, reference room, and toilet room may be air-conditioned. The high bay lab is NOT air-conditioned. Program specific spaces are NOT air-conditioned.
Where necessary, include emergency shut-off switch for equipment.



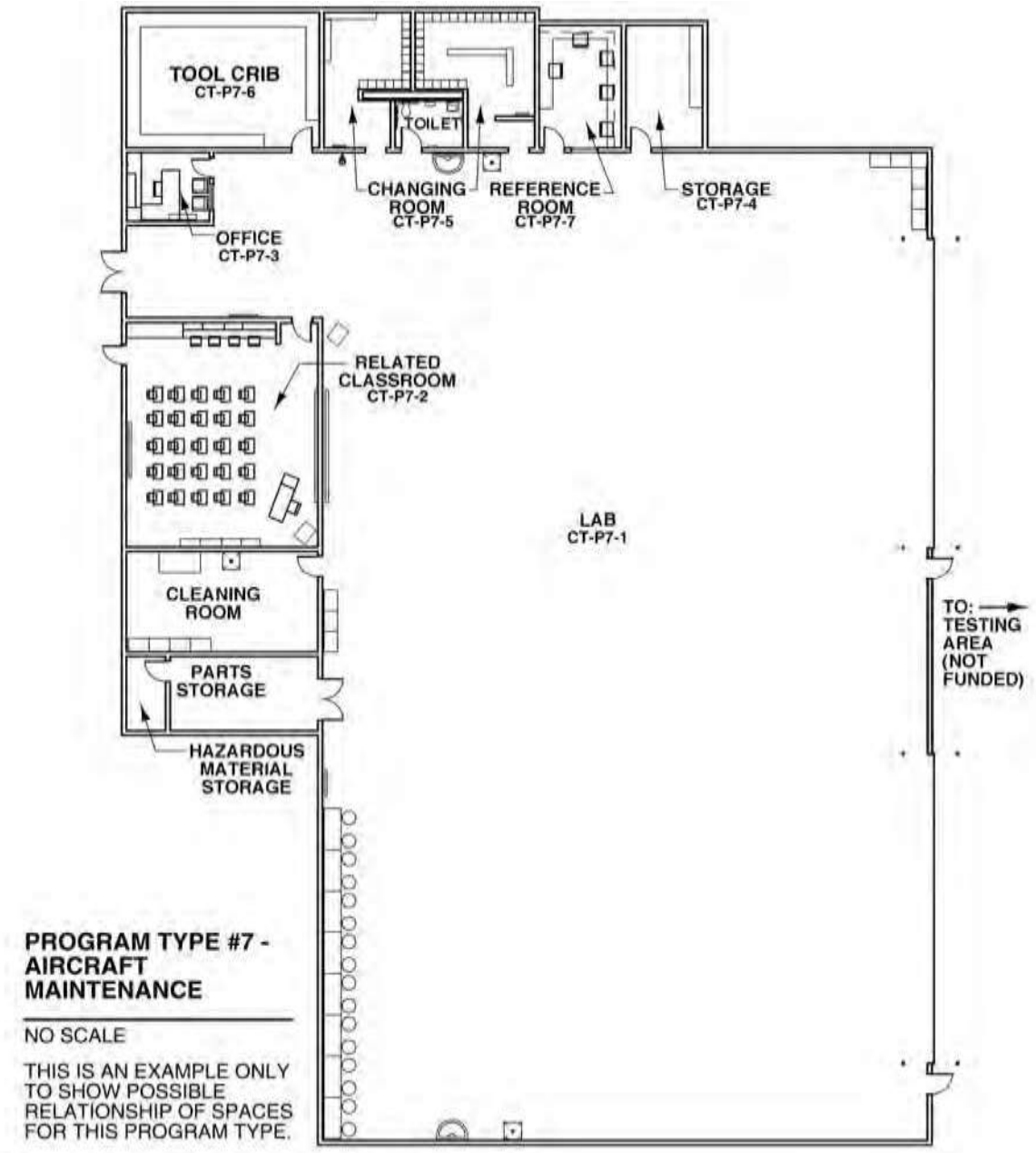
NOTES:

This is an example of how the Program Type 7 spaces in a career-technical school could be arranged. This is meant only to demonstrate the relationships between various spaces of this area.

Following are the Program Type 7 space plates:

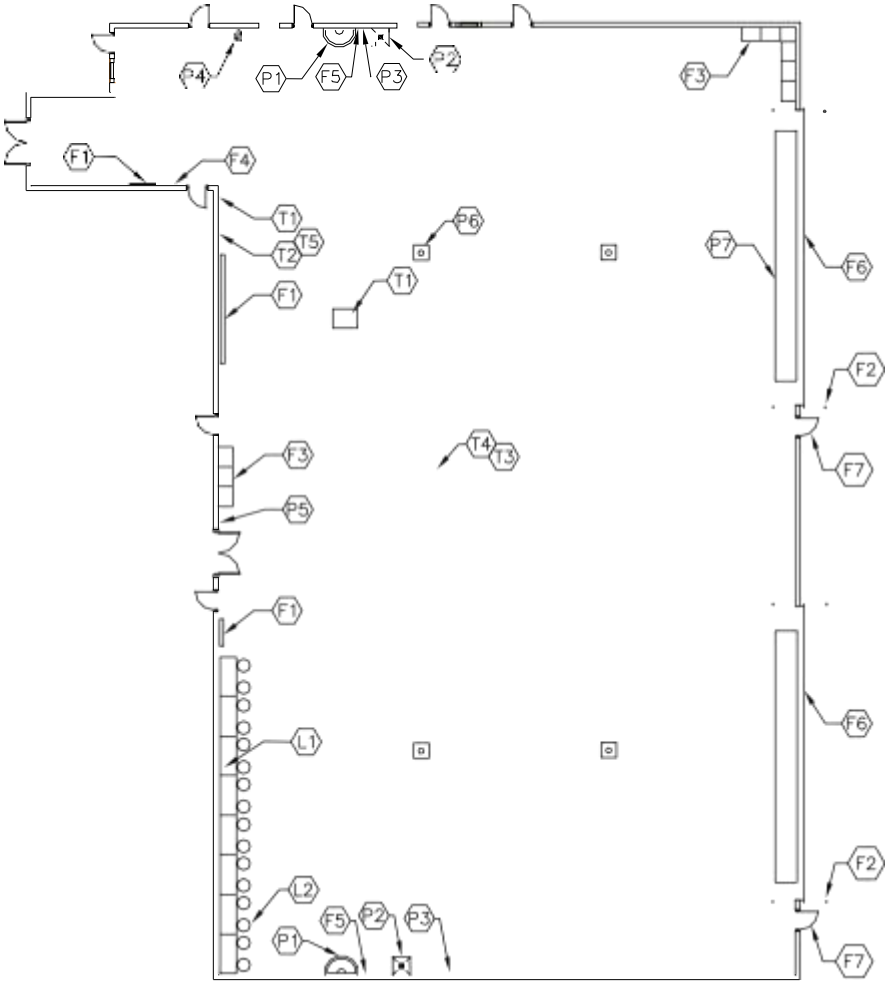
CT-P7-1	Lab
CT-P7-2	Related Classroom
CT-P7-3	Office
CT-P7-4	Storage
CT-P7-5	Changing Room
CT-P7-6	Tool Crib
CT-P7-7	Reference Room
CT-P7-8	Toilet Room

PROGRAM TYPE 7
EXAMPLE



NOTES:

1. See lab descriptions within this section for specific lab requirements.
2. See individual space plates at the end of this section for specific requirements.



CAPACITY: 24 Students SIZE: 8,000 – 13,000 SF (see lab summaries for exact sizes) ANCILLARY SPACES: CT-P7-2 thru CT-P7-8	

NOTES:
1. Loose furnishings shown represent one of many possible arrangements.
2. Graphic plate is an example only. Other labs within this program are not drawn – refer to lab summaries within this program type for information on a particular lab.

PROGRAM ACTIVITIES:
- Large and small group instruction
- Group and individual work
- Demonstrations

SPATIAL RELATIONSHIPS:
- Near other related labs
- Adjacent to typical support spaces
- Proximity to large group restrooms
- Located away from noisy or public activities
- Proximity to core academic area and common use areas
- Flexibility of space

ENVIRONMENTAL CONSIDERATIONS:
- ***Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.***
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall ***only*** minimum STC ***45***
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Loose Furnishings: Refer to Lab Profiles within this section.
3. Loose Furnishings, fixed equipment, utility locations, and general footprint of room shown represent one of many possible arrangements.

PROGRAM DESCRIPTION:
Classroom and lab learning experiences concerned with the inspection, repair, servicing, and overhauling of all airplane parts, including engines, propellers, instruments, airframes, fuel and oil tanks, control cables and hydraulic units. Involves learning the use of technical manuals and various types of testing equipment.

Program Type: 7
Size Requirements: 13,000 SF Lab
Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
L1 (8) Workbenches with heavy-duty metal tops
L2 (24) Stools or chairs
Wastebasket

Electronic Safety and Security:
Life safety devices per code 283111

Miscellaneous:
Pencil sharpener (optional)
E1 Duplex receptacle with dedicated circuit for wireless devices

The following items to be funded by the School District:
Paint booth, paint prep station, paint mixing station

Communications (cont'd):
T4 Wireless access point (WAP) as determined by Design – refer to Note 2 272133
T5 Classroom technology center video port 271543, 274116, 274119, 275127

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 24' of marker board, tack board, or tackable wall surface	101100
F2 Reserved	
F3 24' of tall storage cabinets	123550
F4 Pencil sharpener support (optional)	062000 F5
(4) Paper towel dispensers	102813
F6 (2) 35'high x 45'long motorized overhead sectional doors to exterior	083613
F7 (2) 3'x7' hollow metal service doors to exterior	081113
F8 Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
P1 2 washfountains (minimum)	224000
P2 2 utility sinks (minimum)	224000
P3 3 hose bibbs (minimum)	224000
P4 Safety shower/eyewash	224000
P5 14 compressed air connections	221500
P6 2 floor drains	224000
P7 1 trench drain	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
40 duplex receptacles (minimum)	262726
Double duplex receptacle adjacent to each data and video port	262726
220v service	262726
Communications:	
T1 1 projector video port and video display device	271543/274119
T2 1 voice port and phone	271513/273123
T3 Wireless access point cable above ceiling	271513
Clock	275313
Central sound system	275123

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133

requirements.

TA AIR TRANSPORTATION
T0 / 17.0401 AIRCRAFT MAINTENANCE
Cleaning Room

Program Type: 7

Size Requirements: 400 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Suspended, acoustical	095113
Option: painted, exposed structure	099100
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
(1) Work table
Wastebasket

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
4' of tall storage cabinets	123550
Paper towel dispenser	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Utility sink	224000
Plumbing connections	221116/221119/224000
Compressed air connections	221500
HVAC:	
Supplemental heat as required	Div. 23
Independent ventilation	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
4 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111

Miscellaneous:
N/A

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

Program Type: 7

Size Requirements: 300 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Fire-rated gypsum drywall	092113
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
N/A

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
30' of heavy duty steel adjustable shelving	105613
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supplemental heat as required	Div. 23
Independent ventilation	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
2 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

TA AIR TRANSPORTATION
T0 / 17.0401 AIRCRAFT MAINTENANCE
Hazardous Material Storage

Program Type: 7

Size Requirements: 60 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Fire-rated gypsum drywall	092116
Walls:	
Painted concrete masonry units	042000/ 099100

LOOSE FURNISHINGS:
N/A

ENVIRONMENTAL CONSIDERATIONS:
- Wall minimum STC 45
- This room to be one-story (14'+/-) tall, located within high-bay program.

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
N/A	
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supplemental heat as required	Div. 23
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Single level switching	262726
2 duplex receptacles	262726
Communications:	
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

PROGRAM DESCRIPTION:
Applies principles of anatomy and physiology, nutrition, reproduction, health, and genetics and behavior to the production, management, marketing, and training of domestic animals.

Program Type: 7

Size Requirements: 8,000 SF Lab

Lab Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Compacted earth	
Ceiling:	
Painted, exposed structure	099100
Walls:	
Painted exposed structure	099100

LOOSE FURNISHINGS:
N/A

SITE FEATURE:
Plan for the following if required by school curriculum requirements:
Fenced riding area

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
180' of metal pipe rail fencing	055000
12' x 14'motorized overhead sectional door to exterior	083613
3'x7' hollow metal service door to exterior	081113
Steel bollards at overhead door, both sides	055000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
2 hose bibbs (minimum)	224000
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
High intensity lighting or fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
12 duplex receptacles (minimum)	262726
Communications:	
1 voice port and phone	271513/273123
Clock	275313
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

A2 / 01.0901 ANIMAL SCIENCE AND MANAGEMENT (EQUINE)

Stables

Program Type: 7

Size Requirements: 6,800 SF

Requirements:

FINISHES:	Spec. Ref #
Flooring:	
Sealed concrete	033000
Ceiling:	
Painted, exposed structure	099100
Walls:	
Exposed wood	062000
At wash stalls, provide fiberglass reinforced plastic panels	

LOOSE FURNISHINGS:

- Teacher desk and chair
- File cabinet
- Wastebasket

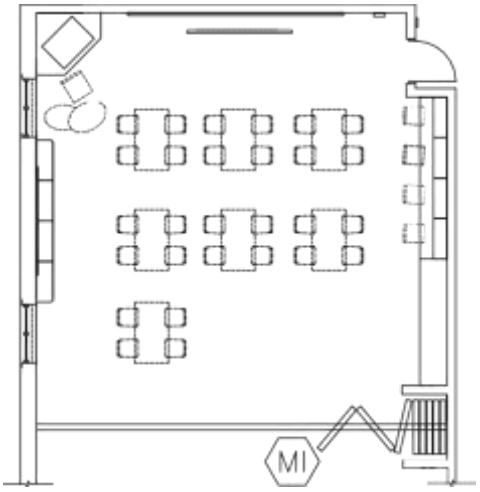
ENVIRONMENTAL CONSIDERATIONS:

- This room to be one-story (14'+/-) tall, adjacent to indoor riding area.
- Building is to be of wood construction.
- Optional: Provide loft space above stalls for storage.

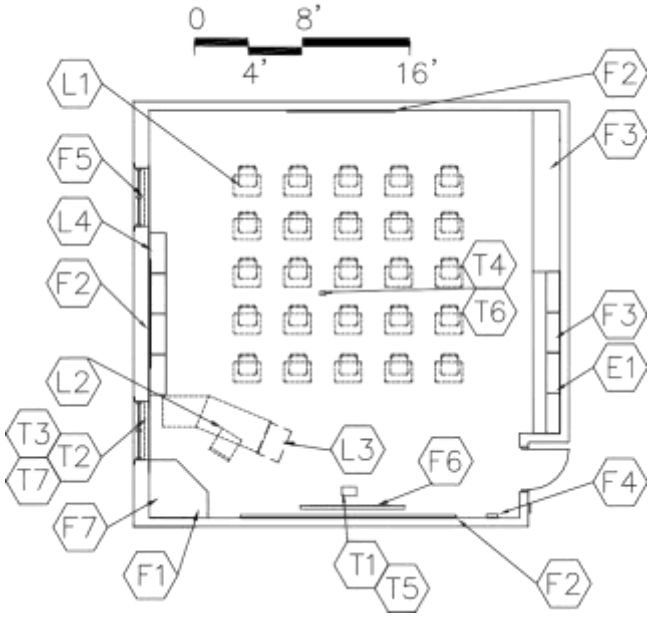
FEATURES[1]:	Spec. Ref.#
Fixed Items:	
(4) Paper towel dispensers	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
6 frost-free hose bibbs	224000
Plumbing connections	221116/221119/224000
Floor drains with clean-out pits	224000
HVAC:	
N/A	
Electrical:	
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
12 duplex receptacles (minimum)	262726
Communications:	
1 voice port and phone	271513/273123
1 data port	271513
Central sound system	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



CLASSROOM WITH OPTIONAL FOLDING WALL



TYPICAL CLASSROOM

CAPACITY: 25 students
SIZE: 900 SF

PROGRAM ACTIVITIES:

- Large group, small group, and individual instruction
- Group and individual work
- Demonstrations
- Accommodates any of the core academic disciplines

SPATIAL RELATIONSHIPS:

- ☐ Near other related lab
- ☐ Near teacher prep area/workroom
- ☐ Classrooms should be located in academic "zone" that is away from noisy or public activities
- ☐ Classrooms with access to media center and administrative services
- ☐ Flexibility of space
- ☐ Proximity to main corridor to accommodate other students without interrupting lab

ENVIRONMENTAL CONSIDERATIONS:

- Required: View glass – minimum 5% without daylighting design; minimum 3% with daylighting design.
  Recommended: Daylighting design with glazing area determined by design solution.
- Environmental sound control -
  wall only minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.
2. Depending upon the educational program of the district, a tall wardrobe may be placed in this classroom or could be placed in a teacher prep area/workroom.

RELATED CLASSROOM
CT-P7-2

FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or carpet tile	096816
Optional: linoleum, ET,	096516
or sheet vinyl	096500
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:

L1 Student desks and chairs
L2 Teacher desk or workstation/computer support and chair
L3 File cabinet
L4 9' of low bookcases (fixed or mobile)
Wastebasket

Miscellaneous:
Pencil sharpener ***(optional)***

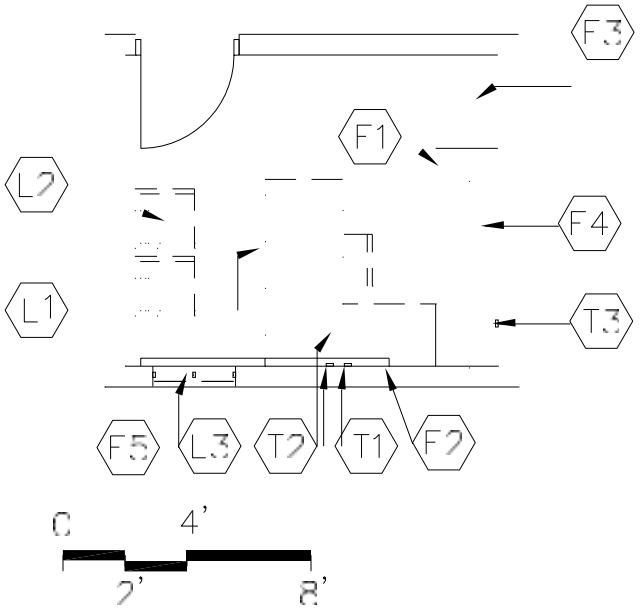
M1 Operable partitions between classrooms are optional 02226

E1 Duplex receptacle with dedicated circuit for wireless devices

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Tall wardrobe with file drawers	123550
F2 20'-32' combination marker board, tack board and tackable wall surface	101100
F3 18'-24' combination base and wall cabinets	123550
F4 Pencil sharpener support (optional)	062000
F5 Windows with integral blinds	085113
F6 Projection screen (optional)	115213
F7 Technology support casework	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Fluorescent lighting:	265100
Illumination level: See Table 8600-5	
Multilevel switching	262726
4 duplex receptacles	262726
Double duplex receptacle adjacent to each data and video port	262726
Communications:	
T1 1 ***projector*** video port	271543
T2 1 voice port and phone	271513/273123
T3 1 data port near teacher workstation	271513
T4 ***Wireless access point cable above ceiling***	271513
Clock	275313
Central sound system	275123
Sound reinforcement system	275127
T5 ***Ultra-short throw interactive*** projector	274119
T6 Wireless access point (WAP) as determined by Design – refer to Note 4	***272133***
T7 Classroom technology center video port	***271543, 274116, 274119, 275127***
Electronic Safety and Security:	
Life safety devices per code	283111

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.
2. Technology components may be placed in a separate small cabinet, or integrated in the other casework in the room.
3. Where appropriate, some casework may be mobile to add flexibility and become part of the loose furnishings.
4. ***Baseline includes WAP cable per classroom. WAP device quantity / placement per 272133 requirements.***



PROGRAM ACTIVITIES:

- Private space for program instructor
- One-on-one conferences with academic instructors, students, etc.

SPATIAL RELATIONSHIPS:

- Near related lab
- Direct access to school circulation areas

ENVIRONMENTAL CONSIDERATIONS:

- Environmental sound control -
  wall minimum STC 45
  ceiling minimum CAC 35, NRC 0.70

CAPACITY: 1 - 3 persons
SIZE: 120 SF

NOTES:

1. Loose furnishings shown represent one of many possible arrangements.

OFFICE
CT-P7-3

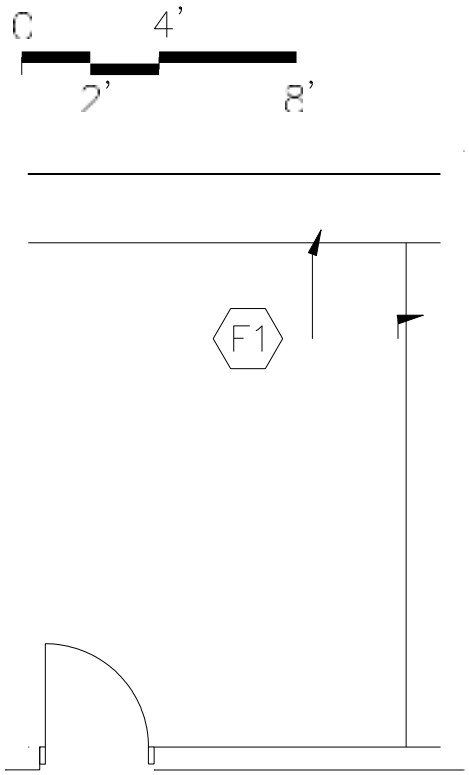
FINISHES[1]:	Spec. Ref.#
Flooring:	
Carpet or carpet tile	096816
	096813
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted gypsum wallboard over metal studs	092116/099100

LOOSE FURNISHINGS:
L1 Desk and chair
L2 Visitor chairs
L3 Computer desk return
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Work surface with file drawers	123550
F2 4' of tack board or tackable wall surface	101100
F3 Tall wardrobe	123550
F4 Wall cabinets above work surface	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Independent temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-5	
4 duplex receptacles	262726
Double duplex receptacle adjacent to data and video port	262726
Communications:	
T1 1 voice port and phone	271513/273123 T2
1 data port near workstation	271513
T3 1 ***projector*** video port	271543
Central sound system	275123
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references. Optional: moveable cabinets
2. Fixed casework and loose furnishings can also be all fixed casework or all loose furnishings.



PROGRAM ACTIVITIES:
- Space for storage of lab equipment

SPATIAL RELATIONSHIPS:
- Near related lab

ENVIRONMENTAL CONSIDERATIONS:
N/A

CAPACITY: N/A
SIZE: 200 SF

NOTES:

STORAGE AREA
CT-P7-4

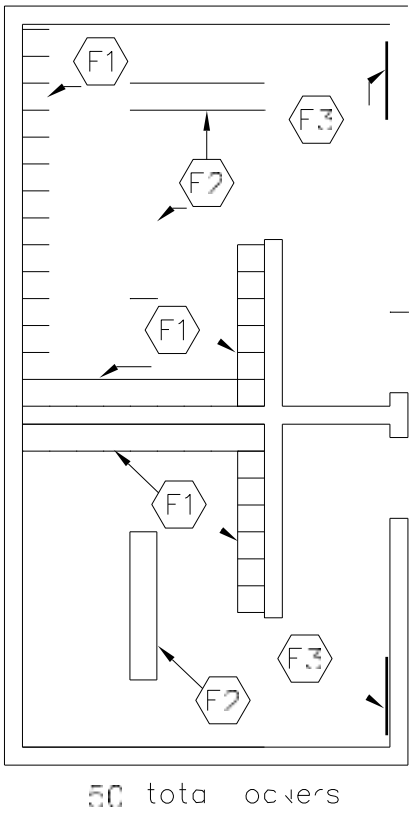
FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Base:	
Resilient base	096500
Ceiling:	
Exposed structure	---
Walls:	
Painted concrete masonry units	042000/099100

LOOSE FURNISHINGS:
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items[1]:	
F1 8'-20' of open shelving	
Depth may vary (fixed or loose)	123550
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
To be determined by Design Professional	
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Personal and health needs for the program Specific users.
- Changing of clothes and/or uniforms.
- Storage of personal items while students are in lab.

SPATIAL RELATIONSHIPS:
- Adjacent to related lab

ENVIRONMENTAL CONSIDERATIONS:
- Sanitary and durable finishes.
- Environmental sound control
  Wall minimum STC 40
  Ceiling minimum CAC 35, NRC 0.70

CAPACITY: N/A
SIZE: 9 SF per student (see Note 2)

NOTES:
1. Large and small changing areas are interchangeable for either males or females. Determination based on male/female ratio within each program.
2. Student count determined by total number of approved program spaces Types 5, 6, and 7 times 30.

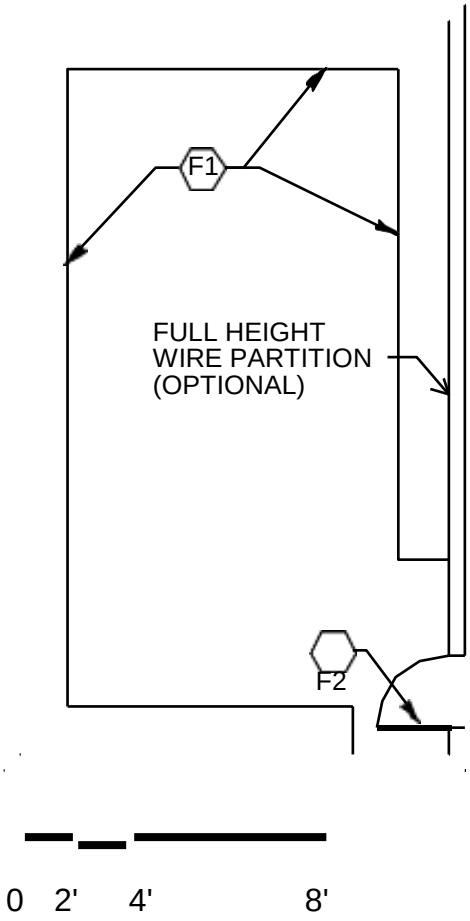
CHANGING ROOM
CT-P7-5

FINISHES[1]:	Spec. Ref.#
Flooring:	
Polished concrete finishing, or	033510
colored concrete finishing	033519
Optional: linoleum or rubber	096500 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical with high impact hold down clips	095113
Walls:	
Painted concrete masonry units	042000 / 099100
LOOSE FURNISHINGS	
Wastebaskets	

FEATURES[1]:	Spec. Ref.#
Fixed Items[1]:	
F1 Student lockers	105113
F2 Locker benches	062000
F3 24" x 60" mirror	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/Return air system	Div. 23
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Individual temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***6***	
2 Duplex receptacles	262726
Means of egress lighting per code	265100
Communications:	
Clock	275313
Central Sound System	275123
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.



PROGRAM ACTIVITIES:
- Storage of program related tools and instruments.
- Storage of students' tools.

SPATIAL RELATIONSHIPS:
- Adjacent to related lab

ENVIRONMENTAL CONSIDERATIONS:
- Sanitary and durable finishes

CAPACITY: N/A
SIZE: 550 SF
ANCILLARY SPACES:

NOTES:

TOOL CRIB
CT-P7-6

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Optional: linoleum, or rubber	096500 096516
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000 / 099100

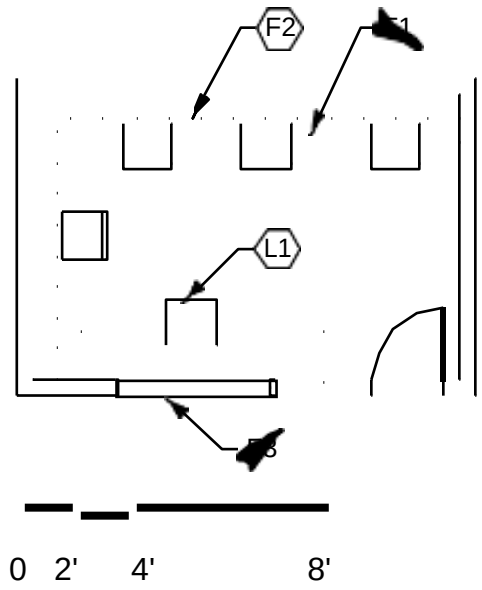
LOOSE FURNISHINGS
N/A

FEATURES[1]:	Spec. Ref.#
Fixed Items[1]:	
F1 80' of open metal shelving (total), Depth may vary (fixed or loose)	105613
F2 Dutch door	105613
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
4 Duplex receptacles	262726
Communications:	
N/A	
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

REFERENCE ROOM
CT-P7-7



PROGRAM ACTIVITIES:
- Individual computer research.
- Reference program specific manuals.
- Small group meetings.

SPATIAL RELATIONSHIPS:
- Adjacent to related lab

ENVIRONMENTAL CONSIDERATIONS:
- Sanitary and durable finishes
- Environmental sound control
  Wall ***only*** minimum STC ***45***
  Ceiling minimum CAC 35, NRC 0.70

CAPACITY: N/A
SIZE: 200 SF

NOTES:

REFERENCE ROOM
CT-P7-7

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	033000
Optional: rubber	096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000 / 099100

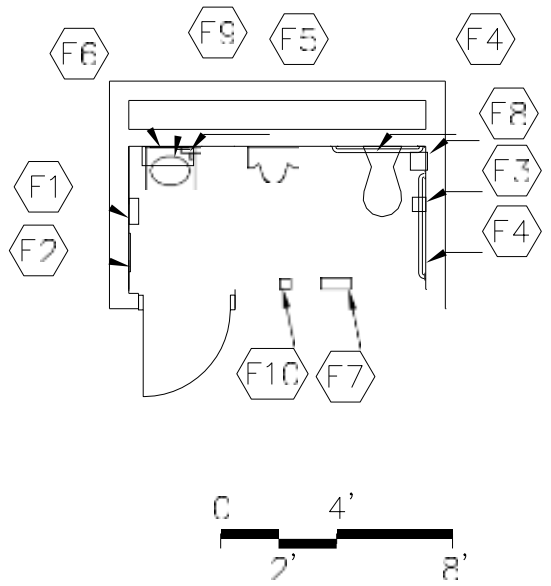
LOOSE FURNISHINGS
L3 Student chairs
Wastebasket

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 34' of plastic lam. counter	062000
F2 27' of adjustable shelving	062000
F3 Interior window	081113/ 088000
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
N/A	
HVAC:	
Supply/return air system	Div. 23
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
2 Duplex receptacles	262726
Duplex receptacle adjacent to Each data and video port	262726
Communications:	
T1 6 data ports	271513
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:

1. Finishes/Features: Refer to Chapter 9 for specification references.

TOILET ROOM
CT-P7-8



PROGRAM ACTIVITIES:
- Personal and health needs for the program
- Specific users
- Changing of clothes and/or uniforms.

SPATIAL RELATIONSHIPS:
- Adjacent to related lab

ENVIRONMENTAL CONSIDERATIONS:
- Sanitary and durable finishes.
- Environmental sound control
  Wall minimum STC 48
  Ceiling minimum CAC 35, NRC 0.70

CAPACITY: N/A
SIZE: 68 SF

NOTES:

TOILET ROOM
CT-P7-8

FINISHES[1]:	Spec. Ref.#
Flooring:	
Sealed concrete	***093000***
Optional: Rubber	096500
Base:	
Resilient base	096500
Ceiling:	
Suspended, acoustical	095113
Walls:	
Painted concrete masonry units	042000 / 099100

LOOSE FURNISHINGS
Wastebaskets

FEATURES[1]:	Spec. Ref.#
Fixed Items:	
F1 Towel dispenser	102813
F2 24” x 60” mirror	102813
F3 Toilet tissue holder	102813
F4 36” and 42” grab bars	102813
F5 Soap dispenser	102813
F6 16” x 24” mirror	102813
F7 Sanitary product dispenser	102813
F8 Sanitary product receptacle	102813
F9 Stainless steel shelf (optional)	102813 F10
Coat hook	102813
Fire Suppression:	
Fire suppression system	211000
Plumbing:	
Plumbing connections	221116/221119/224000
HVAC:	
Supply/return air system	Div. 23
Exhaust air system	Div. 23
Supplemental heat as required	Div. 23
Individual temperature control	230923
Electrical:	
Single level switching	262726
Fluorescent lighting	265100
Illumination level: See Table 8600-***5***	
2 Duplex receptacles	262726
Means of egress lighting per code	265100
Communications:	
Clock	275313
Electronic Safety and Security:	
Life safety devices per code	283111
Miscellaneous:	
N/A	

NOTES:
1. Finishes/Features: Refer to Chapter 9 for specification references.

INTRODUCTION

PURPOSE

The purpose of this chapter is to present guidelines for meeting the intent of OFCC Resolution 07-124 adopting LEED-Silver as a minimum standard for all OFCC projects and to provide a source of proven ideas and concepts for achieving that benchmark.

OFCC – LEED "SILVER"

On September 27, 2007, the OFCC passed resolution 07-124 which states: "For projects approved by the Commission subsequent to this date, LEED for Schools Silver Certification with a preferred investment in attaining LEED points in the energy and atmosphere category is the standard for projects participating in OFCC programs under the standards and specifications approved ***in the*** Ohio School Facilities Design Manual (OSDM).

Under the Commission's Green Schools Initiative, all future funded buildings will be encouraged to meet LEED Gold certification and attain Silver certification as a minimum.

LEED "RATING"

The U.S. Green Building Council (USGBC) developed the LEED (Leadership in Energy and Environmental Design) rating system in response to a growing need for defining and quantifying buildings as "green". The LEED rating system provides a nationally recognized standard and a third party certification of attaining sustainable design features.

LEED FOR SCHOOLS

The USGBC recognizes the unique nature of the design and construction of K-12 schools. Based on LEED for New Construction, the USGBD developed LEED for Schools that addresses issues such as master planning, classroom acoustics, mold prevention, school grounds design, and environmental site assessment. By addressing the uniqueness of school spaces and children's health issues, LEED for Schools is a unique, comprehensive tool for schools that wish to build green, with measurable results. LEED for Schools is the recognized third-party standard for high performance schools that are healthy for students, comfortable for teachers, resource efficient, and cost-effective.

LEED for Schools encourages project teams to use an integrated design approach and promotes improved practices in:

- Site selection and development
- Water use
- Energy use
- Environmentally preferred materials, finishes, furnishings
- Waste stream management
- Indoor air quality and comfort
- Innovation in sustainable design and construction

SUSTAINABLE FEATURES The importance of understanding the design and construction industry's environmental impact is critical. Each year the built environment consumes significant amounts of the nation's raw materials (40%), total energy produced (33%), and fresh water use (17%). The challenge is to design intelligent, economically prudent structures that use a minimum of nonrenewable energy, produce a minimum of pollution and wastes, and are generally environmentally benign; all the while increasing the comfort, health, and safety of the people who live and work in them.

A sustainable school facility provides a healthy indoor environment for students and staff, lower life cycle costs, and lessens the environmental impact during construction and occupancy. An additional component should result – increased student achievement.

Research indicates that test scores increase when daylight is introduced to a classroom. The optimum design solution is one that effectively emulates all of the natural systems and conditions of the predeveloped site – after development is complete.

The major features of sustainable school building design are:

- Sustainable Site Planning and Landscape Design
- Renewable Energy Sources
- Integrated Day Lighting and Electrical Lighting Systems
- Energy-Efficient HVAC Systems
- Energy-Efficient Building Shell
- Environmentally Preferable Building Materials
- Indoor Environmental and Air Quality
- Water Conservation
- Construction and Occupancy Waste and Recycling Systems
- Transportation and Community Integration
- Systems Commissioning and Maintenance Programs
- Eco-Education
- Classroom Acoustical Performance
- Refrigerant Management
- Commissioning

These features support the use of the United States Green Building Council (USGBC), Leadership in Energy and Environmental Design (LEED) Green Building Rating System, but focus on principles and strategies rather than specific solutions or technologies, which are often site specific.

Many of the preceding features are being incorporated in new school facilities through criteria in the Design Manual guidelines. School districts and their Design Professionals are encouraged to recognize, perpetuate, and include sustainable features in their buildings.

WHOLE BUILDING DESIGN

According to the *Whole Building Design Guide*:

> Whole Building Design consists of two components: an integrated design approach and an integrated team process. The "integrated" design approach asks all the members of the building stakeholder community, and the technical planning, design, and construction team to look at the project objectives, and building materials, systems, and assemblies from many different perspectives. This approach is a deviation from the typical planning and design process of relying on the expertise of specialists who work in their respective specialties somewhat isolated from each other.
>
> Everybody engaged, every issue considered, early in the project.

Within LEED, there are two essential components to a successful integrated design process. The integrated team process is defined through design charettes (eco-charrettes); the integrated design approach is represented by the results of the energy modeling which begins at the very onset ***(schematic design phase)*** of the project and continues through the development of construction documents.

A. INTEGRATED TEAM PROCESS: The Eco Charette

1. The purpose of the OFCC's eco charrette is to:
   a. Understand the owner's project requirements and the options available to the design team for achieving those.
   b. Integrate the design team and assign tasks for small group collaboration.
   c. Integrate energy saving design elements and technologies into the project wherever possible.
   d. Develop community buy-in of project and increase the likelihood of the district developing their local share of the project costs (through all existing resources).
   e. Encourage greater community connectivity.
   f. Ongoing development of LEED Project Checklist.
   g. Optimize building performance.

2. The eco charrette is to be interactive and address the questions: What can we do? What do we want to do? What do we need to accomplish our (owner's) goals? Who do we need to invite to the table? There are three good places where a charrette or charrette-like workshop will benefit the project:
   a. During the Planning Phase: Prior to the development of the PoR (or Owner's Project Requirements), the design team, District, and OFCC planning manager would host a community meeting and engage members of the community in a discussion of options, desires, and requirements. The goal would be to leverage the support of the community to pass levies or issue bonds to be fund the project and to bring needed support for elements of the project that would be beneficial to the community. This charrette could be facilitated by an expert in obtaining positive outcomes in community meetings.
      1) Outcome: Develop elements of the PoR that the community will support that meets the mission of the school.
      2) Outcome: Create a list of needs, including what community partners will be essential to have at the table as we move forward.
   b. During Schematic Design: The design team has developed the Owner's Project Requirements and the "Basis of Design" document. Site information is known, preliminary design concepts are clear and it is possible that they may be fully developed. Given extensive knowledge about the project and site, this charrette would encompass discussion of learning spaces, invite major stakeholder input, and completion of a LEED Project Checklist.

1) Outcome: Development of a realistic preliminary LEED Project Checklist.
2) Outcome: Development of a list of possible design elements that need research to determine viability.
3) Outcome: List of needed resources for project needs.
4) Outcome Task assignment related to LEED checklist items.
5) Outcome: Creation of small teams that will work through design elements, for example architect, mechanical engineer, and CM cost estimator working through energy modeling according to GO Specs.

c. End of Schematic Design: More of a design charrette where the design team comes together with drawings on the wall to critique, modify, optimize, and begin to finalize designs. This charrette would be facilitated by a mentor with demonstrated experience and success in designing in high performance, sustainable design, and should understand the commission's objectives with the LEED initiative.
   1) Outcome: Design is optimized for daylighting, energy performance, rain water harvesting, and implementation of renewables such as solar thermal.
   2) Outcome: Schematic design documents are ready for finalization and submission to OFCC for review.
   3) Outcome: LEED Online Design Submission is ready to be completed. LEED Project Checklist is finalized barring any unforeseen opportunities or difficulties that arise as the project enters the construction phase.

B. INTEGRATED DESIGN APPROACH: Energy Modeling

1. Modeling During PoR and SD: Envelope Optimization
   a. The goal of modeling here is to run energy usage models for your building based on square foot allotted, building orientation, shape, envelope, fenestration, and the integration of daylighting and to integrate those elements creating the optimal space possible for the allowable space to be lighted, heated, and cooled as efficiently as possible. This is similar to working the building like a block of clay and building out the space as the design team continuously runs it through a modeling software and gaining insight as to how to best optimize it for long-term energy performance.
   b. For this modeling, it is essential to use software that is very robust in dealing with envelope materials and daylighting, such as the U.S. Department of Energy's eQUEST. Through the use of such software, architects and engineers work together to continually improve the performance of their building by adapting the orientation, walls, windows, and other external elements based on information learned about the interaction of the wall insulation and natural daylight penetration.

2. Modeling During DD and CD: Energy System Optimization
   a. Once the building is optimized for energy performance based on the integration (or remediation) of external influences (sunlight, wind, heat gain, heat loss); the design team can move forward to begin laying out interior spaces more precisely; designing HVAC, plumbing, electric, etc. ***For this final load analysis and equipment selection, the Mechanical Engineer may elect to use commercial software such as indicated in the Systems and Materials section of Chapter 8.***

END OF SECTION

INTRODUCTION

Of all the typical sustainable design strategies that could be implemented into a school, daylighting will have the greatest positive impact. This daylighting guideline addresses those key design considerations typically confronted when designing K-12 schools in Ohio. To achieve a successful daylighting strategy, school designers must:

- Consider human factors
- Consider the energy ramifications
- Account for site constraints and benefits
- Select well-integrated daylighting strategies
- Optimize the most appropriate daylighting strategies
- Accurately simulate daylighting performance
- Verify and modify your design process.

A. CONSIDER HUMAN FACTORS

Daylighting design is not just putting in a lot of windows. If uncontrolled, direct beam radiation will stream in through your classroom window into a student's face and the teacher will simply close the blinds, negating your daylighting strategy all together. The most important aspects of good daylighting design are to understand human nature and to be realistic. Daylighting done well in a school helps:

- Improve student performance
- Create a healthier indoor environment
- Increase attendance
- Decrease energy consumption
- Reduce maintenance

1. Daylighting must be superior.

a. For daylighting strategies to be effective, the great majority of time that teachers and students are in the particular space, the daylighting strategy must be superior to your electrical lighting. If not, the habit of walking into a space and turning on the lights will never be broken. Develop your daylighting strategy to provide superior lighting for two-thirds of the daylit hours. The examples of typical spaces provided in this guide were developed to achieve the desired footcandle level 65% to 75% of the time. The following desired footcandle levels were assumed for each type of space:

1) Classrooms ***40*** footcandles
2) Ag-Tech Labs ***50*** footcandles
3) Elementary Gymnasiums 30 footcandles
4) Middle & High School Gyms 50 footcandles

b. In determining the desired footcandle level in a particular space it is also important to understand how this requirement may change over a typical day. For example, a classroom will require 50 footcandles of light during class periods but at night the same space may be used for parent-teacher meetings or an individual teacher's work. In these cases, 40 footcandles may be adequate if the teacher's area is lit appropriately.



1) Daylit Classroom



2) Daylit Gymnasium

2. Eliminate direct beam radiation

a. An essential component of any good daylit school design is the elimination of uncontrolled, direct beam radiation. It is critical that in all classrooms, gymnasiums, ag-tech lab spaces, media centers, and administrative spaces, the design strategies bounce, redirect, or filter the sunlight so that direct radiation does not enter a space where it could be problematic. This is easy to say, but harder to achieve. This constraint essentially eliminates most commonly designed windows as good daylighting strategies.

3. Consider the need to darken individual spaces

a. The success of your daylighting strategy will certainly be determined by how occupants interact with the various components of your daylighting strategy. This is particularly true when it comes to the incorporation of blinds or shades that can be used to darken a particular space. If the blinds are left closed, the daylighting contribution will never be realized. If temporarily darkening a specific space is not required functionally, don't install shades or blinds. The implementation of blinds will result in decreased performance, increased first costs, and greater long-term maintenance expenses.

b. If the intended function of the space requires darkening for limited periods of time, consider motorized roll shades or motorized vertical blinds. It may seem like more long-term maintenance but it is actually less. The mechanical stress placed on manual operators by the students and teachers (do to uneven cranking) limits the effective life of these devices to under ten years. The inconvenience associated with the process also results in a number of these shades being left closed. The implementation of motorized shades, while more expensive to install, will provide the teachers and students with greater ease of operation and result in a better performing daylighting design.

4. Only use shades if entire space needs to be darkened

a. Today's classrooms commonly use digital projectors and TV monitors that are best viewed in locations with lower than normal light levels. When designing your daylighting strategy, consider creating a darker location(s) in the room for the projection screen or TV monitor. See the section on Optimization. This strategy will allow the majority of the classroom to remain well daylit while still providing good viewing.

b. Only utilize darkening shades if the entire space requires darkening.

5. Don't count on view glass

a. Wall space is precious in schools. This unfortunately results in many lower, view glass windows also serving as display areas. Additionally, these windows are almost always accompanied by blinds that can readily be closed by the teachers and students. In designing your daylighting strategy, do not count on low, view glass windows for your daylighting strategy. Develop your design around roof monitors; high, south-side lightshelf apertures; or high, north glass transom windows that would be hard to reach and even harder to block.

6. Concentrate on the most utilized spaces

a. Daylighting strategies do cost money to implement so it is important to place them where they do the most good. Put them where the students are the most – in the classrooms. Gymnasium spaces are also typically used more, longer into the day and most of the year.

b. From a student and teacher productivity standpoint, classrooms are the most beneficial spaces to daylight. Design daylighting strategy to provide natural lighting for at least two-thirds of the daylit hours in:

1) the majority of the classrooms
2) special needs classrooms
3) gymnasium
4) ag-tech labs
5) cafeteria
6) media center
7) administrative areas

7. Utilize low, view glass to provide visual connection to outdoors

a. Regardless of building code requirements, you should incorporate a reasonable amount of low view glass for the students' benefit of a visual connection to the outdoors.

B. Consider the Energy Ramifications

From an energy perspective, the worst thing that you can do is to implement a daylighting strategy that is not quite good enough. If you create a situation that typically has insufficient natural sunlight, resulting in lighting not being turned off as planned, you have created a negative energy situation. The spaces will gain all the heat produced from the lights as well as the heat created by sunlight.

If designed correctly a daylighting strategy can reduce:

- electricity for lighting and peak electrical demand
- cooling energy and peak cooling loads
- maintenance costs associated with lamp replacement
- electrical service to building
- in some cases, the number of installed lighting fixtures in the school

1. Orient building to maximize daylighting

a. A good, cost-effective daylit school design starts with good orientation. To maximize your opportunity for daylighting, lay out the school on an east-west axis with the majority of spaces facing either south (best) or north (second best). This will be particularly important if you are going to rely on side lighting (versus roof monitors) as a significant daylighting strategy.

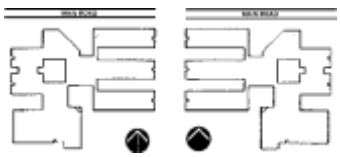
2. Maximize south glazing; minimize east and west facing glass

a. By employing south-facing apertures, you create a strategy that is much easier to control through the use of external window treatment strategies. It enables you to maximize winter radiation and optimize summer gain. As you can see from the accompanying chart that indicates the amount of radiation falling on different flat, non-shaded surfaces, a south-facing aperture is the only orientation that, on an annual basis, balances typical thermal needs and lighting requirements with available radiation. In the summer, the least amount of radiation hits the south, vertical surface of your school and in the winter, the most radiation strikes this surface. With few exceptions, having more solar gain entering your school in the winter is a benefit. As you can see, east- and west-facing apertures receive twice the amount of radiation in the summer as in the winter. Even north-facing apertures, although very slight, will also see a slight gain in the summer versus the winter.

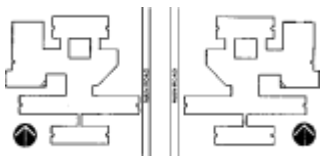
b. Remember that the more sunlight that you allow to enter your building to address your lighting needs, the more heat you also have to deal with. By placing your apertures correctly, nature will be working with you versus against you.

c. Daylighting strategies can even be successfully implemented in prototype schools. The following prototype design was developed to address the potential of multiple orientations and entry possibilities.

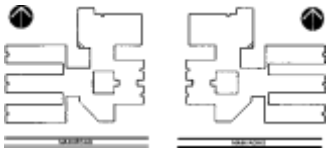
1)



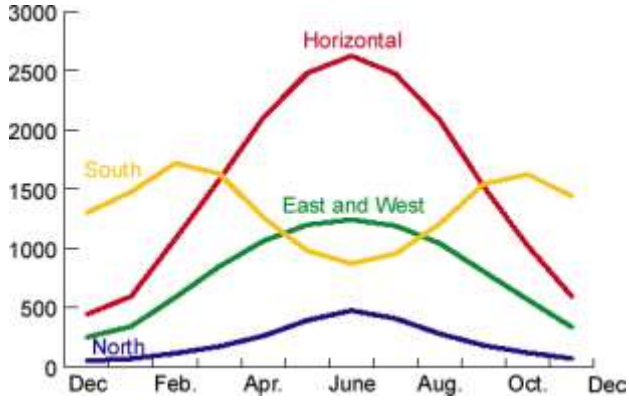
2)



3)



d. As you can see, the classroom wings, under any scenario, run east-west in length with roof monitors facing south or north. The rest of the building core was developed so that square roof monitors could be rotated within the same space, always facing south.



1) Radiation striking each surface at 40^0 latitude
(Btu/sf of unprotected glass/day)

3. Avoid uncontrolled skylights

a. The worst energy choice a designer can make is to implement skylights. The warmer months get the most radiation, just when it should be avoided. More than twice the radiation will enter through a flat skylight in the summer than in the winter, just the opposite of what you want.

b. The best way to design the size of daylighting apertures is to size glazing and overhangs so that just the right amount of radiation is brought into the school during peak cooling conditions. If the glazing is south-facing, this strategy will create optimal conditions by allowing more and more radiation to enter the space as fall progresses into winter. However, if you have a flat skylight, and you design the apertures to allow the optimum amount into the space during the summer peak, there will not be enough daylight to fulfill typical needs the rest of the year.

c. While skylights can be designed with internal, tracking louvers and produce very nice daylighting, it is still difficult to justify them when it comes to reducing cooling peak loads.

4. Optimally size overhang on south-facing glazing

a. When considering strategies to optimize daylighting and energy, think of how your glazing can be placed and again consider the above chart (graph shows varying radiation hitting each surface without any external shading devices or overhangs). Also consider the azimuth angles throughout the day during both summer and winter. Several things should drive your balancing act.

b. To reduce winter heating load, place the overhang much as you would if designing a passive solar building. Start out by placing the outer point of the overhang on an angle about 45 degrees from horizontal, above the head of the window. This will allow most of the solar gain to enter during the winter when the sun's altitude, even at noon, is low.

c. Remember that it is very easy to put in enough glazing to provide a very high daylighting contribution. The key will be using the maximum while not negatively impacting cooling loads (particularly the peak). By moving the overhang in and out and simulating these different conditions during peak cooling times (as well as annual simulations), you will be able to determine the correct, optimum location. You do not want anymore radiation entering the space during peak cooling times than is necessary to deliver the footcandles necessary. If during peak cooling time the space has higher footcandle levels than is necessary, you will increase cooling loads.

d. Because of the sun's very low azimuth angles that hit the east and west sides, it is very difficult and expensive to develop any strategy that can produced a "controlled" daylighting solution that maximizes winter gain and minimizes summer gain. Avoid east and west glazing.

5. Reduce installed lighting

a. All good daylighting strategies will reduce long-term operational costs. One strategy to lower the first costs associated with daylighting is to reduce the installed lighting in the classrooms. To achieve this, the designer needs to:

1) consider how classroom usage changes from typical daytime conditions to nighttime uses
2) evaluate if there are different lighting requirements associated with different uses (e.g., during the day the desired light level is ***40*** footcandles in the classrooms but, at night, the necessary light level may drop to 40 footcandles, when parent-teacher meetings and other activities require less light)
3) determine the minimum daylighting contribution during school hours
4) determine if there was a minimum amount of daylight that can be counted on to reduce the installed lighting

b. Good daylighting design that provides two-thirds of the lighting needs during daytime hours will typically allow at least 10 footcandles of natural light to enter the space even on a very overcast day. The only exception is normally (depending upon what time classes start) in December, very early in the morning, when it could still be dark outside. However, if you add up all of these hours when it is still dark outside, the total for the year would normally be less than a dozen hours. If the space lighting requirements are less for the projected nighttime use, and considering the few hours that are impacted, lowering the footcandle level makes good sense. The result will be one-fifth less installed lighting.

c. If the space has the same nighttime function (for example a classroom that will have night classes) you will need to install the amount required to address the full footcandle demand.

d. Another good example of a space that cannot be reduced is a gymnasium. Since the gymnasium is used for the same function during the day and night, no reduction in installed light is possible.

6. Reducing cooling loads

a. In the warmer months, cooling loads can be reduced by providing just the right amount of daylighting in your school. Because the lights are out, the cooling load is lower. This is because the lumens per watt from daylighting is twice that of typical fluorescent fixtures. In other words, to meet the same lighting need, daylighting produces half the heat. However, to achieve this reduced cooling it is essential that during peak cooling times:

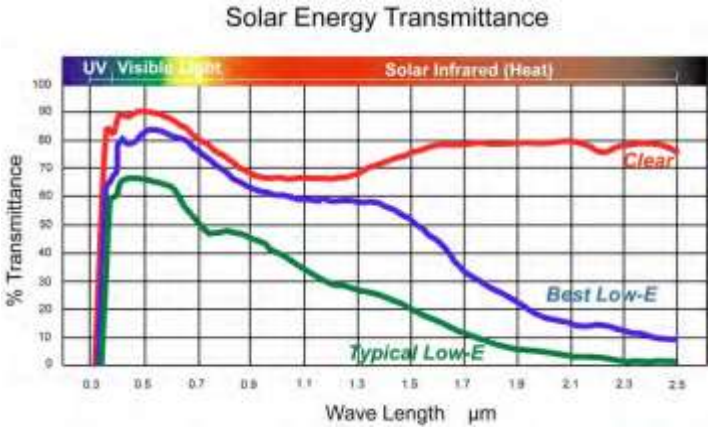
1) no more radiation is allowed to enter your building than is required to meet your footcandle objectives
2) properly sized overhangs limit the radiation to optimal amounts
3) the lights, with the use of photo sensors, are automatically dimmed (or stepped)

7. Passive solar can offset heat previously provided by lights

a. However, you also need to remember that, like in the summer, the lights are mostly off in the winter. This means that the heat that was typically being produced by the lights is gone, appearing to create a seemingly increased heating load. Not so. It is simply the result of the lights being off and not producing heat and the mechanical heating system having to address more of the load.

b. If the school is heated with a gas boiler, slightly more natural gas but much less electricity will be used. Typically, even with greatly increasing natural gas rates, this is a good tradeoff. If heating is to be accomplished with a heat pump, the tradeoff would likewise be smart since the heating efficiency of the heat pump is greater than that of electric lights.

c. However, with natural gas prices skyrocketing, it makes sense to take advantage of passive solar strategies. You can easily design a north-facing roof monitor that will, over the course of the year, provide as much daylighting into a classroom. But, if that same monitor were facing south, the glazing area could be 15% to 20% less in size (resulting in lower first cost as well as conductive heat losses). When coupled with well-designed overhangs, the south-facing monitors could maximize winter solar gain. This strategy can do a lot to offset winter heating requirements. Remember that in Ohio, the school's heating demand was previously masked by the fact that the lights were doing a lot of the heating.



8. Select the right glazing

a. In all cases, windows should be made of high-quality construction, incorporate thermal breaks, and include the appropriate glazing for the particular application. Make a clear distinction between glazing that is incorporated for views and ventilation and that which addresses daylighting needs

b. In all cases, where windows are used specifically for daylighting, clear glass has an advantage over glazing with a low-E coating. Because of the 10% to 30% reduction in visible light transmission characteristic of most low-E coatings**,** 10% to 30% more glass would be required to produce the same daylighting benefit.

c. In evaluating the trade off between the thermal benefits associated with low-E coatings and the visible light transmission, your calculations should also consider the accompanying costs of lightshelves or roof monitors that would also have to be proportionally added if more glazing is required. Because of these other system component costs, the tradeoff is seldom worth it from a life-cycle approach. However, wherever low, view glass windows are incorporated, low-E coatings should be used to improve comfort and save energy.

d. Carefully consider the visible light, solar transmission, and insulation qualities of the particular glazing system you are evaluating, with particular emphasis on how much additional glazing will be needed to achieve the same visible light transmission. If you are to effectively address energy at the same time you are creating a good daylighting strategy, it will be important to minimize the size and maximize transmission of daylighting apertures.

9. Consider reduced maintenance

a. When considering the energy-related life-cycle benefits associated with daylighting, don't forget the maintenance savings associated with lamp replacement. Although the fluorescent lamp life is actually decreased by employing staged dimming strategies, this is more than offset by the fact that the lamps are on the majority of the time. When comparing a typical non-daylit classroom to one daylit, the lamps in the non-daylit space will require lamp replacement three times more than in the daylit space.

C. Account for Site Constraints and Benefits

The most obvious site consideration is orientation. A design can only be maximized if oriented correctly. The potential for cost-effective daylighting is greatly enhanced by elongating the school on an east-west axis, locating high priority spaces on the north and south exposures. A one-story design consumes more land area but maximizes your opportunities for roof monitors.

1. Account for shading from adjacent buildings and trees

a. When integrating your building into the overall site, make sure that your daylighting apertures are not unintentionally shaded by adjacent buildings or vegetation. Verify that your own building's components do not create a negative impact.

2. Consider the reflectance from adjacent surfaces

a. Consider the reflectance of the materials in front of the glazing areas. The use of lighter roofing colors can reduce the glass area need for roof monitors; while a light colored walkway in front of a lower window may cause unwanted reflections and glare inside the classroom.

3. Utilize landscaping to benefit overall design

a. Identify and incorporate design elements that are to become teaching tools or integral aspects of educational programs.

D. Select Well-Integrated Daylighting Strategies

Most designers who are considering implementing daylighting strategies for the first time are very concerned that their projects will go over budget and result in having to delete the daylighting strategy altogether. More often than not, this creates a negative consequence. In trying to think ahead to the process of "taking the daylighting out of the design," the designer never truly integrates the daylighting components into the overall design, thus hurting the budget that they are trying to protect.

1. Don't consider daylighting strategies as alternates

a. The most economical and effective daylighting strategies are ones that are very well integrated into the design from a structural, mechanical, electrical, and architectural standpoint. Daylighting is not as simple as it may appear. To do it well, the many inter-related aspects of the school's architecture, landscape, and engineering must be considered. If daylighting is fully integrated, many common architectural components can serve dual functions. White roofing material will reduce overall cooling loads while allowing desired radiation into a south-facing daylighting aperture, thereby reducing the glazing requirement. Mechanical cooling equipment can be further reduced because the lighting loads are reduced. Only a comprehensive, well thought out approach will guarantee a low cost system that accomplishes the benefits you hope to achieve.

b. The opposite is true if the design is not fully integrated. If designed and bid as an alternate, it is unlikely that the daylighting strategy will be nearly as cost effective or resource smart. The problem arises if the designers think that the daylighting components will have a good chance of being eliminated. Once the designer has this mindset, it is very unlikely that they will risk designing a smaller mechanical cooling system, thinking that they may have to redo the design at their cost.

c. The best way to guarantee a low cost daylighting strategy is to fight against this instinct and integrate your strategy early in the schematic design phase. With good schematic design cost estimates that reflect the added daylighting components as well as the reduced cooling equipment and eliminated building components (that would have typically been implemented), you will soon see that the "net" daylighting costs are very reasonable.

2. Consider roof monitors and lightshelves

a. When considering the best daylighting strategies for a particular school, many factors will play a role in determining the best daylighting strategies to employ. However, from a typical school situation, you should place roof monitor and lightshelves at the top of that list to consider.

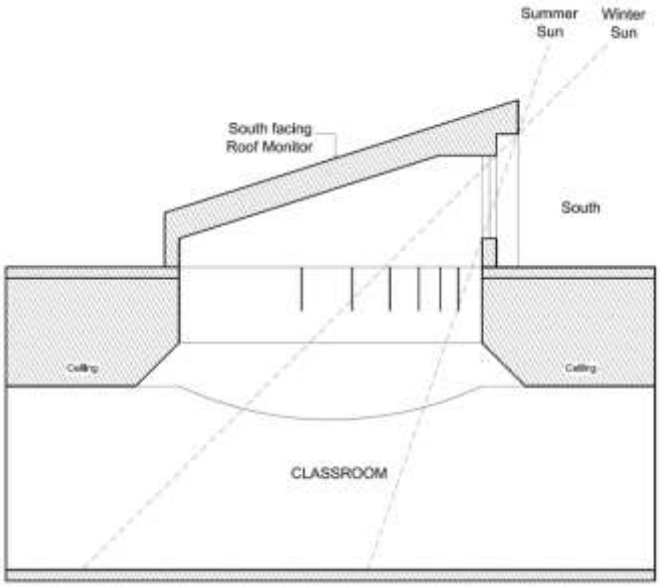
b. South-facing Roof Monitors - Roof monitors, incorporating vertical south glazing and properly sized overhangs and interior baffles, have an advantage in that they:

1) Create very uniform lighting throughout the space
2) Can be used to daylight spaces far from the perimeter of the building
3) Create passive heating benefits, allowing more radiation to enter the space in the colder months
4) Create a more diffuse, filtered lighting strategy; and eliminate contrast.

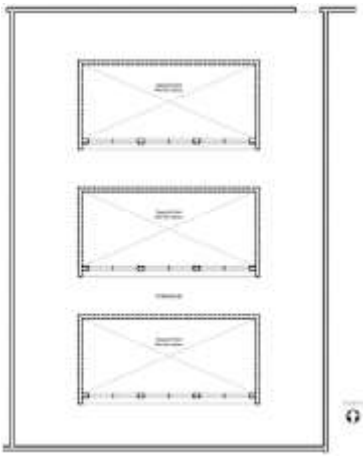
The big downside of roof monitors is that they can only be employed in single story designs.

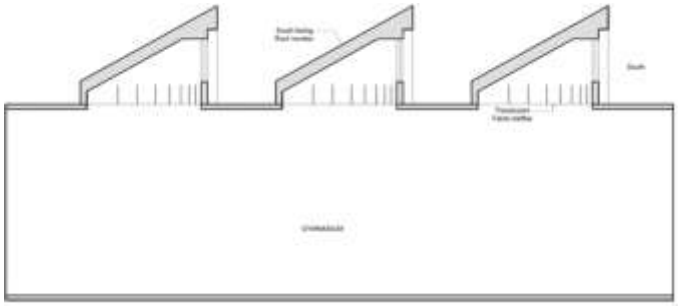


a) South-facing daylighting roof monitors



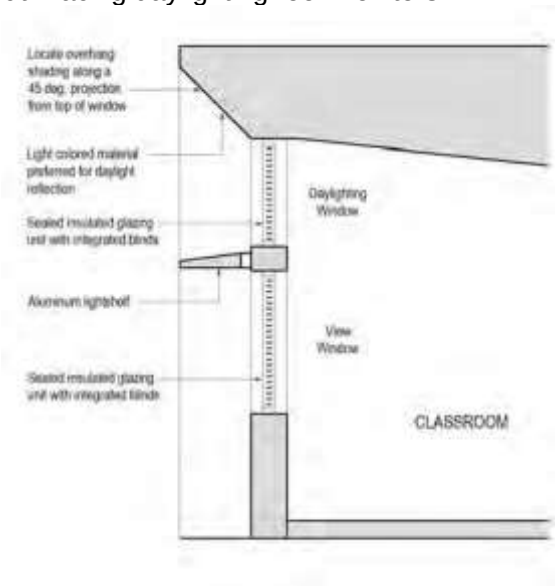
b) Classroom with south-facing roof monitor





c) Plan & Section of a Gymnasium with 3 south-facing daylighting roof monitors





d) South-facing lightshelf with blinds between the glass in the transom window

c. South-facing Lightshelves - From a light quality standpoint, lightshelves incorporated into south glazing strategies are typically the next best option in that they:

1) Can be used in multi-story situations
2) Can bounce sunlight to the back of most school classrooms
3) Help shade lower view glass (located below the lightshelf)
4) Typically cost less than monitor strategies

Their downside is that all the light is coming from one side of the classroom, making it harder to achieve uniform lighting. There is a fairly significant drop off in light levels at the back of rooms that are deeper than 20 feet and have ceilings that are 10 feet. Contrast between the brighter glazed wall and the opposite side of the room also must be addressed.

d. North-facing Roof Monitors - North-facing monitors, while similarly effective as south-facing monitors in providing natural light, are not as energy efficient because they typically require 15% to 20% more glazing to achieve the same annual daylighting contribution and they produce higher lighting levels in the summer than winter. North monitors are beneficial but, because of the additional glazing and the lack of passive heat benefits in winter, they are not as cost-effective as the south-facing monitor.

e. North-facing Transom Glazing - In north-side rooms, the use of high transom glazing can also be an effective strategy but requires more glazing. In spaces with both north and south exposures it may be logical to use a combination of south-facing lightshelves or roof monitors with the high, north glazing.

3. Provide proper glass-to-floor area ratios

a. Until detailed daylighting analysis is conducted, you can use basic rules-of-thumb (for Columbus, Ohio) that will help you in determining the right amount of daylighting glazing for particular systems. The percentages equal the glass-to-floor area ratio. The floor area in the classroom is equal to the primary area being daylit and excludes the area that is intentionally shaded at the teaching wall to allow for projector/TV monitor viewing.

	South-facing roof monitor	**North-facing roof monitor**	**South-facing B-B-G, double**	**South-facing B-B-G, triple**	**High-North transom**
900 sf Southside Classroom	9-10%	10-11%	11.5-12.5%	12-13%	--
900 sf Northside Classroom	9-10%	10-11%	--	--	11-12%
1,200 sf Southside Classroom	9-10%	10-11%	11-12%	11.5-12.5%	--
1,200 sf Northside Classroom	9-10%	10.5-11.5%	--	--	11-12%
600 sf Southside Resource	9-10%	10.5-11.5%	13-14%	13.5-14.5%	--
600 sf Northside Resource	9-10%	10.5-11.5%	--	--	13-14%
3,500 sf Gym/multipurpose	7.5-8.5%	--	--	--	--
16,000 sf High school Gym	9-10%	--	--	--	--
4,500 sf Ag-Tech Lab*	--	9-10%	--	--	--

*Ag-Tech lab assumed to not have a ceiling cavity

(continued on next page)

4. Factors for altering the glass-to-floor area ratio

a. If the following conditions exist, add or subtract the following percentage points from the ranges in the ratio of glass-to-floor area shown above. The percentages should be added or subtracted from the ratios pertaining to just the daylit space. For example, if an elementary gym's roof color in front of the south-facing roof monitor is a dark color instead of white, the glass area in the monitor should be increased from 8% glass-to-floor ratio to 9% glass-to-floor area.

	Classroom	Gymnasium
Color of Roof - In the case of a dark roof in front of a south-facing roof monitor	Add one-half of one percentage point to glass-to-floor area ratio	Add one percentage point to glass-to-floor ratio
Sloped Ceiling - In the case of a flat ceiling versus a sloped ceiling (sloped from a high above the daylighting window to back of room)	Add one-half of one percentage point to glass-to-floor are ratio	---
Ceiling Cavity - If the ceiling cavity is 10 feet versus 5 feet	Add three percentage points to glass-to-floor area ratio	---
Color of Interior Finishes - If the finish colors are darker than assumed (with a roof monitor)	Add one-half of one percentage point to glass-to-floor area ratio	---
If the finish colors are darker than assumed (with a side lit strategy)	Add one percentage point to glass-to-floor area ratio	---
If the finish colors are lighter than assumed (with a roof monitor)	Subtract one-half of one percentage point from glass-to-floor area ratio	---
If the finish colors are darker than assumed (with a side lit strategy)	Add one percentage point to glass-to-floor area ratio	---

	Light Colors	Assumed Colors	Darker Color
Walls	70%	60%	50%
Ceiling	85%	80%	70%
Floor	50%	35%	30%

Location in Ohio If in Cincinnati versus Columbus	Subtract one-half of one percentage point from glass-to-floor area ratio	Subtract one-half of one percentage point from glass-to-floor area ratio
If in Cleveland versus Columbus	Add one percentage point to glass-to-floor area ratio	Add one percentage point to glass-to-floor area ratio

E. Optimize the Most Appropriate Daylighting Strategies

1. South-facing Roof Monitors

As the primary strategy, south-facing roof monitors coupled with interior baffles can provide uniform light within the room and eliminate glare. When optimizing your south-facing monitor strategy, consider the following:

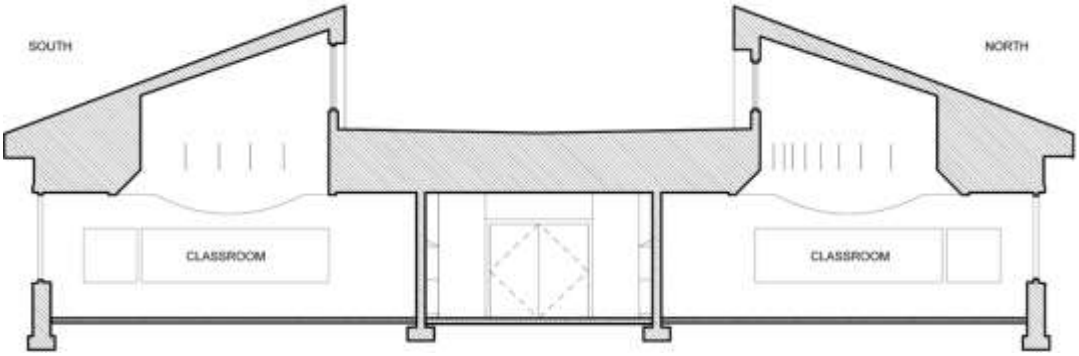
a. Minimize size by maximizing transmission

1) Minimize the size of the glazing by maximizing the transmission through the glass.

b. Consider the passive benefits

1) Design your south-facing monitor to capture passive heating in the winter months. This will help in offsetting the heat not being provided when electric lights are off. Do not over-extend your overhang. It will hurt your daylighting contribution as well as your passive heating benefit.

2) The glazing area, if south-facing, is typically 15% to 20% less than if north-facing. If you have both south- and north-facing monitors and want the profiles to be the same, you need to size the vertical wall of the monitor for the north side, since this will be a greater height.



c. Use light colored roofing in front of monitors to enhance radiation

1) Specify a light-colored roofing material to reflect additional light into the glazing. A white single-ply roofing material (aged reflectance of 69%) typically provides the best long-term reflectance. This compares to black EPDM of 6%, a gray SPDM of 23%, or a light colored rock ballast of 25%. Because single-ply roofing is smooth and without granules, it is also ideal for rainwater catchment systems. If installing a modified bituminous roof, use an Energy Star-rated, elastomeric coating with a reflectance of over 65%.



a) White roof in front of roof monitor windows reflects daylight deeper into the spaces.

Reflectance of Typical Roofing Materials[1]		% Reflected	% Absorbed
Single-ply Roof Membrane	Black EPDM	6%	94%
	Gray SPDM	23%	77%
	White EPDM	69%	37%
Asphalt Shingles	Black	5%	95%
	Medium Brown	12%	88%
	Green	19%	81%
	Gray	22%	78%
	White	25%	75%
Metal roof	Aluminum	61%	39%
	Metal White	67%	33%

[1] Source: Berdahl 2000. "Cool Roofing Material Database"

2) When white roofing is placed directly in front of the south-facing roof monitors, the glazing area in the monitors is able to be reduced by 5% to 10% because of the additional reflected radiation entering the monitor. Add one-half of one percentage to glass-to-floor area ratio for classrooms and one percentage point to glass-to-floor area ratio for gymnasiums.

3) The white color also provides an overall benefit by reflecting solar radiation that would otherwise be absorbed and re-radiated downward into the conditioned space. Energy savings also result as a benefit of a lowered cooling load.

d. Use baffles to block direct beam radiation and diffuse light

1) In the roof monitor's light well assembly, white baffles should hang parallel to the glass and be spaced to ensure that no direct beams can enter the space. The spacing and depth of the baffles should be determined so that when standing inside the room looking out, you do not see the sky. This will ensure that no direct beam light gets in.

e. Specify fire-retardant, UV resistant baffles

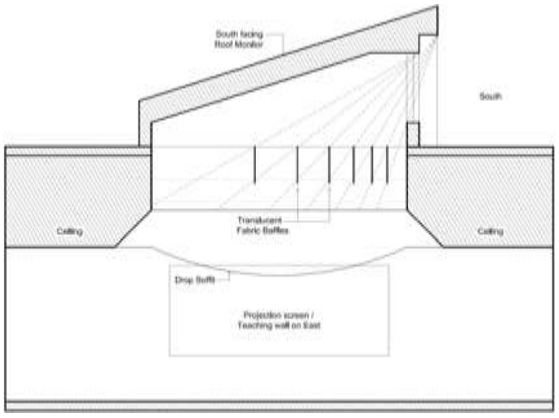
1) The baffles should be fire-retardant and UV resistant.

f. Use translucent baffles to help reduce contrast

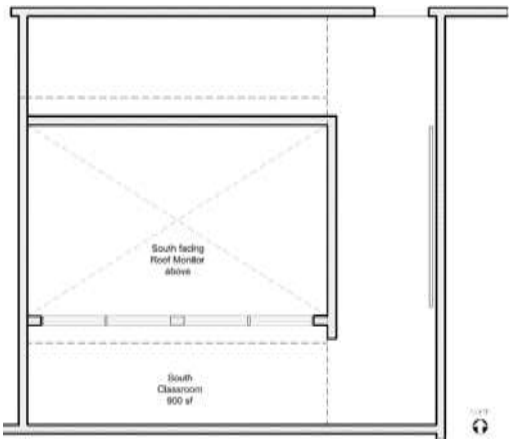
1) Light-colored translucent baffles not only reflect the sunlight into the space, but also help eliminate contrast from one side of the baffle to the other.

g. Minimize contrast at well-ceiling intersection

1) At the bottom of the light well, contrast is greatly lessened if there is a transition between the vertical plane surface and the horizontal. A 45 degree, angled plane is good but a curved transition is even better. To achieve this curved effect, many designers are now using fiber-reinforced plaster curved sections that blend nicely with sheetrock.



2) Section through south-facing roof monitor monitor in a classroom



3) Plan showing daylight roof

h. Address the monitor design

1) To help reduce conductive gains and losses, the walls and ceiling of the roof monitor should be well insulated and incorporate appropriate infiltration and moisture ***retarders***.

2) Make sure that the colors used within the monitor well are very light. White is best. Any use of darker colors will result in a considerable loss in efficiency.

3) Also consider the acoustic issues. If acoustical ceiling material is used, make sure that the reflectance as well as the acoustical properties are high. Often manufacturers will specify the paint color when describing the reflectance of an acoustical tile. Remember that you also need to account for the reduced reflectance due to the fissures and holes in the tile.

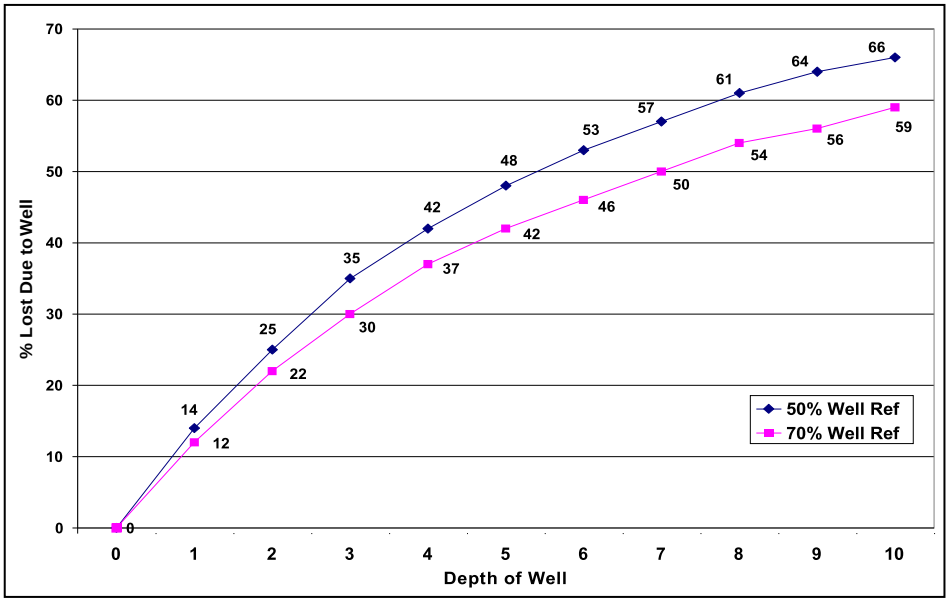
i. Let the heat stratify

1) One of the keys to achieving the desired cooling reductions is to rely on the stratification of heat within the monitor itself. You should not attempt to remove this heat by placing supply and return grilles in this area, but instead allow the heat to stratify. This benefit is often overlooked in designing daylit spaces and comparing one strategy to another.

j. Minimize the depth of the ceiling cavity

1) The depth of the well is very important. The deeper the well, the harder it is for the radiation to reflect down into the space. From the following chart you can see the theoretical decrease in efficiency that results from deeper and deeper wells. For example, with a seven foot deep, square sky well that has a 70% reflectance, the loss in effectiveness due to the well will be 50%.

2) To adjust your desired glass-to-floor area ratios from a ceiling cavity that is five feet deep to ten feet deep, add three percentage points to your glass-to-floor area ratio.



2. North-Facing Roof Monitors - North-facing monitors, while having a downside of being less energy efficient, can still provide good daylighting and a net energy benefit in particular types of spaces. In Ag-Tech labs, where baffles may be problematic from a cleaning standpoint, north-facing monitors may be a logical choice. When optimizing your north-facing monitors, consider the following:

a. Can dual-functionality serve as a mounting surface for a solar system

1) Because of the additional high costs associated with structural elements involved in supporting solar hot water systems or photovoltaic systems, selected daylighting roof monitors can also serve as a mounting surface for the collectors. This "cost-sharing" keeps costs down and allows inclusion of more sustainable design components that might not otherwise be as cost effective.



Solar collectors mounted on north-facing roof monitors

b. Consider the elimination of baffles
   1) Because of the orientation and limited hours that most school spaces would be used (not early or late in the summer months) baffles could be eliminated in these spaces.
   2) With north-facing monitors, baffles may be required in gymnasiums because this space is often utilized more during the summer.
   3) The baffles also can help from an acoustic standpoint. Other acoustical treatment may be required.
   4) The baffles, particularly in classrooms, help reduce the scale of the space, making the room not seem as tall.

3. Lightshelves on South Walls (Glass with internal, horizontal blinds)

Your choice of both interior and exterior lightshelves will be, for the most part, driven by the depth of the space. If the primary locations within classrooms (with 10 foot ceilings) that you are attempting to daylight are less than 20 feet from the south window, lightshelves can be effectively used. If the ceiling is higher (as in a multi-purpose room) or the ceiling is sloped, it is possible to use the lightshelves to reflect the light deeper. This strategy can often be coupled with high, north transom glazing to effectively light a space. When optimizing your lightshelf design, consider the following.

a. Recognize the limitations of side daylighting
   1) This is a very effective strategy for daylighting spaces in rooms with 10 foot ceilings up to 15 to 20 feet from the window and can be employed in multi-story schools or where roof monitors are not possible. The deeper the room is, the higher the ceiling has to be.
   2) From a normal window the illuminance levels will drop off considerably as you move away from the window. It would be common for a light level to be 120 footcandles at the window and 20 footcandles at a distance 8 feet back.

b. Bounces light deeper into space
   1) The lightshelf, made of a highly reflective material, will bounce the sunlight that strikes the top of the shelf's surface deeper into the building. The reflected sunlight will hit the ceiling and provide light for the room.
   2) Don't use lightshelves on northern exposures. They provide no benefit.

c. Shade lower view glass
   1) The exterior lightshelf also serves the vital role of shading the window below. With extended lightshelves covering lower view glass, it is possible to keep the lower view glass window treatments open more, particularly in the warmer months when the sun is higher in the sky.

d. Select durable but reflective lightshelf material
   1) Select durable materials for both interior and exterior lightshelves and, if reachable, design them to be capable of carrying the weight of a person.
   2) Specify aluminum exterior lightshelves as a good compromise between good reflectance, little or no maintenance, and cost.

e. Interior lightshelves

1) While the majority of the guidance in this document stresses the use of horizontal blinds-between-glass, the use of an extended interior lightshelf would allow you to implement a strategy with less glass area and better energy performance. The difficulty normally arises from the length the interior lightshelf has to be in order to block all the direct beam radiation.

2) Incorporate white painted gypsum board on top of interior lightshelves. However, aluminized acrylic sheets applied to the top of the interior shelf allows light to bounce further back into spaces and can improve performance in deeper rooms without top lighting.

3) A white or very light colored, translucent, interior lightshelf is better than a solid lightshelf because it will allow light to filter down directly under the lightshelf as well as reflect back into the space.



f. Interior, horizontal lightshelves are difficult to implement in schools

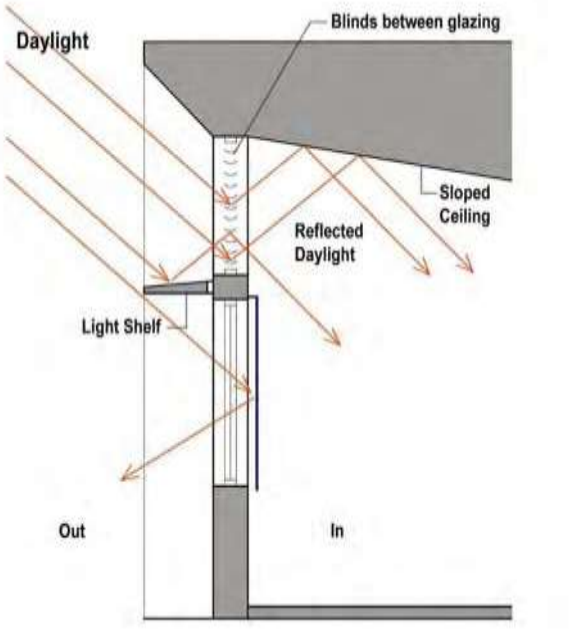
1) The use of an exterior lightshelf will shade much of the view glass below the shelf but it can not stop direct beam radiation from coming through the top section of glazing and into someone's face when the sun is low in the sky. One option is to incorporate an interior light shelf but this option often requires a significant depth to effectively block low altitude sunlight. They also can become problematic in schools if placed too low inside the classroom. A better option is to incorporate horizontal directional blinds that would intercept the direct beam light and either reflect it up to the ceiling or sideways to the walls.

g. Stop direct beam with vertical directional blinds

1) If the lightshelf area is narrow (in east-west direction) and located adjacent to the perpendicular walls (running north-south), vertical blinds can be employed to bounce the sunlight outward or towards the walls.

2) When installing vertical blinds make sure that one continuous blind is not installed that covers both the top lightshelf area and the view glass. This will clearly have a negative effect on the performance of the lightshelf, generally only making it effective in the months where the lightshelf can effectively shade the lower view glass. Install separate blinds for the glass above and below the lightshelf.
3) When sizing the glazing area, it is critical to account for the loss in sunlight coming into the space due to the window treatment.





h. Use horizontal blinds-between-glass
1) If the lightshelf is more extensive and is incorporated across all or most of the southern exposure, as is typical of most daylighting strategies, the design will require that the light is bounced up to the ceiling and back, to reach deeper into the space.
2) For these horizontal blinds to be most effective they should have the blades either flat or curved upward. If curved, they perform better if they are turned the opposite way that they are normally installed and are curved upward to reflect the light up to the ceiling. (Note that they do work reasonably well if curved downward, just not as well) Additionally, because of potential dirt build-up and maintenance, they should be placed between the glazing panes.
3) When sizing the amount of glazing required, make sure to account for the loss in transmission due to the internal shades and the third pane of glass.

4) Most of the shades that are available today are operable and have the opportunity to be closed if desired. However, if the space does not need to be temporarily darkened, the angle of the internal blinds can be fixed, angled up to the ceiling. By fixing the angle and not allowing the occupants to operate the blinds, there will less opportunity for the daylighting to be negated. The key is to look at the geometry of the blind in combination with the room – the width and spacing of the blinds, as well as the depth of the room. Understand that the blinds should be angled up so no direct beam radiation can hit any student sitting at their desks or working at a teaching station. But the blinds should be as horizontal as possible in order to bounce the light back into the space. The depth of the room is also a critical factor to consider. With the same angle of blind, direct sunlight may hit a student at the back of a deep room, while in a shallow space, the direct beam may simply hit high on the north wall. In a typical 900 square foot, square classroom, the angle should be approximately 35 degrees up from horizontal.

5) If the internal blinds do need to be operated for darkening purposes, it is desirable to have one setting that optimizes the gain while intercepting direct beam radiation and a second "closed" position.

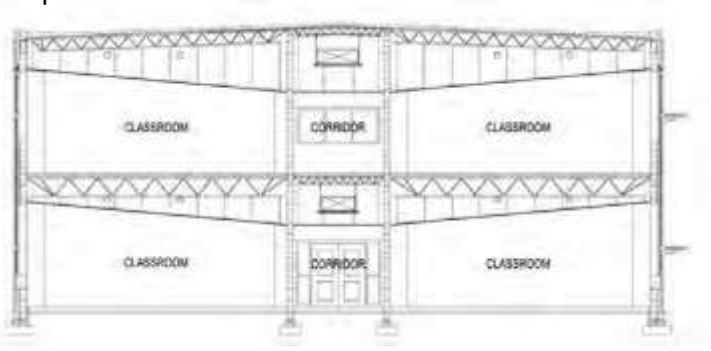
i. Elongate room to maximize glazing opportunity

1) The more elongated the classrooms and offices are in the east-west direction, the more opportunity there will be to achieve an adequate daylighting strategy that employs a lightshelf.

j. Slope ceiling from top of lightshelf glazing to back of room

1) To maximize the ability to bounce light deep into a space using a lightshelf and blinds-between glass, consider the advantages of sloping the ceiling from the top of the south-side lightshelf glazing down to the back of the room (north wall of space).

2) By sloping the ceiling from the outside wall to the back of the space it is often possible to encroach into the ceiling cavity space just at the window area, not increase floor-to-floor dimensions, and still have enough space for ductwork. A good comparison can be made by looking at a classroom with a flat ten foot ceiling versus one that might be 11'-4" at the lightshelf and 9'-0"at the back of the classroom. By dropping the ceiling at the corridor wall, there is still adequate ceiling cavity for mechanical units and ductwork can run between the floor joists out to the perimeter.



k. Implement lightshelves to complement roof monitors

1) Lightshelves on south-facing windows can be very effective in complementing the daylighting provided by the roof monitors. Windows placed on the south wall, one on each end of a classroom, could be used to better balance the daylighting within the space.

4. High Transom Glazing on North Walls - From a daylighting perspective, high, north transom glazing can provide a good daylighting option in spaces that are not too deep. Like north-facing roof monitors, they take more glazing than would a south lightshelf to achieve the same annual contribution, hence the energy performance is not quite as good. The most significant advantage is that controlling direct beam radiation is not usually a problem.



High north clerestories provide daylighting to a media center

a. Don't use lightshelves

1) Because of the lack of direct beam radiation on the north, lightshelves do not provide any benefit and should not be used.

b. Employ many of the same optimization strategies as with south lightshelves

1) Place the glazing high in the room with the head of the glazing at the ceiling.
2) Utilize sloped ceilings to enhance performance.
3) It is even more important to elongate rooms in an east-west direction so that there is more exposed wall area in which to place the glazing.
4) Window treatments should only be used to provide a strategy to temporarily darken a space. Make sure that the blinds can be fully retracted so that they do not block any more light than possible.
5) As with glazing in lightshelves, do not use low-E glass in the high, designated daylighting apertures. It will reduce visible light transmission and require more glazing.

c. Utilize lower glass areas as a last resort

1) Establishing ceiling height can be difficult when implementing a daylighting strategy in a classroom wing that faces both north and south. On the south side you can use lightshelves that generally require less glazing than high, north transom apertures. If you use blinds-between-the-glass, the height of the south aperture will pretty closely match the height of north transom glazing. To avoid different ceiling heights, as a last resort, consider some of the lower view glass as an integral part of your north side daylighting strategy. Because the blinds would typically not be used by the students or teachers to block direct beam radiation, it is logical to assume that this lower view glass can be considered. The big drawback is that the window area could still be used as a display board, blocking the light.

2) Assuming that lower, north view glass is considered in your daylighting strategy, it would be advisable, because of comfort, to utilize low-E glass in this case, sacrificing the 10% to 30% reduction in visible light benefit.

5. General Recommendations for All Daylighting Options

a. Minimize contrast

1) The success of your daylighting strategy will be determined to a great degree by the amount of contrast within the space. Your design should attempt to eliminate contrast between bright surfaces and darker surfaces. Avoid bright, visually exposed windows.

2) Roof monitors help considerably in bringing more uniform light into a space since not all the daylighting apertures are located on one wall.

3) If you do use lightshelves, consider using blinds-between-the glass so that you are not looking directly at the window.

b. Select light colors for interior finishes

1) The colors of the ceiling, walls, floor, and furniture have major impacts on the effectiveness of your daylighting strategy. When considering finish surfaces, install light colors (white is best) to insure that the daylight is reflected throughout the space. In order of importance, the lightest colors should be installed at your:

a) sky well
b) ceiling
c) wall
d) furniture
e) floor

2) All have an impact. The darker these surfaces, the more glazing will be required to achieve the same net effect. In a typical 900 square foot classroom with a roof monitor strategy, the difference between the lighter and darker finish colors is one percentage point in glass-to-floor area ratios. In a typical 900 square foot classroom with a side lit strategy, the difference between the lighter and darker finish colors is two percentage points in glass-to-floor area ratios.

	900 sf classroom w/lightshelf and B-B-G	900 sf classroom w/south-facing roof monitor
Light Colors Wall reflectance = 70 Ceiling reflectance = 85 Floor reflectance = 50	10.5% g-t-f	8.5% g-t-f
Mid-Range Colors Wall reflectance = 60 Ceiling reflectance = 80 Floor reflectance = 35	11.5% g-t-f	9.0% g-t-f
Darker Colors Wall reflectance = 50 Ceiling reflectance = 70 Floor reflectance = 30	12.5% g-t-f	9.5% g-t-f

c. Select highly reflective ceiling tile
   1) Consider a ceiling tile or surface that has a high reflectivity. Make sure that you account for any fissures or holes within acoustical tiles and how this will impact the amount of light absorbed. Don't assume that the color of a tile alone dictates reflectance.
   2) When selecting a tile, question the product manufacturers regarding the listed reflectance. Most will list the reflectance as if it were the paint color reflectance.

d. Use continuous dimming controls
   1) To enhance the economic benefits and provide for smoother transition between varying light conditions, dimmable lighting controls should be used in most cases. Stepped strategies should be used if continuous dimming strategies are not utilized. In a typical classroom, a continuous dimming strategy will be in a range of 20% to 25% better than a 2 stepped strategy and 5% to 10% better than a 4 stepped strategy.
   2) Depending upon the daylighting strategy employed, photosensor controls should be used to dim specific, logical groupings of lights.
   3) Implement a lighting fixture layout and control wiring plan that complements the daylighting strategy.
   4) If a lightshelf strategy is used, photosensors should control each bank of lights (running parallel to the outside glazing wall) as they progressively move back deeper into the space. Because of the strong difference in light that will occur close to the window and back further from the window, having this individual control by bank will help balance out the space.
   5) In a space that has a roof monitor, you may prefer to install a photosensor that controls all the perimeter lights and a second that controls all the lights within the monitor well.

6) In gymnasiums, ganged fluorescent fixtures coupled with dimmable ballasts are a great way of eliminating the problems typically associated with the long re-strike times associated with using metal halide fixtures.

7) With certain products it may be advantageous to employ a control strategy that dims to 20% and then cuts off. There is currently not much data available from manufacturers on the effects of low-level dimming on lamp life.

e. Compatibility between lamps, ballasts and controls

1) Absolutely insure that there is compatibility between your lamps, continuous dimming ballast, and controller. Your controller should kick in at full light/power and then dim down to the appropriate level. If it is not controlled in this manner, it is likely that you will experience premature lamp failure.

f. Locate your photosensors correctly

1) Mount the photosensors in a location that closely simulates the light level at the work plane (desk height). You can also locate the sensor in a place that is brighter or darker than the work plane but the amount of light should, during the course of a day, modulate at a relatively constant amount above or below the level at the work plane. In this later case, simply set the controller accordingly to account for the amount of the constant variation.

2) Provide a means and convenient location to override daylighting controls in spaces that are intentionally darkened to use projectors. In the examples provided for Ohio school classrooms, the dropped soffit area at the teaching wall should have its own lighting controls, separate from the rest of the classroom.

g. Select compatible light fixtures

1) First consider the use of indirect lighting fixtures. They more closely match the quality of daylighting by producing more uniformly distributed light with less glare than individual lay-in light fixtures.

h. Consider the space layout and need to darken the teaching wall

1) When designing the classrooms consider where the light is coming from and the potential for glare. The characteristics of the space will be much different if the daylighting is accomplished with a roof monitor versus a lightshelf.

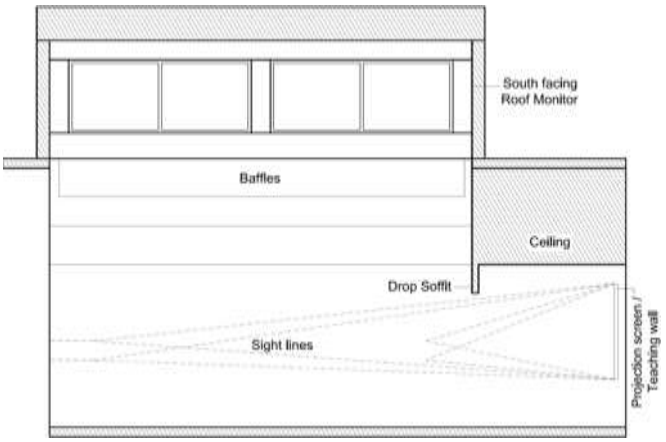
2) The teaching wall will have key teaching aids that have unique lighting requirements. The teaching wall is normally the location for the projection screen, white board, and TV monitor. Implement strategies in the teaching wall area where both the electrical lighting and daylighting can be controlled. Allow the majority of the classroom to remain well daylit while creating a lighting condition at the teaching wall that is, under normal daylit conditions, approximately 20 footcandles or less. To be effective, this design strategy will necessitate a separate light switching circuit that controls the lights at this specific area versus the remaining part of the classroom. If this space is normally at 20 footcandles it means that if the projection screen or TV monitor are not being utilized, the lights should be able to dim up (or be switched on) to reach at least the 50 footcandles desired for good viewing of the white board. Place the switch convenient to the teaching wall. This grouping of lights may also fall over the teacher's desk and enable the teacher to use the space at night while not turning on all the lights in the classroom.

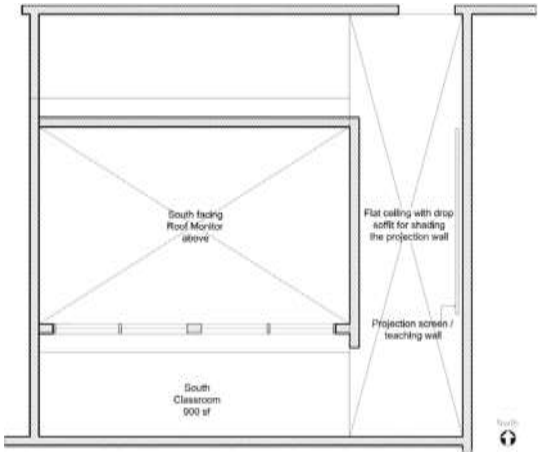
3) Ideally, the teaching wall (in south-side classrooms with either lightshelves or roof monitors) will be on the east wall within the classroom. This placement is preferred because the projection screen area, as well as TV monitors, will need to be placed in a location where the light level is low enough for viewing. By placing it on the east wall in a daylit space the sunlight will be less intense on this surface. Only during the late afternoon will the sun have a chance of more directly reflecting on to this surface.

4) The second best position for the teaching wall in a south-side classroom (with a lightshelf) would be the north classroom wall. This is because the light level drops off as it goes deeper into the space from the south glazing. However, (even with the below explained architectural element to shade the projection screen) it is possible, at certain limited times, to have 40 footcandles of light on the screen area. If you incorporate a teaching wall on the north classroom wall and have a south-facing lightshelf strategy, make sure that your projector and screen are capable of overcoming this level of light. See the recommendations below.

5) If you have a classroom with a high, north glazing section as your daylighting strategy, the teaching wall is still best placed on the east or north wall.

6) At the same time it is good to intentionally darken the teaching wall during video viewing, it is best to maintain the desired 50 footcandle level within the rest of the classroom. To accomplish this objective, the enclosed classroom examples indicate a dropped, flat ceiling area for the 8 feet area in front of the teaching wall. It additionally indicates a vertical shading element coming down from the ceiling that helps block the reflected sunlight from bouncing onto the projection screen. This element also visually hides the projector and can serve as a mounting surface for the projector.





7) Students normally would be seated facing the teaching wall with the lower view glass windows, lightshelf windows, and high north glass to the side or back of the students. In no case should the students facing the outside windows.

8) A good location for computer stations in daylit spaces with lightshelves or high, north glass would be on the exterior wall, in locations where there isn't any low view glass. With roof monitors there isn't a likely problem from the roof monitor since it diffuses the light and creates a more uniform lighting condition. However, it may still be best to locate the computers on the outside wall (in sections of the wall where there isn't any view glass) that contains view glass. By placing the computers on this wall they will not receive glare from any low, view glass windows.

i. Select projectors and screens appropriate for daylit spaces

1) Select video projectors that are designed to be used in spaces with high ambient light levels.

2) Digital projectors should be 3,000 to 3,500 lumens or better and have a contrast ratio of 1000 to 1 or better. Many newer projectors have control modes that allow the user to adjust for daylit or bright ambient conditions.

3) In order to ceiling mount the projector as close to the screen as possible, specify types with keystone correction and lens shift capabilities. Some allow the projector to me mounted closer than 8 feet, allowing the dropped area in the classroom (over the teaching wall) to be reduced to 6 feet.

4) Look for projectors that have a low standby power mode.

5) Projection screens should be designed for high-contrast and have a high "gain" factor of 1.5 or above.

6) The screen characteristics should be appropriate for the "viewing angle." If you draw a straight line from the projector to the center of the screen, the screen type selected should consider the angle between that straight line and the closest viewer to either the far left or right (the student in the front row of desks the furthest from the projector).

6. Typical Daylit Spaces

a. The attached daylighting designs have been provided for designers of schools in Ohio. Several typical spaces, common to most school projects have been included. The following chart represents a summary of the results of simulations developed with the daylighting computer simulation model Daysim. The chart provides recommended amounts of glass for each application. The amounts are expressed in "glass-to-floor" area ratios. These results are specific to the conditions analyzed and described in the attached details. Variations from these amounts can be achieved by applying the various rules-of-thumb included within this text.

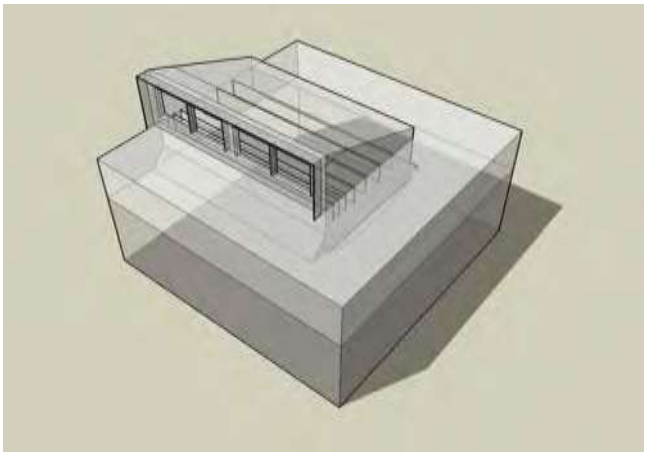
b. These glass-to-floor (GTF) ratios are expressed as a percentage of the total area of the space and also as a percentage of just the daylit space, excluding the space by the teaching wall that is intentionally being darkened.

Note: * indicates the spaces where the analysis of the north-facing roof monitor strategy predicts that the peak cooling reduction energy savings and overall energy savings will not be as significant as the south-facing roof monitor options. They still represent positive energy solutions (particularly from a lighting reduction standpoint) but, because the south-facing monitor has passive heating benefits in the winter and reduced heat/light in the warmer months, the south-facing options are better and should be considered first.

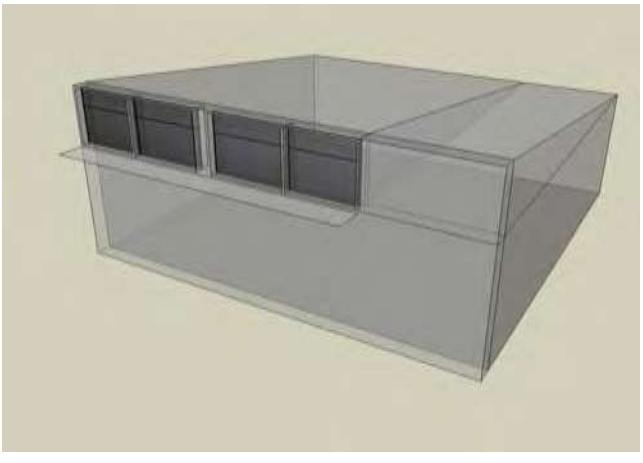
Space	Orientation	Daylighting Strategy	Glazing Type	G-T-F of Total Area	G-T-F of Daylit Area
900 sf clrm	S or N	South-facing roof monitor	***clear, sealed insulation unit***	6.5% - 7.5%	9.0% - 10.0%
900 sf clrm	S side	South-facing lightshelf	***clear, sealed insulation unit***	8.5% - 9.5%	11.5% - 12.5%
900 sf clrm	S side	South-facing lightshelf	***clear, sealed insulation unit***	9.0% - 10.0%	12.0% - 13.0%
900 sf clrm	N or S	North-facing roof monitor*	***clear, sealed insulation unit***	7.5% - 8.5%	10.0% - 11.0%
900 sf clrm	N side	High, north glass	***clear, sealed insulation unit***	8.0% - 9.0%	11.0% - 12.0%
1200 sf lab/cr	S or N	South-facing roof monitor	***clear, sealed insulation unit***	6.5% - 7.5%	9.0% - 10.0%
1200 sf lab/cr	S side	South-facing lightshelf	***clear, sealed insulation unit***	8.5% - 9.5%	11.0% - 12.0%
1200 sf lab/cr	S side	South-facing lightshelf	***clear, sealed insulation unit***	9.0% - 10.0%	11.5% - 12.5%
1200 sf lab/cr	N or S	North-facing roof monitor*	***clear, sealed insulation unit***	7.5% - 8.5%	10.5% - 11.5%
1200 sf lab/cr	N side	High, north glass	***clear, sealed insulation unit***	8.0% - 9.0%	11.0% - 12.0%
600 sf resource	S or N	South-facing roof monitor	***clear, sealed insulation unit***	6.5% - 7.5%	9.0% - 10.0%
600 sf resource	S side	South-facing lightshelf	***clear, sealed insulation unit***	9.0% - 10.0%	13.0% - 14.0%
600 sf resource	S side	South-facing lightshelf	***clear, sealed insulation unit***	9.5% - 10.5%	13.5% - 14.5%

Space	Orientation	Daylighting Strategy	Glazing Type	G-T-F of Total Area	G-T-F of Daylit Area
600 sf resource	N or S	North-facing roof monitor*	***clear, sealed insulation unit***	7.5% - 8.5%	10.5% - 11.5%
600 sf resource	N side	High, north glass	***clear, sealed insulation unit***	9.0% - 10.0%	13.0% - 14.0%
3500 sf gym	S or N	South-facing roof monitor	***clear, sealed insulation unit***	7.5% - 8.5%	7.5% - 8.5%
3500 sf gym	S and N	South-facing lightshelf High, north glass	***clear, sealed insulation unit*** 50/50	8.0% - 9.0%	8.0% - 9.0% 50/50
3500 sf gym	S and N	South-facing lightshelf High, north glass	***clear, sealed insulation unit*** 50/50	8.5% - 9.5%	8.5% - 9.5% 50/50
16000 sf gym	S or N	8 S-facing roof monitors	***clear, sealed insulation unit***	9.0% - 10.0%	9.0% - 10.0%
16000 sf gym	S and N	4 S-facing roof monitors South-facing lightshelf High, north glass	***clear, sealed insulation unit***	11.0% - 13.0% 40/30/30	11.0% -13.0% 40/30/30
16000 sf gym	S and N	4 S-facing roof monitors South-facing lightshelf High, north glass	***clear, sealed insulation unit***	11.5% - 13.5% 40/30/30	11.5% -13.5% 40/30/30
4500 sf high bay	S and N	High, south-facing glass High, north glass	***clear, sealed insulation unit***	11.5% - 12.5% 40/60	11.5%-12.5% 40/60
4500 sf high bay	N side	High, north glass	***clear, sealed insulation unit***	10.0% - 11.0%	10.0%-11.0%
4500 sf high bay	N or S	3 N-facing roof monitors	***clear, sealed insulation unit***	9.0% - 10.0%	9.0%-10.0%

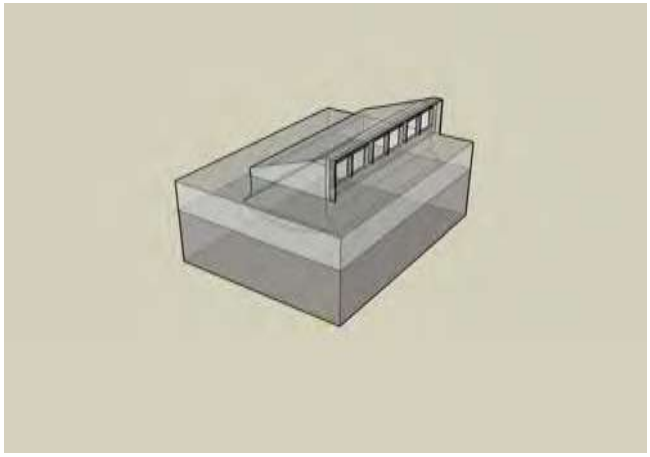
d. Examples of typical daylit spaces:



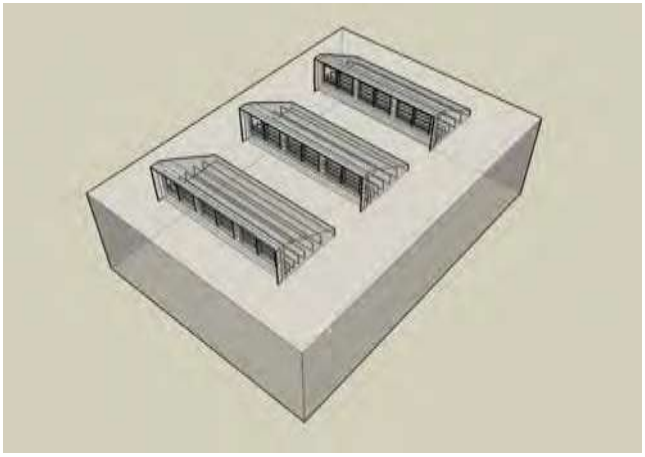
900 sf classroom with south facing monitor



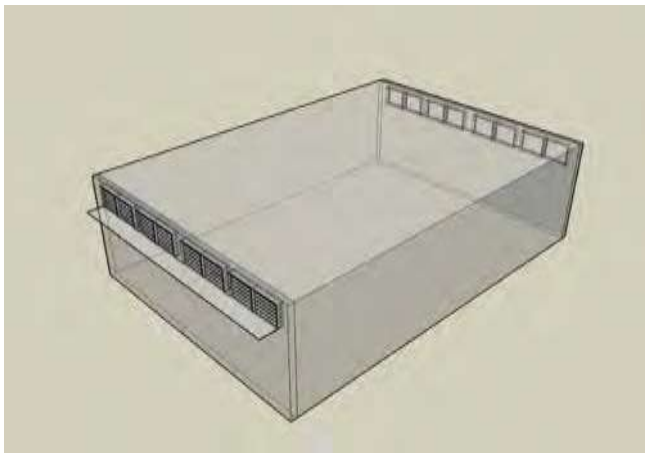
900 sf south classroom with blinds between the glass



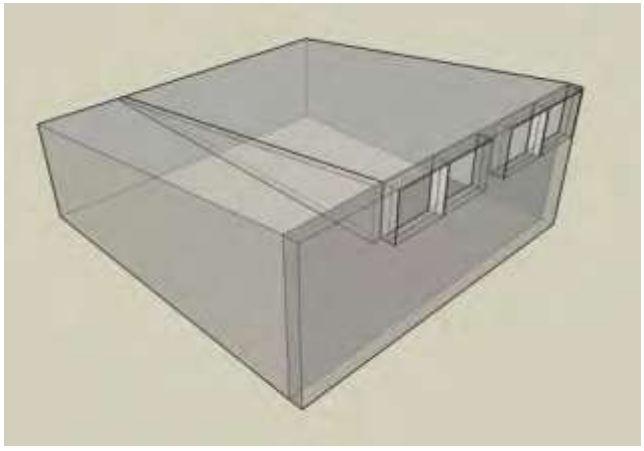
1200 sf classroom/lab with north facing monitor



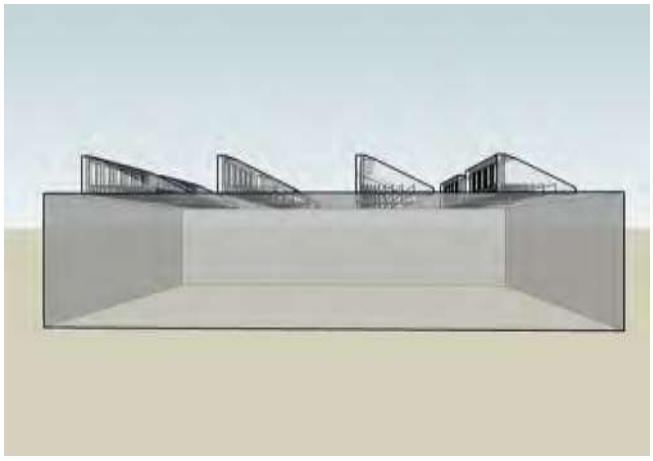
3500 sf elementary gymnasium with south facing monitors

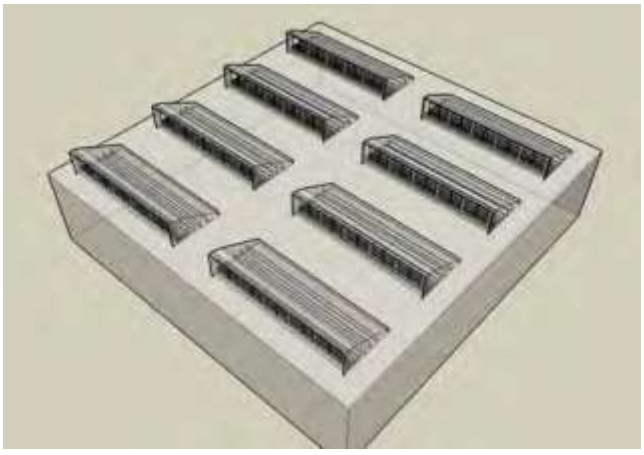


4500 sf high-bay space with south & north clerestories



600 sf north resource room with clerestory





16000 sf high school gymnasium with south facing monitors

e. Keep in mind that these glass-to-floor area ratios are based upon specific assumptions and, in order to maximize potential energy savings, more detailed analysis is recommended. In every project you should consider the unique conditions including:
   1) Characteristics of the space -Size, proportions, colors, etc.
   2) Location -These recommendations are based upon Columbus. We have provided rules-of-thumb to vary these amounts for Cincinnati and Cleveland. Other locations with greatly different conditions than Columbus, Cincinnati or Cleveland should be simulated.
   3) Time of use - This analysis was based upon the school operational times:
      a) Classrooms 8am – 5pm
      b) Gymnasiums 7am – 6pm
   4) Orientation - These recommendations are based upon the building facing true south. If the building varies by more than 15 degrees from true south it is advisable to conduct more detailed analysis.
   5) Depth of ceiling cavity - These recommendations for classrooms were based upon a ceiling cavity depth of 5 feet. Rules-of-thumb are included for variations to 10 feet. The gymnasiums and high-bay spaces are assumed to not have any ceiling cavity.

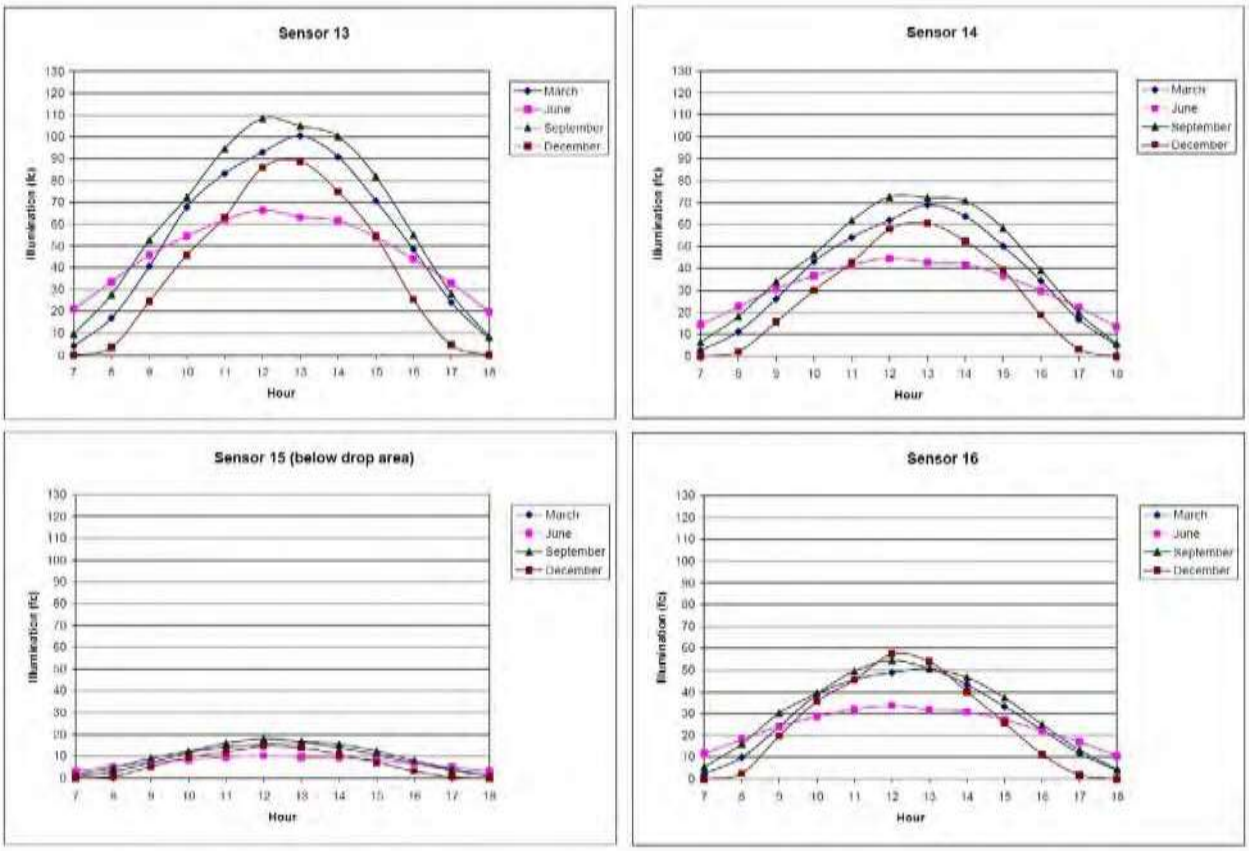
F. Accurately Simulate Daylighting Performance

1. Daylighting Analysis

a. To determine the optimum daylighting and glazing strategy for each application, the designer should conduct detailed daylighting computer simulations that compare options. The program variables should allow you to input different locations (TMY data for various cities) as well as component configurations including exterior fins, overhangs, glazing types, window treatments, lightshelf design, surface reflectances both inside and outside, space configurations, ceiling heights, glazing placements, mullion sizes, dirt buildup, dimming options, and time-of-use schedules.

b. Simplistically, the goal in conducting this evaluation should be to establish the optimum amount of glazing, regardless of the strategy, that does not ultimately produce overheating and best creates a uniform light distribution. This is most easily done early in schematic design, by looking carefully at the peak cooling months to see if excessive radiation is entering the space during key peak times. If during these peak times more gain is entering the space than is necessary, either reduce the glazing, adjust the overhangs, change the interior reflectances, alter the depth of the ceiling cavity, or change the overall strategy.

c. Analyze your daylighting strategies by conducting computer simulations of each key representative space. You should analyze numerous points within each space for hourly, monthly, yearly contributions. It is important to understand the range of lighting achieved as well as the average for the space. Once this process is accomplished, you should take all the hourly points within one space and produce one generic point that best represents the hourly performance of the space in general.



d. This process should be accomplished for each different "typical" space until a condition exists where no more radiation enters the space during the peak cooling times than is needed to achieve the desired footcandle level. The goal should be to achieve a daylighting strategy that reaches a "design" footcandle level, two-thirds of the daytime. Experience has shown that with south-facing strategies it is very difficult to achieve the desired footcandle level more than 75% of the time without overheating.

e. Once this is completed, the hourly data (by month) for each representative space should be input into the Department of Energy's DOE-2 program, much like a very extensive lighting schedule. This will result in a detailed assessment of how the daylighting strategy interacts with the other building components and systems. The output, taking into account the varying performances of the different spaces, produces a dynamic model of how the school performs and most accurately accounts for the typical cooling load reduction of 10% - 20%.

f. The following daylighting simulation tools are commonly utilized:

	Program	Originator
1)	Daysim	National Research Council, Canada
2)	Daylite	Solarsoft
3)	Lumen Micro	Lighting Technology, Inc.
4)	Radiance	USDOE/University of California
5)	Superlite	University of Michigan

2. DOE-2 Whole-Building Energy Analysis

a. Once you have completed your daylighting analysis it is essential that you utilize a comprehensive, whole building energy stimulation tool that can adequately factor the true impacts of the daylighting. The best programs available are based upon the US Department of Energy's DOE-2 program. The energy simulation should evaluate the entire school to determine interrelationships of key energy-saving measures to the daylighting strategies being considered. The DOE -2 simulation will help you in evaluating hourly, daily, monthly and yearly energy consumption in relationship to space cooling, space heating, fan energy, pump energy, ventilation energy, lighting, and other miscellaneous electrical loads.

b. The following PC versions of DOE-2 have been developed and are available commercially:

1)	eQUEST	www. DOE2.com/equest
2)	ENERGY PLUS 2.0	www.eere.energy.gov/buildings/energyplus
3)	VISUAL DOE 4.0	www.archenergy.com/products/visualdoe
4)	POWER-DOE (2.2)	www.DOE2.com

3. Build physical models

a. Another excellent method of better understanding how spaces within your school will perform is by building and measuring scaled models of particular spaces. There is not a computer model that has been developed that can simulate performance as well as an actual scaled model.

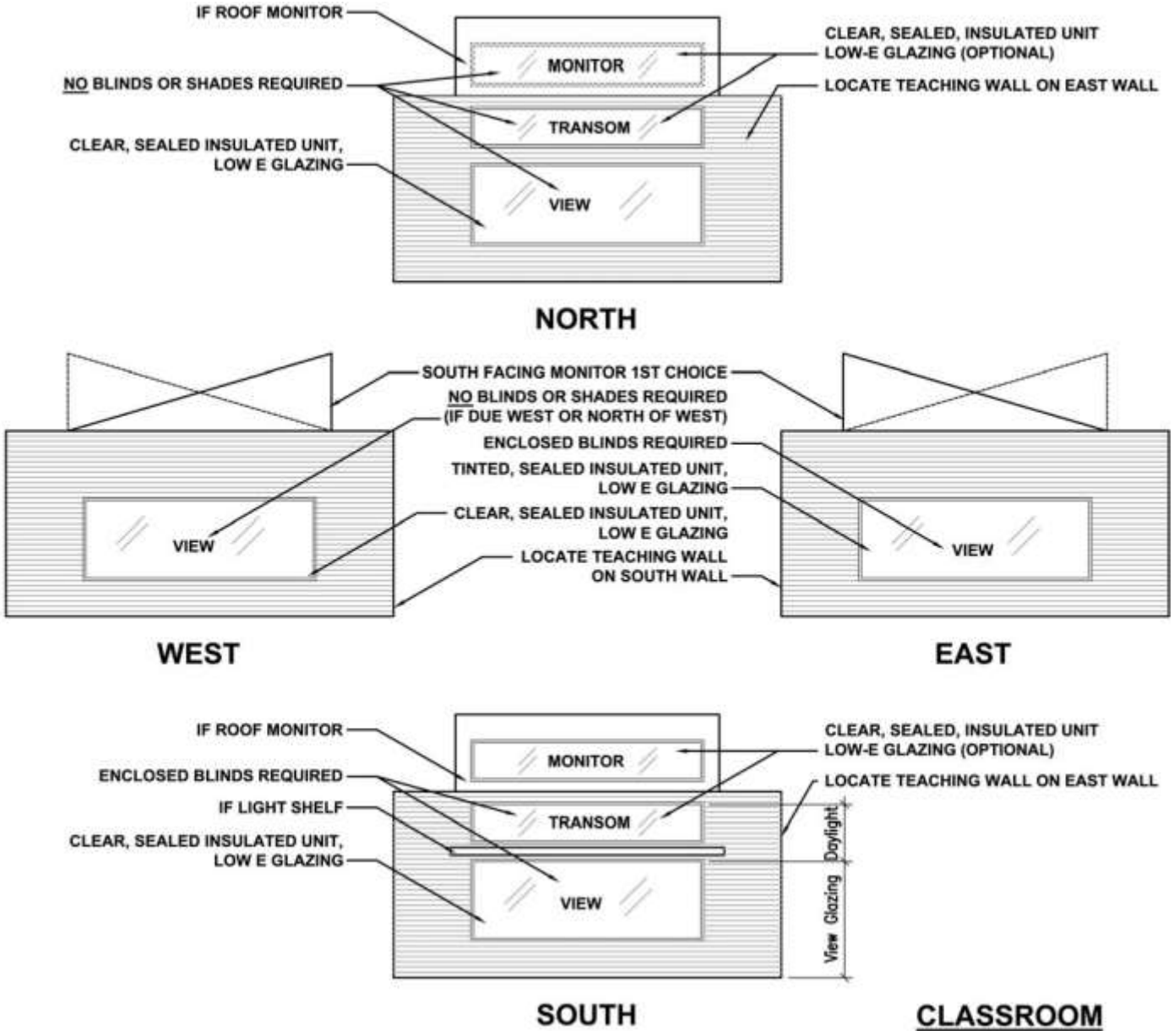


Physical model to study daylighting

G. Verify and modify your design process

1. After your daylit school has been constructed, it is essential that you visit the school and measure the light levels within each of the different spaces at different times of the day and year and compare the performance with your computer and physical models. Every computer program has particular aspects that can not be simulated as accurately as other areas. To improve your future designs it is important to understand the strengths and weaknesses of the program that you are using and how you may modify your runs to achieve better accuracy.

2. Part of your post-occupancy analysis should also be an evaluation of how well the human factors were addressed. Every project offers you a new opportunity to improve your next design.


IF ROOF MONITOR
NO BLINDS OR SHADES REQUIRED
CLEAR, SEALED INSULATED UNIT, LOW E GLAZING
MONITOR
TRANSOM
VIEW
CLEAR, SEALED, INSULATED UNIT LOW-E GLAZING (OPTIONAL)
LOCATE TEACHING WALL ON EAST WALL
NORTH
SOUTH FACING MONITOR 1ST CHOICE
NO BLINDS OR SHADES REQUIRED (IF DUE WEST OR NORTH OF WEST)
ENCLOSED BLINDS REQUIRED
TINTED, SEALED INSULATED UNIT, LOW E GLAZING
CLEAR, SEALED INSULATED UNIT, LOW E GLAZING
LOCATE TEACHING WALL ON SOUTH WALL
VIEW
VIEW
WEST
EAST
IF ROOF MONITOR
ENCLOSED BLINDS REQUIRED
IF LIGHT SHELF
CLEAR, SEALED INSULATED UNIT, LOW E GLAZING
MONITOR
TRANSOM
VIEW
CLEAR, SEALED, INSULATED UNIT LOW-E GLAZING (OPTIONAL)
LOCATE TEACHING WALL ON EAST WALL
Daylight
View Glazing
SOUTH
CLASSROOM

ENERGY EFFICIENT PLUG LOADS

A. Equipment Provided by Building Contractor

1. Commercial Food Service Equipment

a. Food service equipment shall not exceed energy consumption for each type of equipment as follows:

1) Dishwashers, idle energy rate
   a) Under counter, high temperature: 0.90 kW
   b) Under counter, low temperature: 0.5 kW
   c) Stationary Single Tank Door, high temperature:1.0 kW
   d) Stationary Single Tank Door, low temperature: 0.6 kW
   e) Single Tank Conveyor, high temperature: 2.0 kW
   f) Single Tank Conveyor, low temperature: 1.6 kW
   g) Multiple Tank Conveyor, high temperature: 2.6 kW
   h) Multiple Tank Conveyor, low temperature: 2.0 kW

2) Fryers
   a) Open, deep-fat gas
      .1 Heavy load cooking efficiency shall be minimum 50% and idle energy rate shall not exceed 9,000 btu/hr (2,635 W)
   b) Open, deep-fat electric
      .1 Heavy load cooking efficiency shall be minimum 80% and idle energy rate shall not exceed 1,000 watts

3) Hot Food Holding Cabinets
   a) Maximum Idle Energy Rate = 40 watts/ft^3

4) Steam Cookers
   a) 3-, 4-, 5-, and 6-pan capacity, including countertop models, wall-mounted models and floor-models mounted
      .1 3-pan electric: 50% cooking energy efficiency and 400 W idle rate
      .2 4-pan electric: 50% cooking energy efficiency and 530 W idle rate
      .3 5-pan electric: 50% cooking energy efficiency and 670 W idle rate
      .4 6-pan electric: 50% cooking energy efficiency and 800 W idle rate
      .5 3-pan gas: 38% cooking energy efficiency and 6,250 btu/hr idle rate (1,830 W)
      .6 4-pan gas: 38% cooking energy efficiency and 8,350 btu/hr idle rate (2,445 W)
      .7 5-pan gas: 38% cooking energy efficiency and 10,400 btu/hr idle rate (3,046 W)
      .8 6-pan gas: 38% cooking energy efficiency and 12,500 btu/hr idle rate (3,661 W)
   b) Cooking Energy Efficiency is based on heavy load (potato) cooking capacity.

c) Idle Energy Rate: The rate of appliance energy consumption while it is maintaining or holding at stabilized operating condition or temperature

5) Braising pan
   a) Specify insulated wall units.
   b) When in operation, keep lid closed to maximum extend practical.

6) Combi-oven
   a) Reduce use of the 'combination' function to maximum extent practical to reduce energy and water consumption.

b. Do not exceed the most recent version of commercial food service equipment performance specifications published by the US EPA 'Energy Star' Program. See www.energystar.gov for the most recent commercial food service equipment performance specifications.

c. See www.energystar.gov for an updated list of ENERGY STAR Qualified Models Submitted to the EPA.

2. Reach-In or Pass-Through Cabinets, Roll-In or Roll-Through Cabinets

a. Maximum Daily Energy Consumption in kWh shall not exceed the following formulae for each type of cabinet where V = total volume (ft3) and AV = Adjusted Volume = [1.63 x freezer volume (ft3)] + refrigerator volume (ft3)]:

1) Reach-in cabinets, pass-through cabinets, and roll-in or roll-through cabinets that are refrigerators
   a) Solid door: (0.10V + 2.04) kWh
   b) Transparent door: (0.12V + 3.34) kWh

2) Reach-in cabinets, pass-through cabinets, and roll-in or roll-through cabinets that are freezers (except ice cream freezers)
   a) Solid door: (0.40V + 1.38) kWh
   b) Transparent door: (0.75V + 4.10) kWh

3) Reach-in cabinets, pass-through cabinets, and roll-in or roll-through cabinets that are freezers that are ice cream freezers
   a) Solid door: (0.39V + 0.82) kWh
   b) Transparent door: (0.88V + 0.33) kWh

4) Reach-in cabinets that are refrigerator-freezers and that have an adjusted volume (AV) of 5.19 ft3 or greater
   a) Solid door: (0.27AV – 0.71) kWh

5) Reach-in cabinets that are refrigerator-freezers and that have an adjusted volume (AV) of less than 5.19 ft3
   a) Solid or transparent door: 0.70 kWh

3. Kitchen Ventilation Hood

a. Group appliances according to effluent production and associated ventilation requirements. Specify different ventilation rates for hoods or hood sections over the different duty classification of appliances. Where practical, place heavy-duty appliances in the center of a hood section, rather than at the end.

b. Provide UL Listed proximity type hoods.

c. Provide hood construction details (such as interior angles and flanges along the edge) or high-velocity jets to promote capture and containment at lower exhaust rates.

d. Provide side and/or back panels on canopy hoods to increase effectiveness and reduce heat gain.

e. Maximize transfer air/minimize direct makeup air. Integrate the kitchen ventilation with the building HVAC system (i.e., use dining room outdoor air as makeup air for the hood). Kitchen equipment designer and the mechanical engineer shall coordinate their designs.

f. Minimize the velocity (fpm) of the makeup air as it is introduced near the hood by minimizing the volume (cfm) of makeup air through any single distribution system, by maximizing the area of the diffusers through which the makeup air is supplied, or by distributing through multiple pathways.

g. Do not use short-circuit hoods. Use caution with air-curtain designs.

h. Avoid four-way or slot ceiling diffusers in the kitchen, especially near hoods.

i. Diversify makeup air pathways using a combination of backwall supply, perforated perimeter supply, face supply, displacement diffusers, etc.

j. Minimize makeup air velocity near the hood; it should be less than 75 fpm.

k. Consider variable or two-speed exhaust fan control for operations with a high diversity of appliances or with a set schedule of use.

l. Provide air balance schedule in design drawings to avoid over- or under-supply of MUA.

m. Require building air balancing and system commissioning as part of the construction requirements.

n. Discourage use of fans by kitchen staff for cooling near hoods as they can negatively impact the performance of the hood.

4. Ice Machines

a. Maximum Daily Energy Consumption in kWh for automatic commercial ice-makers shall not exceed the following formulae for each type of ice maker where H = harvest rate in pounds if ice per 24 hours:

1) Water-cooled Ice-Making Head
   a) Harvest Rate up to 500 lbs = (7.80-.0055H) kWh/100 lbs.
   b) Harvest Rate from 500 to 1,436 lbs.=(5.58-.0011H) kWh/100 lbs.
   c) Harvest Rate greater than 1,436 = 4.0 kWh/100 lbs.
2) Air-cooled Ice-Making Head
   a) Harvest Rate up to 450 lbs = (10.26-.0086H) kWh/100 lbs.
   b) Harvest Rate over 450 lbs. = (6.89-.0011H) kWh/100 lbs.
3) Air-cooled Remote Condensing (but not remote compressor)
   a) Harvest rate up to 1,000 lbs = (8.85 - .0038H) kWh/100 lbs.
   b) Harvest rate over 1,000 lbs. = 5.10 kWh/100 lbs.
4) Air-cooled Remote Condensing and remote compressor
   a) Harvest rate up to 934 lbs. = (8.85 - .0038H) kWh/100 lbs.
   b) Harvest rate over 934 lbs. = 5.03 kWh/100 lbs.
5) Water-cooled, self-contained
   a) Harvest rate up to 200 lbs. = (11.40 - .0190H) kWh/100 lbs.
   b) Harvest rate over 200 lbs. = 7.60 kWh/100 lbs.
6) Air-cooled, self-contained
   a) Harvest rate up to 175 lbs. = (18.0 - .0469H) kWh/100 lbs.
   b) Harvest rate over 175 lbs. = 9.80 kWh/100 lbs.

b. Do not exceed the most recent version of automatic commercial ice machine performance specifications published by the US EPA 'Energy Star' Program. See www.energystar.gov for the most recent commercial ice-maker performance specifications.

c. See www.energystar.gov for an updated list of ENERGY STAR Qualified Models Submitted to the EPA.

5. Walk-in Refrigerators / Freezers

a. Assembly
   1) Wall, ceiling, and door insulation shall be minimum R-28 for refrigerators and minimum R-34 for freezers.
   2) Floor insulation shall be minimum R-28.
   3) Use CFC free insulation.
   4) Doors shall be provided with automatic closer and shall be no wider than 3'-9" and no higher than 6'-11", that shall be closed to within one inch of full closure.
   5) Install dew point sensors and controls for anti-condensate heater.
   6) Install strip curtains or plastic swinging doors in doorway.

b. Lighting
   1) Use light sources with an efficacy of 45 lumens per watt or more, including ballast losses.
   2) Install low-temperature occupancy sensors or timed switches to control lighting.
   3) Consider use of LED light bulb.

c. Refrigeration System
   1) Condenser fan motors of under one-horse power shall be electronically commutated motors (ECM), permanent split capacitor-type motors or polyphase motors of ½ horsepower or more. Single-phase evaporate fan electronically commuted motors shall be used for fan motors of one horse power and less than 460 volts.
   2) Install evaporator fan controls to reduce fan use.
   3) Install insulation on bare suction lines.
   4) Locate remote condensers under shade from direct sunlight while allowing air flow into and around.
   5) Consider use of refrigerant heat-recovery systems to pre-heat water for hot water used in a kitchen.
   6) Consider use of adsorption refrigeration system with solar thermal panel as a heat source.

d. Do not exceed the most recent version of performance specifications for walk-in freezers and coolers developed by the California Energy Commission. See www.energy.ca.gov for the most recent version of the CEC performance specifications.

B. Equipment Provided by School District – Independent of Building Contractor

1. Desktops, Integrated Computers, and Desktop-Derived Servers

a. For the purposes of determining Idle state levels**,** Desktops, Integrated Computers and Desktop-Derived Servers shall be categorized as follows:
   1) Category A
      a) All desktop computers that do not meet the definition of either Category B or Category C.
   2) Category B
      a) Multi-core processor(s) or greater than 1 discrete processor
      b) Minimum of 1 gigabyte of system memory.
   3) Category C
      a) Multi-core processor(s) or greater than 1 discrete processor
      b) A GPU with greater than 128 megabytes of dedicated, non-shared memory.
      c) In Addition to the requirements above, models qualifying under Category C must be configured with a minimum of 2 of the following 3 characteristics:
         .1 Minimum of 2 gigabytes of system memory;
         .2 TV tuner and/or video capture capability with high definition support; and/or
         .3 Minimum of 2 hard disk drives.

b. Desktops, Integrated Computers and Desktop-Derived Servers shall have power consumption no greater than as follows:
   1) Standby (Off Mode): 2.0 W
   2) Sleep Mode: 4.0 W
   3) Idle State:
      a) Category A: 50.0 W
      b) Category B: 65.0 W
      c) Category C: 95.0 W
         .1 Desktop-derived servers are exempt from the Sleep level.

c. Do not exceed the most recent version of computer hardware classification and performance specifications developed for or published by US EPA 'Energy Star' Program. See www.energystar.gov for the most recent hardware classification and performance specifications.

d. See www.energystar.gov for an updated list of ENERGY STAR Qualified Models Submitted to the EPA.

e. Do not enable the 'screen saver' function. Set power options to turn off monitor and PC units at shortest practical interval that will not impinge on classroom instruction activity.

f. Unplug each computer from the wall, UPS or surge protector at the end of each day to reduce phantom loads.

g. Do not locate any computer or monitor near a thermostat. Coordinate location of teacher equipment with the architect and mechanical engineer during design.

2. Computer Monitors

a. Power consumption, in the three operational modes, shall not exceed:
   1) 'On' Mode:
      a) Monitors less than 1 megapixel shall not exceed 23 times the number of megapixels (Y= 23X)
      b) Monitors greater than 1 megapixel shall not exceed 28 times the number of megapixels (Y=28X)
         .1 Where Y is expressed in watts and rounded up to the nearest whole number and X is the number of megapixels in decimal form
   2) 'Sleep' Mode: 2 watts
   3) Off Mode: 1 watt.

b. Do not exceed the most recent version of computer hardware classification and performance specifications developed for or published by US EPA 'Energy Star' Program. See www.energystar.gov for the most recent hardware classification and performance specifications.

c. See www.energystar.gov for an updated list of ENERGY STAR Qualified Models Submitted to the EPA.

d. Turn monitor off when not being actively used by student or staff.

e. Unplug each monitor from the wall, UPS or surge protector at the end of each day to reduce phantom loads.

f. Do not locate any computer or monitor near a thermostat. Coordinate location of teacher equipment with the architect and mechanical engineer during design.

3. Notebook and Tablet Computers

a. For the purposes of determining idle state levels, notebooks and tablets shall be categorized as follows**:**

1) Category A
   a) All notebook computers that do not meet the definition of Category B.
2) Category B
   a) A GPU with a minimum of 128 megabytes of dedicated, non-shared memory.

b. Notebooks and tablets shall have power consumption no greater than as follows:

1) Standby (Off Mode): 1.0 W
2) Sleep Mode: 1.7 W
3) Idle State
   a) Category A: 14.0 W
   b) Category B: 22.0 W

c. Do not exceed the most recent version of computer hardware classification and performance specifications developed for or published by US EPA 'Energy Star' Program. See www.energystar.gov for the most recent hardware classification and performance specifications.

d. See www.energystar.gov for a complete list of ENERGY STAR Qualified Models Submitted to the EPA.

4. Television and Video Replay Equipment

a. Power consumption for televisions and television monitors, component television units, TV/VCR combination units and TV/DVD, VCR/DVD, and TV/VCR/DVD combination units shall not exceed 1 watt in 'standby mode'.

b. Power consumption for VCR, DVD and audio units shall not exceed 1 watt in 'standby mode'.

c. Do not exceed the most recent version of television and video replay equipment performance specifications developed for or published by US EPA 'Energy Star' Program. See www.energystar.gov for the most recent television and video replay equipment performance specifications.

d. See www.energystar.gov for a complete list of ENERGY STAR Qualified Models Submitted to the EPA.

5. Vending Machines

a. Provide vending machines consuming no more ennergy, on a daily basis, than:
   1) Y = 0.45 [8.66 + (0.009 x C)] where
      a) Y = 24 hr energy consumption (kWh/day) after the machine has stabilized
      b) C = vendible capacity
         .1 Vendible capacity is the maximum number of 12 ounce cans dispensed from one full loading of the vending machine without further reload operations when used as recommended by the manufacturer.

b. Provide a vending unit that meets, at aminimum, one of the following Low Power Modes:
   1) Lighting low power state:
      a) Unit with hard-wired controls or software capable of automatically placing the machine into a low-power lighting mode, meaning a state where the lighting system is automatically turned off for an extended period of time, then return to normal operating conditions at the conclusion of the low-power lighting mode.
   2) Refrigeration low power state:
      a) Unit equipped with hard-wired controls or software capable of automatically placing the machine into a low-power refrigeration mode, meaning a state where the average beverage temperature is allowed to rise above 40° F. for an extended period of time, then return to normal operating conditions at the conclusion of the low-power refrigeration mode.
   3) Whole machine low power state:
      a) Unit equipped with hard-wired controls or software capable of automatically placing the machine into a low-power lighting mode, meaning a state where the lights are off and the refrigeration operates in its low power state for an extended period of time, then return to normal operating conditions at the conclusion of the low-power lighting mode.
   4) Low-Power State – On-Site Adjustment:
      a) Unit equipped with hard-wired controls or software capable of on-site adjustments to the various low-power modes by the vending machine operator or machine owner.

c. Provide the following refrigerant type:
   1) None ozone depleting

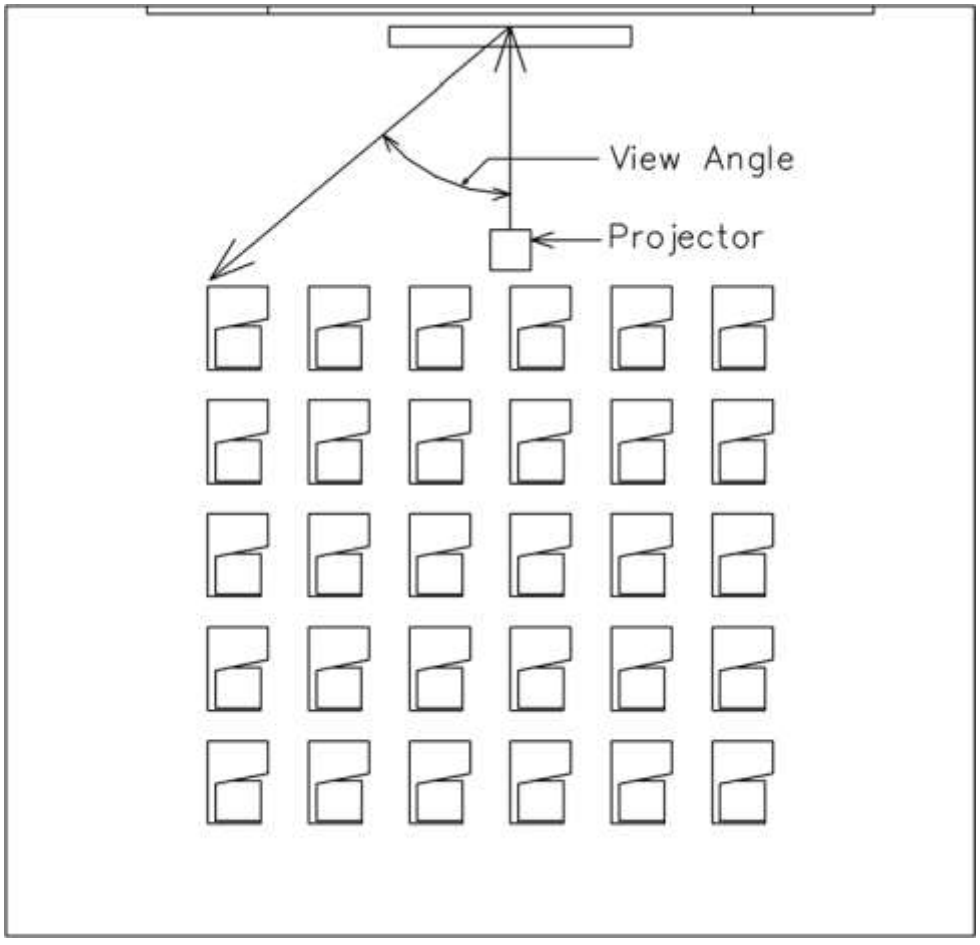
d. Provide the following insulation type:
   1) None ozone depleting

e. Provide the following illumination type:
   1) T8 fluorescent lamp with electronic ballast

f. Do not exceed the most recent version of performance specifications for vending machines developed by the California Energy Commission. See www.energy.ca.gov for the most recent version of the CEC performance specifications.

6. Screens in Daylit Spaces

a. Provide projection screens for daylit rooms with a viewing surface peak gain higher than 1.5 at the appropriate view angle.
   1) Gain is a relative measure of a screen's reflectivity
   2) View angle is the angle one views the screen as the angle deviates from a perpendicular view of the screen.



7. Digital Video Projector

a. Video projection systems shall include DLP or LCD video projection systems for connection to, but not limited to, computers, DVDs and VCRs and digital document cameras.
   1) DLP refers to digital light processing projectors.
   2) LCD refers to liquid crystal display projectors.

b. Video projection systems for daylit classroom spaces shall be minimum 3,000 lumens.
   1) Lumens are a measure of the light produced by a projector bulb. A high lumen output is vital in a daylit classroom environment.

c. Video projection systems for daylit classroom spaces shall provide a high contrast ratio of a minimum of 1,000:1.
   1) Contrast ratio is a figure that compares the ratio between the brightest white and the darkest black a projector produces. A higher contrast ratio delivers a better image quality for videos and natural pictures with details in the darkest of scenes.
   2) A high contrast ratio is vital in a daylit classroom environment. In a bright room, a picture with a higher contrast ratio looks clearer than a picture with a lower contrast ratio at equal brightness levels.

d. Video projection systems shall be equipped with an energy efficient, low power standby mode or an "Eco-Mode" feature.

e. Provide keystone correction function.
   1) Keystone is the effect that produces a keystone shaped image on the screen from any angle the projector lens deviates from horizontal. The keystone correction function is a digital control that brings the image back to square.

f. Provide lens shift correction function.
   1) Lens shift is the effect that produces a keystone shaped image distortion as the projector lens angles deviates from 90 degrees to the screen. The lens shift correction function is a digital control that brings the image shape back to square.

g. Unplug each component of the projection system from the wall, UPS or surge protector at the end of each day to reduce phantom loads.

RAINWATER HARVESTING AND COLLECTION

INTRODUCTION

Although the available amount of fresh water remains relatively constant, our population is growing. It already takes a lot of energy to deliver clean water, and as potable water demand increases it will take even more. Water treatment and delivery use 7-8% of the country's energy. At the same time, our fossil and nuclear energy production methods use large quantities of water. So, by conserving potable treated water, we are saving valuable water and energy.

There are localized concerns about water resources previously considered dependable. Over the past couple of decades, many aquifers have become increasingly polluted from nitrogen, pesticides and toxic chemicals. Sixty percent of the wells sampled in agricultural areas of the United States in the 1990s contained pesticides. With many polluted aquifers, the use of non-treated aquifer water is being questioned. Periods of low rainfall across the country have caused communities to question both their preparation for these occurrences and the consequences of their inability to respond to drought conditions. Along with current population growth, city municipal systems for both potable water supply and storm water treatment are being strained. The solution to these problems is two-fold: reduce water use, and reuse water by installing a **Rainwater Collection System**.

A typical school plumbing system uses city- or well-supplied potable water to satisfy all user demand, and separately sends all site water runoff to an off-site storm water management system. In this case, the school is unnecessarily paying for drinking water at non-potable applications and is unable to easily respond to rising utility prices or periods of drought.

By employing a **Rainwater Collection System**, a school building will take advantage of on-site water sources (rainwater and mechanical condensate) to fulfill non-potable water demands (toilet flushing and site irrigation). In this case, the school is reducing potable water consumption and utility bills, preparing for low-rainfall periods when potable water is in short supply, minimizing load on storm water systems, and providing a valuable educational resource.

IMPORTANCE OF RAINWATER COLLECTION

The minimum annual water consumption needed to sustain life, including food production, is 7,500 gallons per year per person. In the United States, the average consumption is 1,370 gallons per day per person, or 500,000 gallons per year. This must drastically change. Water conservation in the United States must become routine and rainwater harvesting must become commonplace. By being accountable of where our water resources are coming from, what we demand of them, and where they go after use, we can make responsible water consumption feasible for everyone.

A. SYSTEM DESCRIPTION

The concept and value of rainwater collection is simple to understand, however the actual system design is a sequence of several processes and can be complex. The differences in equipment manufacturers, system sizing, and site locations will cause changes to the system model, but the basic water flow diagram will remain the same. Notice the several filtering steps at the roof, in the ground, and in the Equipment Room. Also important is that all systems and pumps are connected and activated by an overall System Controller (described later in this document).

1. Rainwater falls in the designated Roof Catchment Area, sloped towards a filtered gutter and downspout system that leads to the cistern tank.

2. Along the pipe to the cistern tank, the rainwater is filtered through the Storm Drain Trap Pit. This serves to slow the flow rate of the collected water, and to separate heavy sediment and contaminant from water.

3. The water is contained outside in the Cistern Tank, until it is needed for use. The water is drawn from the cistern tank into the building with a submersible pump located in the cistern water. If there is too much rainwater, then the underground tanks overflow to the storm system or a constructed wetland.

4. Once inside the Rainwater Collection Equipment Room, the water is sent through a set of Dual Bag Filters to remove finer suspended particulates and contaminants.

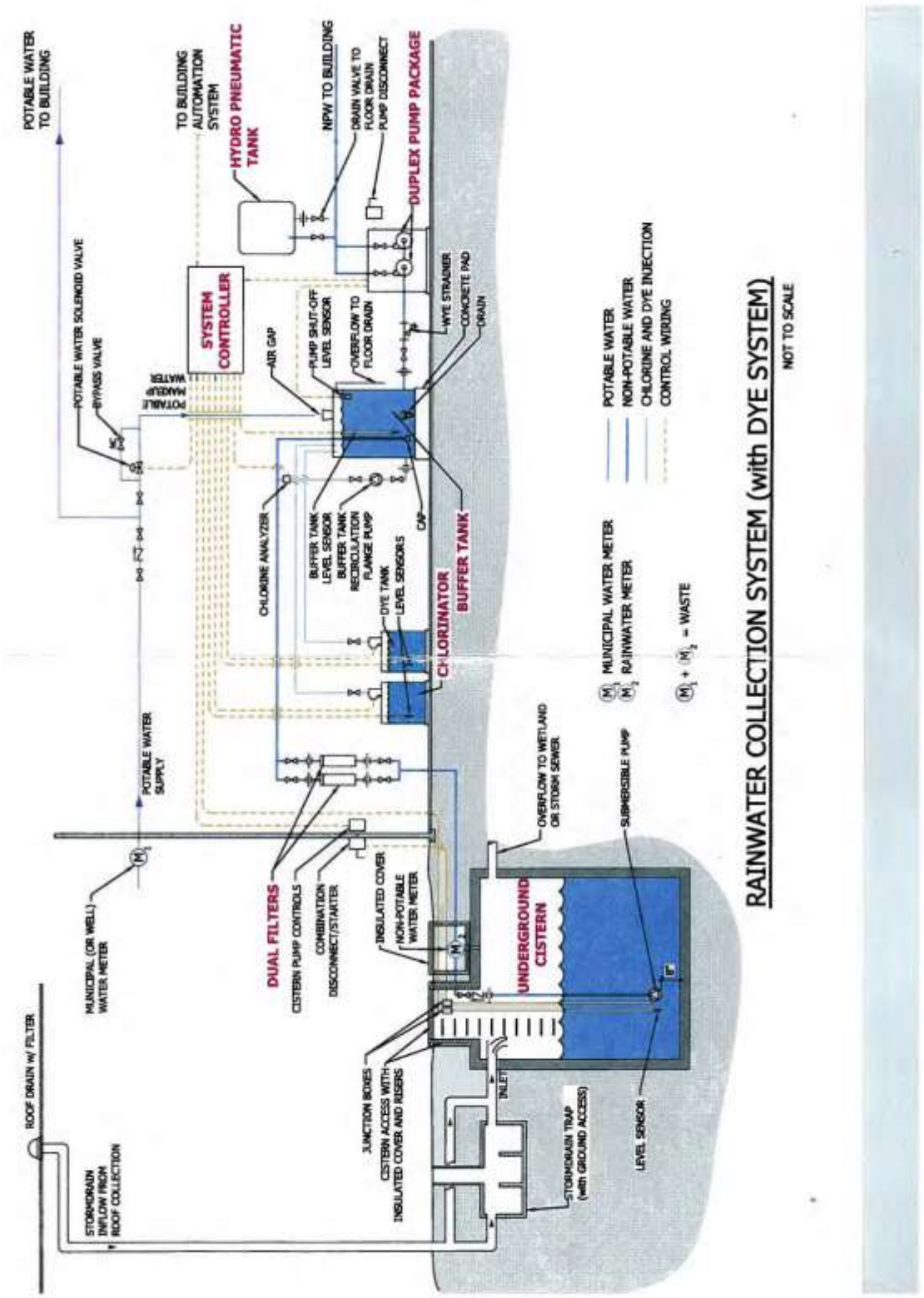
5. The water then is placed in the Buffer tank, where it is treated with chlorine and dye (if necessary) and becomes non-potable water. In response to user demand, the water is drawn from the buffer tank by a set of Dual Booster Pumps.

6. The last process before occupant use is by a Hydro-Pneumatic Tank to pressurize the system.

7. The non-potable water now flows to the toilets, urinals, and the irrigation system. No non-potable water is ever used for potable fixtures, despite any water quality testing.

There are design variations that may be applicable for Ohio projects. These include supplementing rainwater collection with mechanical condensate, adding a dye system to identify non-potable water, and using rainwater collection for irrigation purposes. Using these options will be determined by building needs, available water sources, and regulatory guidelines.

Please see the following page for a rainwater schematic diagram.


RAINWATER COLLECTION SYSTEM (with DYE SYSTEM)
NOT TO SCALE
POTABLE WATER
NON-POTABLE WATER
CHLORINE AND DYE INJECTION
CONTROL WIRING
MUNICIPAL WATER METER
RAINWATER METER
M1 + M2 = WASTE
POTABLE WATER TO BUILDING
TO BUILDING AUTOMATION SYSTEM
HYDRO PNEUMATIC TANK
NPW TO BUILDING
DRAIN VALVE TO FLOOR DRAIN
PUMP DISCONNECT
DUPLEX PUMP PACKAGE
SYSTEM CONTROLLER
POTABLE WATER SOLENOID VALVE
BYPASS VALVE
POTABLE WATER MAKEUP WATER
AIR GAP
PUMP SHUT-OFF LEVEL SENSOR
OVERFLOW TO FLOOR DRAIN
WYE STRAINER
CONCRETE PAD
DRAIN
CHLORINE ANALYZER
BUFFER TANK LEVEL SENSOR
BUFFER TANK RECIRCULATION FLANGE PUMP
DYE TANK LEVEL SENSORS
CHLORINATOR
BUFFER TANK
POTABLE WATER SUPPLY
OVERFLOW TO WETLAND OR STORM SEWER
SUBMERSIBLE PUMP
MUNICIPAL (OR WELL) WATER METER
DUAL FILTERS
CISTERN PUMP CONTROLS
COMBINATION DISCONNECT/STARTER
INSULATED COVER
NON-POTABLE WATER METER
UNDERGROUND CISTERN
ROOF DRAIN w/ FILTER
STORMDRAIN INFLOW FROM ROOF COLLECTION
JUNCTION BOXES
CISTERN ACCESS WITH INSULATED COVER AND RISERS
INLET
STORMDRAIN TRAP (with GROUND ACCESS)
LEVEL SENSOR

B. SYSTEM COMPONENTS

1. Catchment Area

   a. Do not collect runoff from parking or groundwater, direct through bioswales to a constructed wetland instead.

   b. Only consider roof area collection, ideally with a smooth finish that does not collect dirt and debris. Single-ply and metal roofs are recommended; asphalt shingles require additional filtering because of the granular coating. The collected rainwater is initially filtered for large debris at the roof drain or top of downspout.

   c. The catchment area size depends on local rainfall trends, amount and scope of water demand, and roof size.

2. Storm Drain Trap Pit

   a. The Trap Pit is typically a pre-manufactured unit from a manufacturer of storm water management products. The size and type is determined by the purity of incoming water, the type of solids or oils being filtered, and the flow rate of incoming water.

   b. Maintenance involves accessing the separate filtration chambers and vacuuming all deposited sediment. There should be ground access at all filters within the unit to facilitate this cleaning.

   c. Sizing of the sediment trap is specific to the manufacturer. Factors to be considered in selection of the sediment trap include:

      1) Fluid velocity through the sediment trap to ensure solids do not remain suspended.
      2) Collection of hydrocarbons.
      3) If internal by-pass is employed ensure that the design of the sediment trap retains solids and hydrocarbons.
      4) Flow through the trap can typically be estimated based on a rain event of 1” per hour and the project roof area of the building.

3. Cistern Tank and Pumps

   a. Make sure all accesses and openings to and from the Cistern are fully screened to prevent animal access.

   b. From a construction cost standpoint, the choice of storage tank is a major driver. Underground tanks, unless buried too deeply, tend to be less expensive (even considering the high cost associated with excavation). It is hard to beat the cost of a prefabricated, structurally engineered septic tank. For safety purposes during construction, the grade at the access hole typically will need to be cut back at a 45º angle from the bottom, sloping upward.

c. One good option is using multiple, pre-cast concrete tanks that are buried and tied together with the individual tanks ranging in size from 10,000 gallons to 25,000 gallons. The weight of the concrete helps in areas where the water table is high and buoyancy issues come into play. Also, each tank section should have it's own manhole access.

d. Typically, the size of the storage tank(s) is driven by the normal frequency of rainfall, the amount of rainfall during a typical storm event, and the demand. A one-inch rainfall will produce .62 gallons of water / sf collection area. Assuming ten-percent evaporative losses, this will result in .55 gallons / sf. When sizing the tank, consider recent trends as well as long-term historic rainfall data. Also, remember that the size of the tank and the usable water amount are different. This is typically from 8" above the bottom of the tank to the invert elevation of the overflow pipe.

e. Location: When locating the tank(s), keep in mind the extent of the necessary excavation. Place the tanks as close as possible to the demand location. Do not place them too closely to the building foundation. When placing multiple tanks, allow enough space between the tanks so that the connecting piping can be adequately sealed from the outside as well as inside the tanks.

f. The Cistern pump is responsible for transferring rainwater from the cistern tank to the buffer tank, through the primary filtration system. The pump is typically a submersible pump at the bottom of the tank; consider maintenance access of ease of removing pump system when locating pump and maintenance access.

4. Dual Filters

a. Dual filters are the first processing step. They should be located at an easily accessible height with sufficient clearance for periodic maintenance and filter changing.

b. Removing the fine particulate and suspended solids will also ensure a higher-efficiency system. Bag filters are recommended and must be periodically changed.

c. The redundancy of the filters allows for routine maintenance without affecting the use of the entire system. Place valves above and below each filter, so each can be isolated from the system during maintenance.

5. Water Treatment

a. Although the collected rainwater may already meet quality requirements, it is necessary to integrate a water treatment system. This will ensure consistent water quality independent of the water source and storage periods. There are two primary methods for water treatment:

1) Chlorine – The chlorination system supplies a continuous disinfection of the buffer tank, and consists of a chlorine storage tank and a pump to send chlorine into the buffer tank. On the buffer tank, there is a recirculation pump, which monitors the chlorine level of buffer tank water and activates the chlorine injection rate.

2) Blue-Water Dye – The water dye does not affect the quality of the water, but serves to clearly identify non-potable water from potable water. This may not be required by local code officials. The system consists of a dye tank and a pump to send dye into buffer tank. The dye should be water- and vegetable- based, and not contain any element that will disrupt the piping or wastewater systems.

6. Buffer Tank and Pump

a. The buffer tank serves as the location of both water treatment and the storage of non-potable water for occupant use. This is also where make-up water, when necessary, is introduced to the system.

b. Upon demand, the water is pumped from the underground tanks into the smaller, inside buffer tank that is sized to handle the short-term demand. This is the on-demand supply for occupant use. If there is insufficient rainwater, municipal- or well-makeup water will be added into the top of the buffer tank.

c. The water treatment is maintained via a recirculating pump and chlorine analyzer attached to the buffer tank. This pump can be placed on a timer so that it does not run continuously, but on a cycle adequate to access chlorine levels.

7. Booster Pumps

a. The dual booster pumps respond to water demand, and draw non-potable water from the buffer tank to toilet, urinal, and irrigation fixtures.

b. Each pump is sized to individually accommodate peak user demand. Both pumps can be isolated, to allow maintenance without system interruption.

c. When irrigation demand is present (and greater than building demand), pumps shall be selected to operate in parallel to provide peak irrigation demand.

8. Hydro-pneumatic Tank

a. The hydro-pneumatic tank prepares the non-potable water for occupant use by supplying the appropriate pressure for water conveyance and fixture operation.

b. The air in the tank is compressed by non-potable water entering the tank. As the pressure in the tank increases, the pressure in the water distribution system also increases, since it is fed from the tank.

9. Rainwater Equipment Room

   a. The rainwater equipment room is typically located inside the school building, near the cistern tank. This minimizes pipe lengths and prevents the need to run supply pipes under the building. The room should have an exterior door, with sufficient opening for equipment maintenance and replacement. A hose bib and floor drain are recommended for maintenance. The floor drain should be sized and located appropriately to accommodate Buffer tank, chlorine tank, and dye tank overflow.

C. SAMPLE SEQUENCE OF OPERATION

1. When the buffer tank setpoint is reached, the cistern pump shall be de-energized. If the cistern tank water level is below setpoint (field adjustable), then the cistern pump shall not be energized and the potable water solenoid valve shall be energized. When the cistern tank water level reaches setpoint, the potable water solenoid valve shall be de-energized and the cistern pump shall be energized. If the cistern pump receives a start signal and the current switch does not detect current, then an alarm shall be generated.

2. A rise in buffer tank water level above setpoint (field adjustable), due to malfunction of the solenoid valve or cistern pump, shall generate an alarm and de-energize the system.

3. The buffer tank recirculating pump shall run every twelve hours (field adjustable) for ten minutes (field adjustable). Chlorine levels shall be monitored during this ten-minute run time and if levels are below setpoint (field adjustable), then the pump shall continue to run until setpoint is reached. When setpoint is reached, the pump shall be de-energized. If the buffer tank recirculation pump receives a start signal and the current switch does not detect current, then an alarm shall be generated.

4. The hydro-pneumatic tank shall maintain system pressure between a high limit (field adjustable) and low limit (field adjustable) setpoint. When the low limit setpoint is exceeded, the booster pump package shall be energized. The booster pump shall continue to operate until the high limit setpoint is reached. When the high limit setpoint is reached, the booster pump shall be de-energized. The pumps shall operate in a lead-lag sequence. If the booster pump receives a start signal and the current switch does not detect current, then an alarm shall be generated.

   (As an alternate to the above booster pump sequence, when there exists a demand for irrigation, the pumps shall typically operate in parallel to meet such demand. When there is no longer a demand for irrigation, the pumps shall index back to standard lead-lag sequence of operation.)

5. Observations

   a. Monitor the chlorine tank level constantly and generate a low-level alarm when minimum setpoint (field adjustable) is exceeded.

   b. Monitor the dye tank level constantly and generate a low-level alarm when minimum setpoint (field adjustable) is exceeded.

   c. Meter water flow from the cistern constantly.

d. Meter water flow from the municipality constantly.

e. Meter water from to the irrigation system constantly.

f. Flow rates from the cistern, municipality and irrigation shall be used to determine the quantity of wastewater.

6. At a minimum, the following items should be incorporated into the sequence of operation.

a. Setpoint shall be determined based on project specific requirements.

b. All pumps shall generate an alarm upon failure.

c. Buffer tank level shall be monitored and control strategies implemented to keep tank from flooding.

d. Monitor chlorine tank levels and generate an alarm when minimum setpoint is exceeded.

e. Monitor cistern, municipal, and irrigation demand to estimate quantity of wastewater.

D. SYSTEM POINTS LIST

Point Description	Hardware					Software		
	Output		Input			Alarms		
	Digital		Digital		Analog	Status	High	Low
	Open/Close	Start/Stop	Current Switch	Fault	Level/Flow	Failure	Limit	Limit
Cistern Pump		X	X			X		
ORP Controller					X			
Buffer Tank Level					X		X	X
Booster Pump		X	X			X		
Chlorine Tank Level					X			X
Water Filter Detla P							X	
Buffer Tank Recirculation Pump		X	X			X		
Water Meter for Cistern					X			
Water Meter for Re-flush					X			
Water Meter for Irrigation					X			

E. SYSTEM DESIGN TIPS

1. To help reduce the cost impacts of the rainwater system, think of how the tank can serve dual functions.

    a. The cistern can retain enough reserve water for fire protection.

    b. The top of the tank is used as a basketball court.

    c. It is possible to use the main rainwater storage tank for recovering and storing condensate from cooling equipment, further enhancing the value and water savings.

F. IMPACT OF PLUMBING FIXTURES

1. Decreasing the non-potable water demand of the building can reduce the size of both the rainwater collection area and cistern size. Because we assume a constant rate for student facility use, the opportunity for decreasing demand is found in fixture type.
2. Conventional fixtures use 1.6 gallons per flush for toilets and 1 gallon per flush for urinals. There are currently many manufacturers of low-flow fixtures, with efficiencies down to .8 gallons per flush for toilet and .5 gallons per flush for urinals.
3. Refer to the EPA resource **WaterSense** for a listing of recommended high-efficiency fixtures. www.epa.gov/watersense

G. BUILDING INSPECTION TIPS

1. Eliminate any chance that the rainwater can contaminate the municipal water line. To ensure that the rainwater cannot contaminate the potable line, provide an air gap between the makeup municipal or well water line and the buffer tank. The air gap is failsafe.
2. How can the city bill the owner for non-municipal water? Most municipalities bill by water supplied, not waste out. They assume equal waste. The answer is to install multiple flow meters. Measure both the municipal water and rainwater. In some cases, also measure the water that is going to irrigation and not into the sanitary sewer lines.
3. Building codes, almost everywhere, only mention gray water. *Rainwater is not gray water*. It does not come from sinks and drinking fountains and is not subject to the potential disease problems that are present with gray water. With a gray water system, excess water must be directed to the sanitary sewer, not the wetland or storm system. If the local building inspector incorrectly classifies the rainwater system as a gray water system, the costs for enhanced treatment and piping greatly impact the overall cost-to-benefit.

H. ADDITIONAL RAINWATER COLLECTION FACTS, BENEFITS, AND ISSUES

1. Relationship of water and energy: By conserving potable water, we are decreasing energy used for water treatment, conveyance, and infrastructure construction.

2. Municipal Service Fees: In many areas, there are storm water fees and nitrogen fees, both associated with the amount of water that is leaving the site. Rainwater harvesting acts like a retention pond, holding up to 2 in. of rainfall and reducing or eliminating the

need for outside retention strategies. With a rainwater harvesting system, a typical middle school site can avoid paying as much as $50,000 for a retention pond.

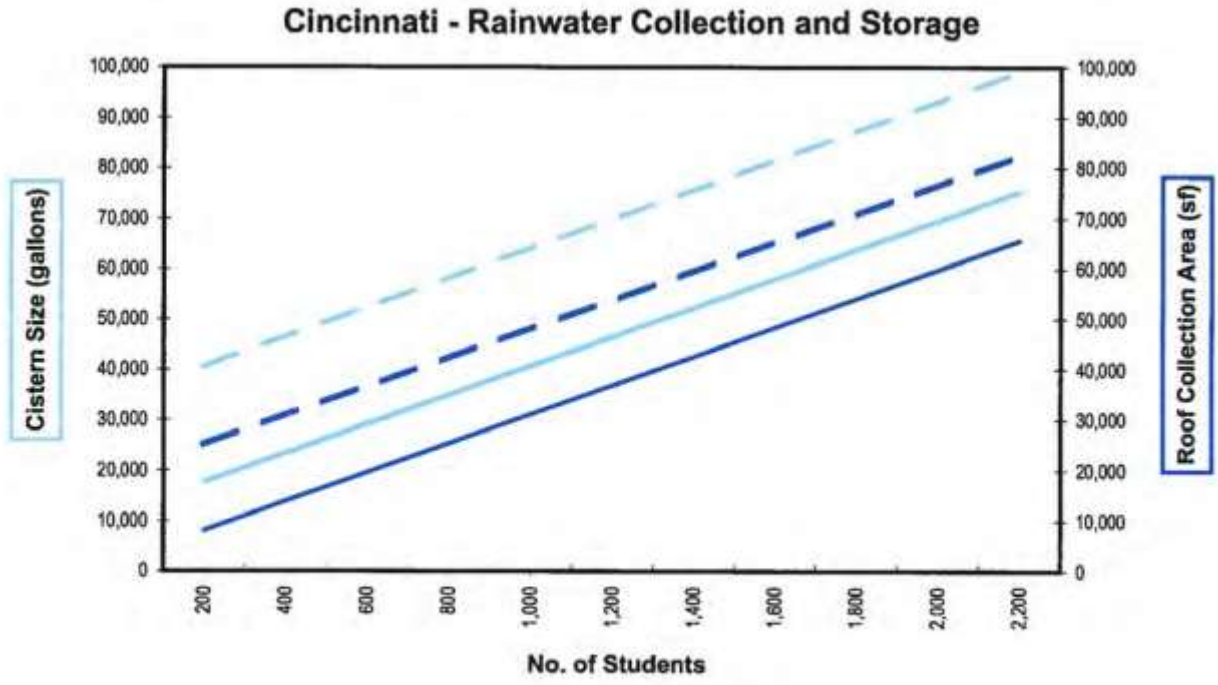
3. Still effective during drought: Because of the storage capacities of the cistern tank, the benefits of rainwater collection will be available during drought conditions. Case studies have indicated that rainwater systems can still provide more than 60% of demand during periods of low rainfall. This savings provides a more dependable water supply to the owner, and greatly reduces demand on the limited potable water availability.

4. Requires Less Chlorine: Municipal systems typically use 4 parts per million of chlorine. Rainwater systems used for non-potable needs can be chlorinated to just 0.25 parts per million to eliminate algae formation, according to the U.S. Air Force. The simplest chlorination strategy ties the chlorinator to the pump that pulls rainwater from the underground cisterns at a known flow rate. Although algae growth is not a big concern with underground tank systems, it is for above ground storage tanks, which have a greater chance of exposure to sunlight. Chlorination to the recommended 0.25 parts per million safeguards the tank.

5. Lowers Nitrogen Flow Off Site Into Local Streams: One pound of nitrogen is reduced for every 7,000 to 10,000 ft^2 of roof area used for rainwater harvesting. However, a commonly used first flush strategy that allows the rain falling on the roof to be diverted to a storm drainage system reduces much of this benefit. Used to reduce filter maintenance, this strategy dumps the debris as well as the nitrogen. To reduce nitrogen flow, use better filters and allow all rainwater to flow into the storage tank.

6. Rural locations: By using rainwater collection for non-potable, irrigation, and fire-fighting purposes, the school demands less of the local well resource. This ensures a longer and more dependable period of well use, and benefits neighbors utilizing the same aquifer. Also if the school uses well water and treats wastewater on site, there are savings from not needing to connect to far-away municipal services.

(see graphs on following pages)


Cincinnati - Rainwater Collection and Storage
Cistern Size (gallons)
Roof Collection Area (sf)
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
200
400
600
800
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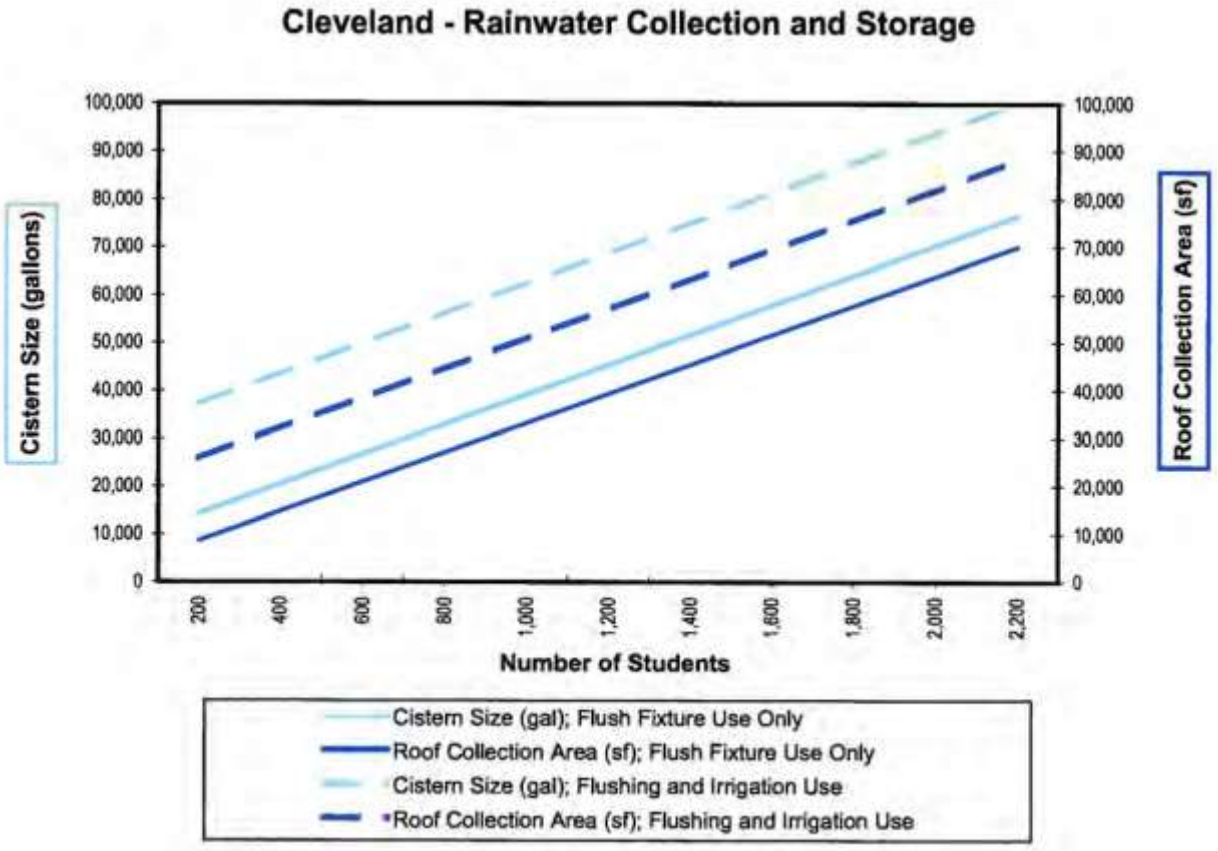
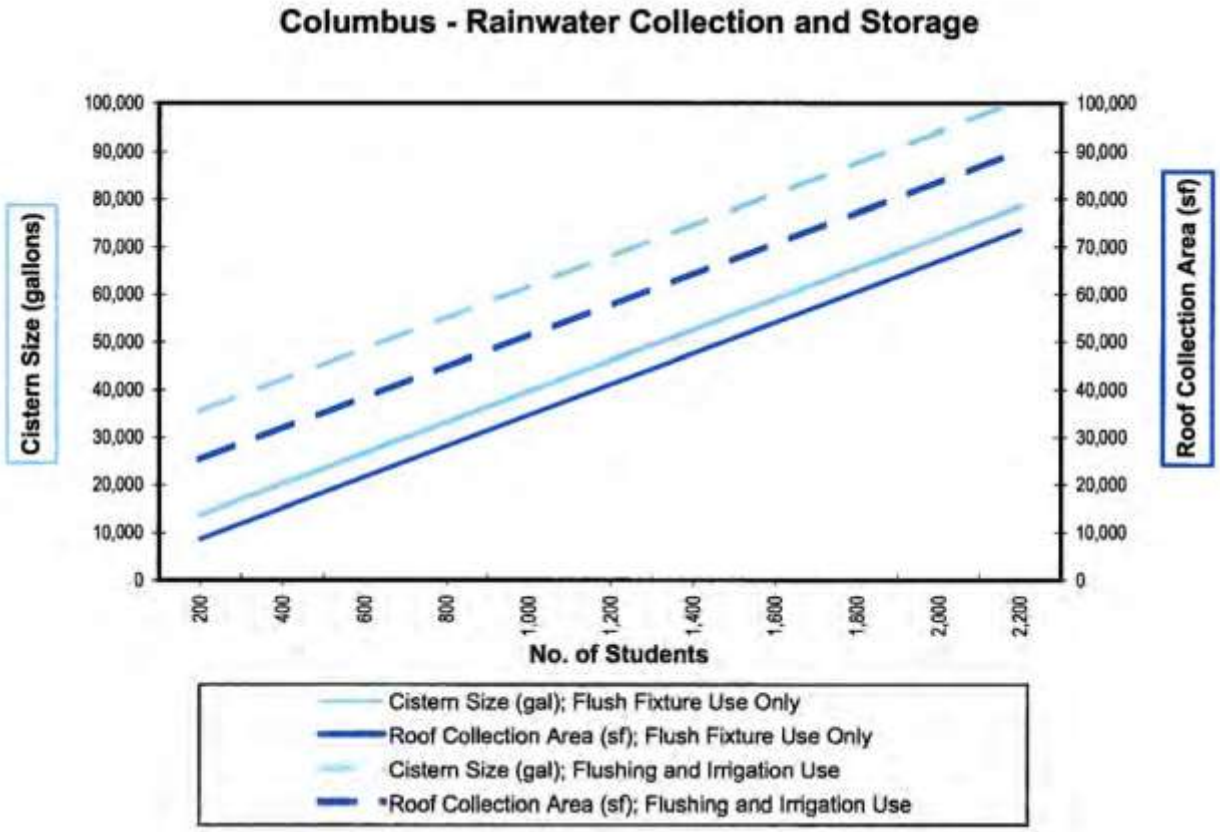
2,000
2,200
No. of Students


Cleveland - Rainwater Collection and Storage
Cistern Size (gallons)
Roof Collection Area (sf)
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
200
400
600
800
1,000
1,200
1,400
1,600
1,800
2,000
2,200
Number of Students
Cistern Size (gal); Flush Fixture Use Only
Roof Collection Area (sf); Flush Fixture Use Only
Cistern Size (gal); Flushing and Irrigation Use
Roof Collection Area (sf); Flushing and Irrigation Use


Columbus - Rainwater Collection and Storage
Cistern Size (gallons)
Roof Collection Area (sf)
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
200
400
600
800
1,000
1,200
1,400
1,600
1,800
2,000
2,200
No. of Students
Cistern Size (gal); Flush Fixture Use Only
Roof Collection Area (sf); Flush Fixture Use Only
Cistern Size (gal); Flushing and Irrigation Use
*Roof Collection Area (sf); Flushing and Irrigation Use

A. ROOF SPACE AND SHADING REQUIREMENTS

The Designer shall designate areas on the roof plan that are suitable for future solar photovoltaic installations where the roof area remains free of shade from 9:00 a.m. to 5:00 p.m. solar time every day. No obstructions shall exist on the roof within the designated solar area. Obstructions to the south, east, or west of the designated solar area shall be limited in height to avoid shading the area. To the extent possible, any equipment, pipes, conduit, and vent stacks should be located north of the designated solar areas.

Select tree species and planting locations so that the mature trees will not shade roof areas that are suitable for solar installation.

B. STRUCTURAL REQUIRMENTS

New roof structures should be designed to anticipate a future additional dead load in areas suitable for solar photovoltaic installation. The Designer shall seek direction from the School District on design parameters for future photovoltaic installation. In the absence of specific direction, the Designer may assume that the photovoltaic panels are mounted parallel to the roof slope.

C. ELECTRICAL SYSTEM ACCESS

Provide an adequately sized chase from the main electrical room, electrical service closets, and the mechanical room to the roof if the building is multi-story. Locate the electrical room on an exterior wall (north side preferred) or plan for shading an adjacent exterior electrical equipment pad. Indicate on the site plan a 10’ by 10’ area reserved for a future outdoor pad for electrical equipment adjacent to the electrical equipment room.

Optional: Reserve 6 linear feet of wall space adjacent to the main electrical panel for future installation of inverters.

D. BUILDING MASSING AND ORIENTATION

If new building massing is dominantly rectangular, it is preferred to orient the long axis to the east-west cardinal points.

E. WAIVER

The provisions for solar readiness may be waived by the Commission when the building is shaded, or will be shaded, or when other conditions exist that make use of the roof area for solar energy production impractical. Requests for waiver shall be submitted to the variance committee.

OHIO - SOLAR DOMESTIC HOT WATER MATRIX

	Number Students	Hot Water Demand	Design Load	Solar Fraction	Gallons Storage	Number Collectors	Areas Collectors	Solar Production	kWh
		Gallons/day	Gallons/day			8'-0" x 4'-0"	Sq. Ft.		
Cleveland									
Elementary	400	219	190	48%	120	3	96	18 Mbtu	5,870
Middle	600	328	285	49%	240	5	160	25.1 Mbtu	8,170
High 1000	1000	547	475	45%	240	8	256	41.6 Mbtu	13,557
High 2000	2000	1094	950	43%	480	15	480	80.0 Mbtu	26,052
Columbus									
Elementary	400	219	190	50%	120	3	96	18.3 Mbtu	5,969
Middle	600	328	285	51%	240	5	160	25.7 Mbtu	8,363
High 1000	1000	547	475	46%	240	8	256	42.3 Mbtu	13,790
High 2000	2000	1094	950	44%	480	15	480	81.4 Mbtu	26,504
Cincinnati									
Elementary	400	219	190	51%	120	3	96	17.9 Mbtu	5,816
Middle	600	328	285	51%	240	5	160	25.0 Mbtu	8,152
High 1000	1000	547	475	47%	240	8	256	41.0 Mbtu	13,363
High 2000	2000	1094	950	45%	480	15	480	78.9 Mbtu	25,701

Collector @ 40 degree tilt

Modeled 12 months & 5 days/week
Elementary June 70%, July 50%, Aug 80%
Middle June 70%, July 50%, Aug 80
High School year round

A. INDIRECT DRAIN-BACK OPTION 1

1. System Description

Drain-back systems offer freeze protection and high-limit protection because the collectors empty by gravity when the system pump in not operating. Since these differentially controlled systems often use distilled water as the heat transfer fluid, they offer improved heat transfer to the potable water. (This is because water has better heat transfer capabilities than other heat transfer liquids such as glycols or hydrocarbons.)

In some hard freezing climates, a mixture of 30% propylene glycol may be used or required to ensure freeze protection in the event of controller failure or the piping not draining completely.

When installed correctly, Drain-Back System Option 1 provides a fail-safe method for protecting the collectors and piping from freeze damage and the system from overheating. Each time the differentially controlled solar pump shuts off, all fluid in the slightly tilted collector array and pipes drains into an insulated storage tank located in the building's interior. The heat exchanger is incorporated in the solar storage tank at a level below the lowest anticipated level of the fluid when the collector array is filled and operating.

Drain-Back Option 1 has a large (80-200) gallon tank that serves as the solar storage tank and the drain back reservoir. Most solar collectors have a capacity of approximately 1 to 1.5 gallons each. Therefore, the storage tank/reservoir must be sized based on the number of collectors and the volume of fluid in the total length of the solar loop.

The solar loop and storage tank is closed to the atmosphere and has a measured volume of fluid and measured volume of air. This system does not require air vents or vacuum breakers. The air in these systems should not be added to or released.

The air is transferred to the storage tank when the solar pump is running and the heat transfer fluid fills the collectors. The fluid level in the storage tank never drops below the level of the water side heat exchanger located inside the tank. When the solar pump shuts off, the air in the reservoir is forced up and into the top of the collectors by the water draining back into the reservoir from the bottom of the collectors.

The cold water supply is routed through the heat exchanger in the solar storage tank and pre-heats make up water prior to entering the conventional water heater. Therefore any available heat in the storage tank is transferred to the water heater.

a. The solar pump must be sized correctly to overcome gravity and friction losses.
b. Since the system is not pressurized, expansion tanks and check valves in the collector loop are not required.
c. Collectors and pipe drains must be installed to allow proper and unimpeded drainage back to the drain back storage tank/reservoir (minimum ¼ inch per foot).

2. Sequence of Operation

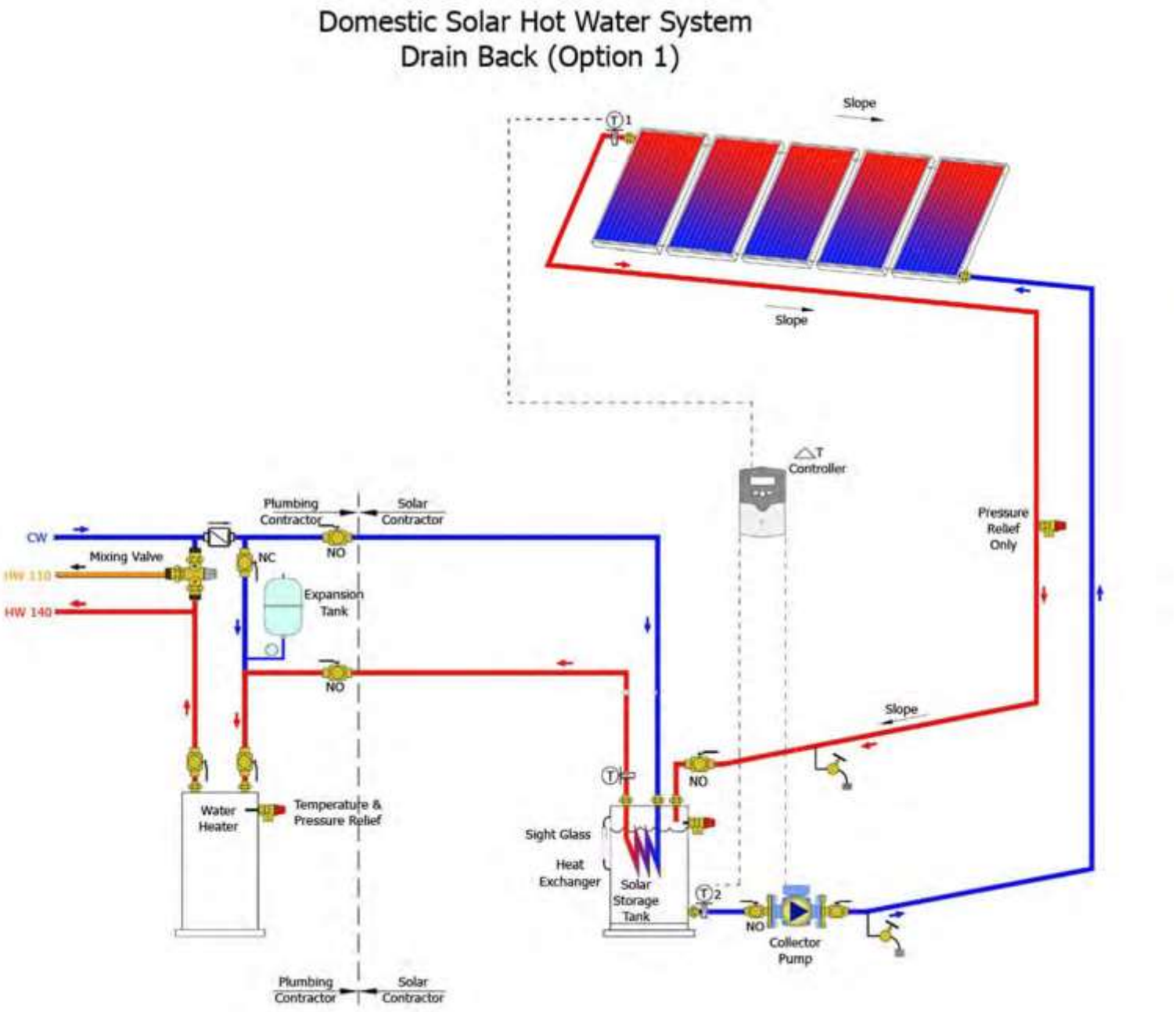
There are two methods of operating the pumps on a Drain-Back system: a dedicated Temperature Differential Controller or a Building Automated Control System.

a. Temperature Difference Control
When the temperature difference between the sensor on the solar collector (T1) and the sensor in the storage tank (T2) exceeds the set point or Delta-T temperature difference setting (typically 25 degrees), the relay in the controller will activate the collector pump, fill the collectors and transfers the heat to the drain-back reservoir/solar storage tank. When the collector tank temperature (T2) indicates a 4°F differential setting, the controller will turn off the circulation pumps and allow the heat transfer fluid to drain back into the reservoir/solar tank.

b. Building Automated Control System
1) The operating protocols for the Building Automated Control System will include:
a) Solar Pump On: Solar pump turns on when the temperature difference between the sensor on the solar collector (T1) and the sensor in the solar storage tank (T2) exceeds the set point or Delta-T temperature difference setting (typically 25 degrees).
b) Solar Pump Off: Solar pump turns off when the temperature difference decreases and falls below 4°F.
c) Solar Storage Tank High Limit: When the temperature (T2) in the storage tank exceeds the HI-LIMIT dialed setting (typically 140-160 degrees), the solar pump relay will be turned off without delay regardless of the status of the temperature difference that exists between the solar storage tank and the solar collectors. When the storage tank temperature falls 4°F below the setting in the HI-LIMIT, the controller will then resume normal operation.
d) Solar Minimum Operating Temperature: The circulation pumps will be deactivated anytime the solar collector sensor (T1) is below 50°F. Normal control operation will not resume until the collector temperature returns to 70°F or above.
2) High Limit Control
When the temperature in the storage tank exceeds the HI-LIMIT dialed setting (typically 140-160 degrees), the solar pump relay will be turned off without delay regardless of the status of the temperature difference that exists between the solar storage tank and the solar collectors. When the storage tank temperature is lowered to 4°F below the setting in the HI-LIMIT, the controller will then resume normal operation.
3) Low Temperature Shut Down Override
This feature may be available to prevent the system from operating at low outdoor temperatures. If this feature is enabled, normal operation will stop when the collector temperature falls below 50°F. The solar pump relay will then be turned off. Normal control operation will not resume until the collector (T1) temperature returns to 70°F or above.

3. Sensors
Modern solar controllers use Resistance Temperature Devices (RTD) or Industrial 400°F (204°C) rated 10K IMC thermistors that have +/- 1°F accuracy. When installed, they will not exceed one degree of additional error for cable distances up to 1,000 feet of 18ga; 700 feet of 20ga, or 500 feet of 22ga.

Please see the following page for a schematic diagram.


Domestic Solar Hot Water System
Drain Back (Option 1)
Slope
T1
Slope
ΔT Controller
Pressure Relief Only
Plumbing Contractor
Solar Contractor
CW
Mixing Valve
HW 110
HW 140
NC
NO
Expansion Tank
NO
Slope
NO
Water Heater
Temperature & Pressure Relief
Sight Glass
Heat Exchanger
Solar Storage Tank
T2
NO
Collector Pump
Plumbing Contractor
Solar Contractor

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A. INDIRECT DRAIN-BACK OPTION 2

1. System Description

Drain-back systems offer freeze protection and high-limit protection because the collectors empty by gravity when the system pump in not operating. Since these differentially controlled systems often use distilled water as the heat transfer fluid, they offer improved heat transfer to the potable water. (This is because water has better heat transfer capabilities than other heat transfer liquids such as glycols or hydrocarbons.)

In some hard freezing climates, a mixture of 30% propylene glycol may be used or required to ensure freeze protection in the event of controller failure or the piping not draining completely.

When installed correctly, Drain-Back System Option 2 provides a fail-safe method for protecting the collectors and piping from freeze damage and the system from overheating. Each time the differentially controlled solar pump shuts off, all fluid in the slightly tilted collector array and pipes drains into an insulated reservoir tank located in the building's interior. The heat exchanger is in the inside at the bottom of this drain-back reservoir tank.

Drain-Back Option 2 has a reservoir on the solar loop and is sized to hold the total volume of heat transfer fluid in the collector array and exposed piping. The reservoirs are available in sizes from 8 gallons to 30 gallons and are designed to hold the fluid of 3 to 15 collectors (based upon the example school systems provided) plus the volume of fluid in total length of the solar loop. Most solar collectors have a fluid capacity of approximately 1 to 1.5 gallons per collector.

The solar loop is closed to the atmosphere and has a measured volume of fluid and measured volume of air. This system does not require air vents or vacuum breakers. The air in these systems should not be added to or released.

The air is transferred to the reservoir tank when the pump is running and the heat transfer fluid fills the collectors. The pump is never without water since the pump is located below the lowest water level when fully drained. When the pump shuts off, the air in the reservoir is forced up and into the top of the collectors by the water draining back into the reservoir from the bottom of the collectors.

a. The solar pump must be sized correctly to overcome gravity and friction losses.

b. Since the system is not pressurized, expansion tanks and check valves in the collector loop are not required.

c. Collectors and pipe drains must be installed to allow proper and unimpeded drainage back to the drain back reservoir (minimum ¼ inch per foot).

2. Sequence of Operation

There are two methods of operating the pumps on a Drain-Back system: a dedicated Temperature Differential Controller or a Building Automated Control System.

a. Temperature Difference Control
When the temperature difference between the sensor on the solar collector (T1) and the sensor in the storage tank (T2) exceeds the set point or Delta-T temperature difference setting (typically 25 degrees), the relay in the controller will activate the collector pump and the water pump. The two pumps operating simultaneously will fill the solar collector and transfer the heat to the reservoir and circulate the cold water from the solar storage tank or water heater through the heat exchanger to transfer the collector heat to the water heating system. When the collector tank temperature (T2) indicates a 4°F differential setting, the controller will turn off the circulation pumps and allow the heat transfer fluid to drain back into the reservoir.

b. Building Automated Control System

1) The operating protocols for the Building Automated Control System will include:

a) Solar Pump On: Solar pump turns on when the temperature difference between the sensor on the solar collector (T1) and the sensor in the solar storage tank (T2) exceeds the set point or Delta-T temperature difference setting (typically 25 degrees).

b) Solar Pump Off: Solar pump turns off when the temperature difference decreases and falls below 4°F.

c) Solar Storage Tank High Limit: When the temperature (T2) in the storage tank exceeds the HI-LIMIT dialed setting (typically 140-160 degrees), the solar pump relay will be turned off without delay regardless of the status of the temperature difference that exists between the solar storage tank and the solar collectors. When the storage tank temperature falls 4°F below the setting in the HI-LIMIT, the controller will then resume normal operation.

d) Solar Minimum Operating Temperature: The circulation pumps will be deactivated anytime the solar collector sensor (T1) is below 50°F. Normal control operation will not resume until the collector temperature returns to 70°F or above.

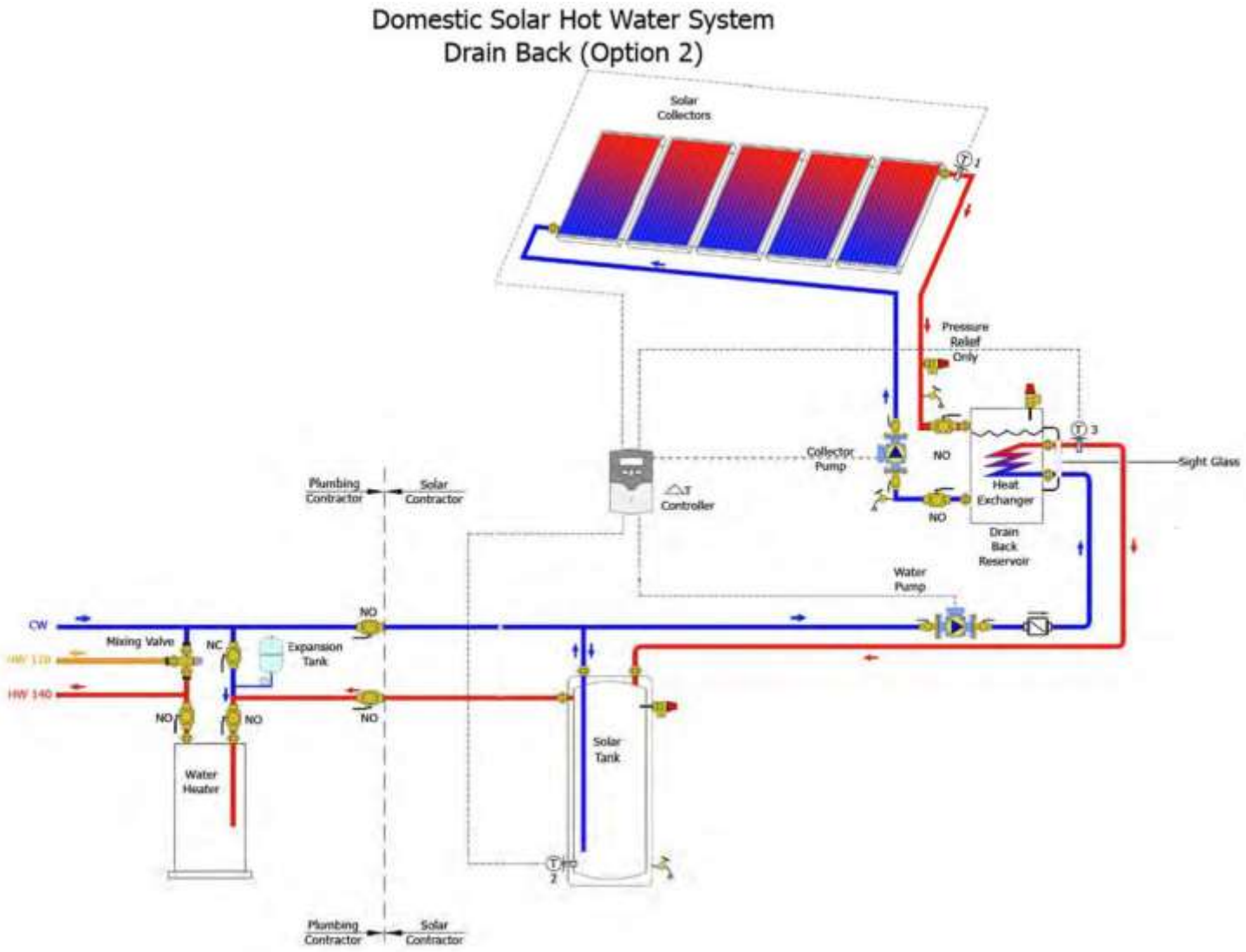
2) High Limit Control
When the temperature in the storage tank exceeds the HI-LIMIT dialed setting (typically 140-160 degrees), the solar pump relay will be turned off without delay regardless of the status of the temperature difference that exists between the solar storage tank and the solar collectors. When the storage tank temperature is lowered to 4°F below the setting in the HI-LIMIT, the controller will then resume normal operation.

3) Low Temperature Shut Down Override
This feature may be available to prevent the system from operating at low outdoor temperatures. If this feature is enabled, normal operation will stop when the collector temperature falls below 50°F. The solar pump relay will then be turned off. Normal control operation will not resume until the collector (T1) temperature returns to 70°F or above.

3. Sensors

Modern solar controllers use Resistance Temperature Devices (RTD) or Industrial 400°F (204°C) rated 10K IMC thermistors that have +/- 1°F accuracy. When installed, they will not exceed one degree of additional error for cable distances up to 1,000 feet of 18ga; 700 feet of 20ga, or 500 feet of 22ga.

Please see the following page for a schematic diagram.


Domestic Solar Hot Water System
Drain Back (Option 2)
Solar Collectors
Pressure Relief Only
Collector Pump
NO
Heat Exchanger
Sight Glass
Controller
Drain Back Reservoir
Water Pump
Plumbing Contractor
Solar Contractor
CW
Mixing Valve
NC
Expansion Tank
HW 120
HW 140
NO
Water Heater
Solar Tank
Plumbing Contractor
Solar Contractor

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A. INDIRECT PRESSURIZED GLYCOL

1. System Description

A pressurized glycol solar hot water system is a closed loop solar water heating system that uses an antifreeze heat transfer fluid. The use of a propylene glycol fluid mixture in the solar loop prevents the fluid from freezing and damaging the solar collectors or the exterior piping in the winter. This system is recommended to be used in extreme weather areas or facilities that have a balanced daily or annual load. Caution should be taken when applying an indirect pressurized glycol system where over heating or collector stagnation could be a problem.

As in most solar hot water systems the indirect pressurized glycol system preheats service hot water through a heat exchanger(s) located at the solar storage tank(s). The glycol heat transfer solution is circulated through the solar collectors and returns to the heat exchangers in the solar storage tank with a higher heat content. This higher heat content is then transferred through the heat exchangers to the water in the solar storage tank increasing the water temperature.

Options for preventing overheating may include over sizing the storage system, installing a larger expansion tank or incorporating a heat dump from the storage tank or on the solar loop with the use of a hydronic coil to atmosphere.

2. Sequence of Operation

There are two methods of operating the pumps on a Pressurized Glycol System: a dedicated Temperature Differential Controller or a Building Automated Control System.

a. Temperature Difference Control
When the temperature difference between the sensor on the solar collector (T1) and the sensor in the storage tank (T2) exceeds the set point or Delta-T temperature difference setting (typically 25 degrees), the relay in the controller will activate the solar collector pump and circulate the heat transfer fluid through the collector array transferring the energy to the heat exchanger inside the storage tank.

If an external heat exchanger is used on the system the relay in the controller will activate the collector pump and the pump to the heat exchanger.

When the collector tank temperature (T2) indicates a 4˚ F differential setting, the controller will turn off the solar pump. In this case the heat transfer fluid remains in the collector loop.

b. Building Automated Control System
1) The operating protocols for the Building Automated Control System will include:
a) Solar Pump On: Solar pump turns <u>on</u> when the temperature difference between the sensor on the solar collector (T1) and the sensor in the solar storage tank (T2) exceeds the set point or Delta-T temperature difference setting (typically 25 degrees).
b) Solar Pump Off: Solar pump turns <u>off</u> when the temperature difference decreases and falls below 4°F.

c) Solar Storage Tank High Limit: When the temperature (T2) in the storage tank exceeds the HI-LIMIT dialed setting (typically 140-160 degrees), the solar pump relay will be turned off without delay regardless of the status of the temperature difference that exists between the solar storage tank and the solar collectors. When the storage tank temperature falls 4°F below the setting in the HI-LIMIT, the controller will then resume normal operation.

d) Solar Minimum Operating Temperature: The circulation pumps will be deactivated anytime the solar collector sensor (T1) is below 50°F. Normal control operation will not resume until the collector temperature returns to 70°F or above.

2) High Limit Control

When the temperature in the storage tank exceeds the HI-LIMIT dialed setting (typically 140-160 degrees), the solar pump relay will be turned off without delay regardless of the status of the temperature difference that exists between the solar storage tank and the solar collectors. When the storage tank temperature is lowered to 4°F below the setting in the HI-LIMIT, the controller will then resume normal operation.

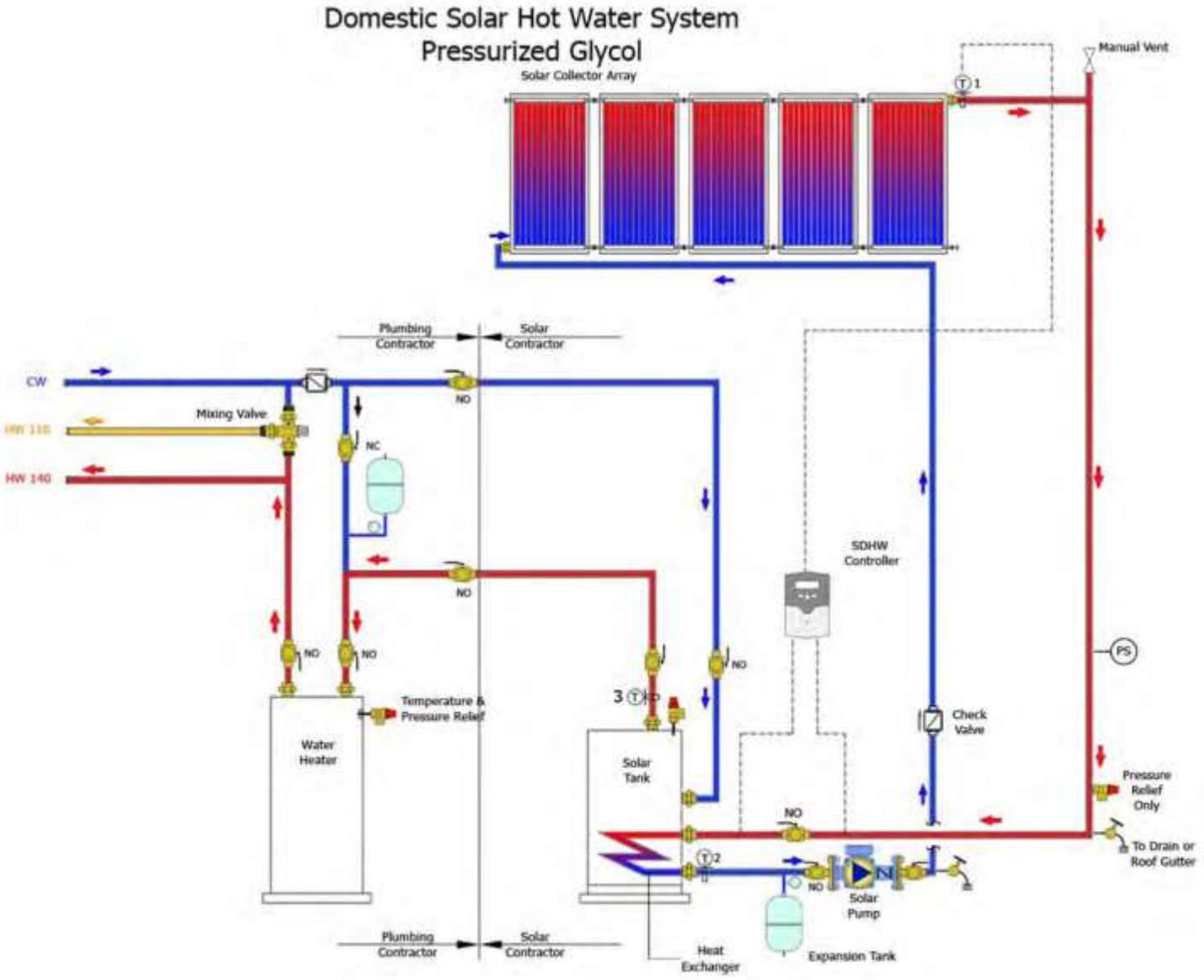
3) Low Temperature Shut Down Override

This feature may be available to prevent the system from operating at low outdoor temperatures. If this feature is enabled, normal operation will stop when the collector temperature falls below 50°F. The solar pump relay will then be turned off. Normal control operation will not resume until the collector (T1) temperature returns to 70°F or above.

3. Sensors

Modern solar controllers use Resistance Temperature Devices (RTD) or Industrial 400°F (204°C) rated 10K IMC thermistors that have +/- 1°F accuracy. When installed, they will not exceed one degree of additional error for cable distances up to 1,000 feet of 18ga; 700 feet of 20ga, or 500 feet of 22ga.

Please see the following page for a schematic diagram.


Domestic Solar Hot Water System
Pressurized Glycol
Solar Collector Array
Manual Vent
Plumbing Contractor
Solar Contractor
CW
HW 110
HW 140
Mixing Valve
NO
NC
SDHW Controller
Temperature & Pressure Relief
Water Heater
Solar Tank
Check Valve
PS
Pressure Relief Only
To Drain or Roof Gutter
Solar Pump
Heat Exchanger
Expansion Tank

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PURPOSE

The purpose of this chapter is to provide a design standard and a level of quality for the systems and materials to be incorporated into new buildings for the State School Building Assistance Program.

SYSTEMS

Major building systems such as structural, roof, exterior wall, plumbing, HVAC, electrical, and technology are described. The stated features, components, performance, and end results are required. These are the standards required for new facilities. Systems, other than those referred to in this chapter, will be considered if adequate information, data, calculations, demonstrations, and relative cost information are provided to the Design Professional and subsequently approved by the Ohio Facilities Construction Commission.

In this Design Manual, no attempt has been made to recommend or describe the means and methods of assembling the various systems.

MATERIALS

With purpose, the materials mentioned in this chapter are generic. No brand or manufacturer's names are stated. Materials other than those mentioned in this chapter, which meet or exceed the characteristics or performance of the stated materials, will be considered, provided adequate information is submitted for approval by the Design Professional and the Ohio Facilities Construction Commission. Alternate materials which exceed the cost of materials indicated in the Design Manual will be at the school district's cost.

DESIGN CODES AND STANDARDS

It is recommended that all school spaces used primarily by children should be designed in accordance with the new, proposed ADA regulations for children ages 3 through 12. Areas used primarily by students 13 and over and by adults are to be designed in accordance with current ADA regulations. All buildings should adhere to all current codes and standards. Efforts in design should be made to reduce energy consumption to at least 30% below ***ASHRAE 90.1-2007 per appendix G.***

DESIGN FOR SAFETY / SECURITY

Design Professionals and educators are encouraged to embrace the concept known as Crime Prevention Through Environmental Design (CPTED). CPTED encourages planners to include safety elements into a building design at the earliest stages. Examples are administration control at main entrances, avoiding corridors with too many hidden spots, and fewer entrances.

ENERGY USAGE

All systems shall be designed in compliance with ASHRAE STANDARD 90.1 “Energy Standard for Building Except Low-Rise Residential Buildings”, and the energy usage requirements prescribed by the Ohio Building Code and the Department of Energy.

AIR BARRIER SYSTEM

An air barrier system is a collection of special materials applied to the walls and roof of a building to control air movement through the building envelope. To be effective all joints between different materials, cracks, penetrations, etc., must be sealed with airtight and flexible membranes.

Air barrier materials include self-adhering sheets, fluid-applied membranes, spray-applied polyurethane foams, and rigid air barrier materials.

The Commonwealth of Massachusetts was the first state to require air barriers and at least six other states are considering it also. (Refer to Specification Section 072700). There is near consensus that in most all climates, properly installed air barrier assemblies can substantially reduce operating energy costs. Design Professionals are required to incorporate a continuous air barrier system into their projects.

TECHNOLOGY COORDINATION

Design Professional shall coordinate closely with the Technology Designer for an integrated classroom design, to assure all classroom technology systems are accommodated properly in conjunction with architectural designs, such as daylighting. (i.e. proper location for projector, adequate casework for AV equipment, etc.)

The School District's Educational Technology Plan has a direct impact on space planning of technology support rooms. Verify and coordinate Equipment Room (ER) and Telecommunications Room (TR) sizes and locations with the Technology Designer during the programming phase.

Design Professional shall coordinate locations of video display viewing surfaces and methods to control room daylighting with the Technology Designer to achieve a minimum 10:1 contrast ratio.

The Technology Designer shall coordinate with other Design Professionals to provide adequate, dedicated rooftop space to accommodate current or future system antennas.

A. APPLICATION

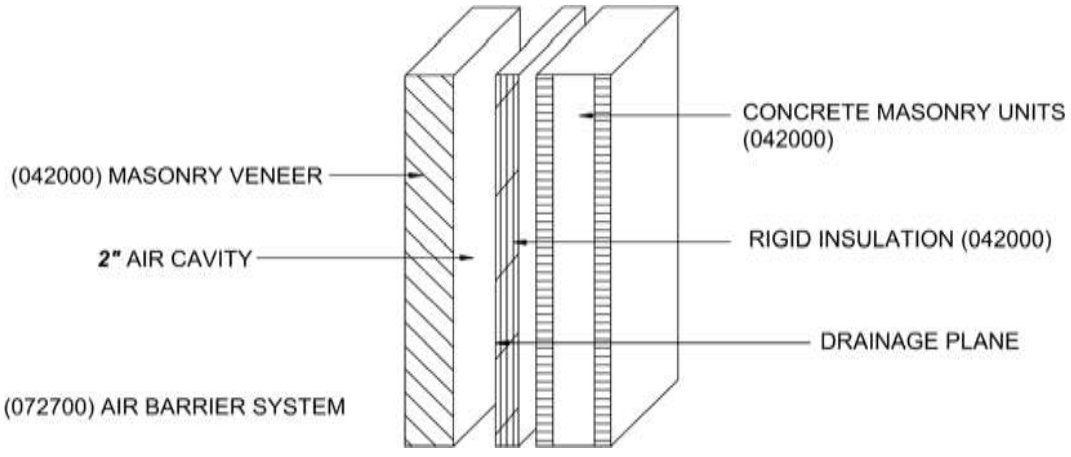
1. No limitation as to location

B. COMPONENTS

1. Exterior Finish
   a. Masonry veneer
2. ***2"*** Air Cavity – Required
   a. Weeps top and bottom
3. Cavity Insulation
   a. Rigid insulation or closed cell polyurethane insulation
4. Air Barrier System (Required) Options include:
   a. Self-adhering sheets
   b. Fluid-applied membranes
   c. Closed-cell polyurethane insulation
   d. Foil faced rigid insulation board
   (air barrier transition tape required at masonry control joints)
5. Backup Material
   a. Concrete masonry unit

C. PERFORMANCE

1. Detail roof/wall intersections ***and all openings and penetrations*** to provide a continuous air barrier system.



Masonry Cavity Wall
Figure A-1

METAL PANEL ON CONCRETE MASONRY WALL

A. APPLICATION

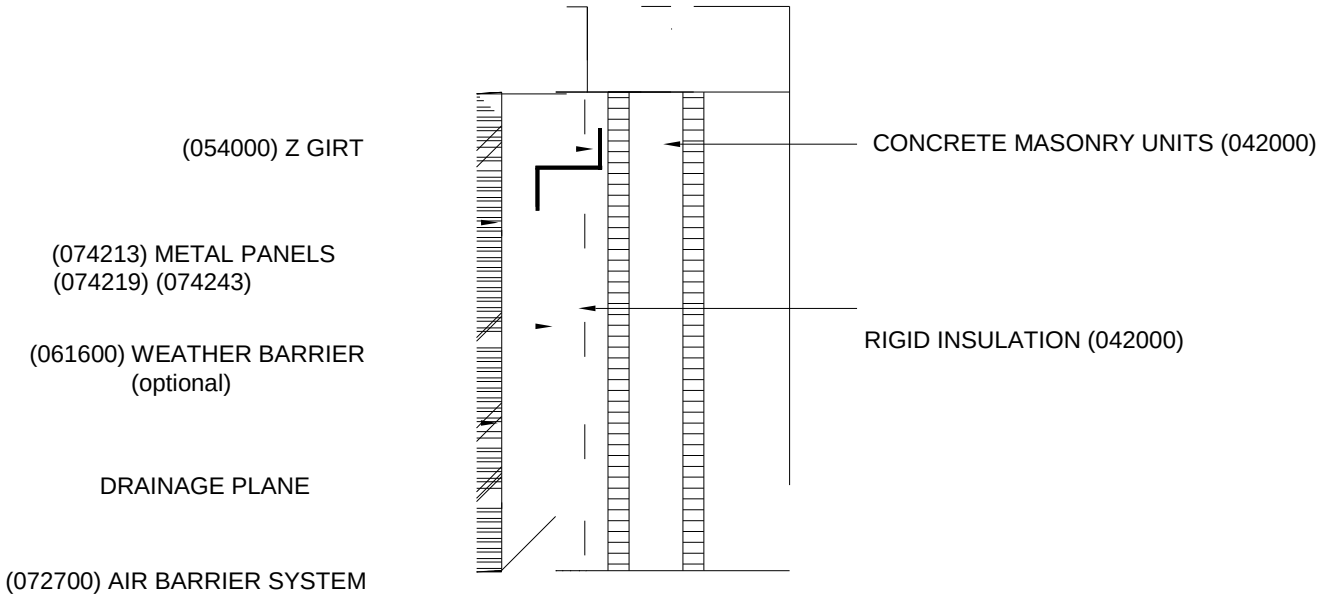
1. Use of this system shall not exceed 20% of total building exterior vertical wall surface.

B. COMPONENTS

1. Exterior Finish
   a. Metal Panel
2. Rigid insulation
3. Metal Framing/Furring
4. Backup Material
   a. Concrete masonry unit
5. Air Barrier System
   (air barrier transition tape required)

C. PERFORMANCE

1. Detail roof/wall intersection ***and all openings and penetrations*** to provide a continuous air barrier system.



Metal Panel on Concrete Masonry Wall
Figure A-1

EXTERIOR WALLS
PLANT-PRECAST CONCRETE INSULATED SANDWICH WALL

A. APPLICATION

1. Excellent for impact resistance
2. Excellent where large, load-bearing capacities are required

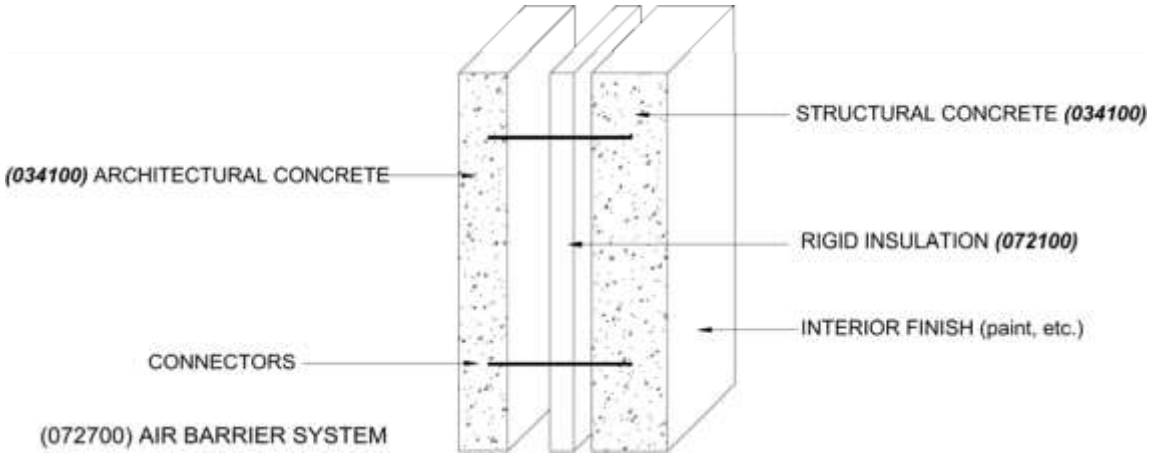
B. COMPONENTS

1. Exterior Finish
   a. Architectural Concrete
2. Cavity Insulation
   a. Rigid Insulation
3. Backup Material
   a. Structural Concrete

4. Air Barrier System

C. PERFORMANCE

1. Detail roof/wall intersection and all openings and penetrations to provide a continuous air barrier system.



Plant-Precast Concrete Insulated Sandwich Wall
Figure A-1

A. APPLICATION

1. Permitted in spaces, such as mechanical penthouses and other locations where heavy structural loading is not practical.

2. Use of this system shall not exceed 10% of the total building exterior vertical wall surface.

B. COMPONENTS

1. Exterior Finish
a. Metal Wall Panel

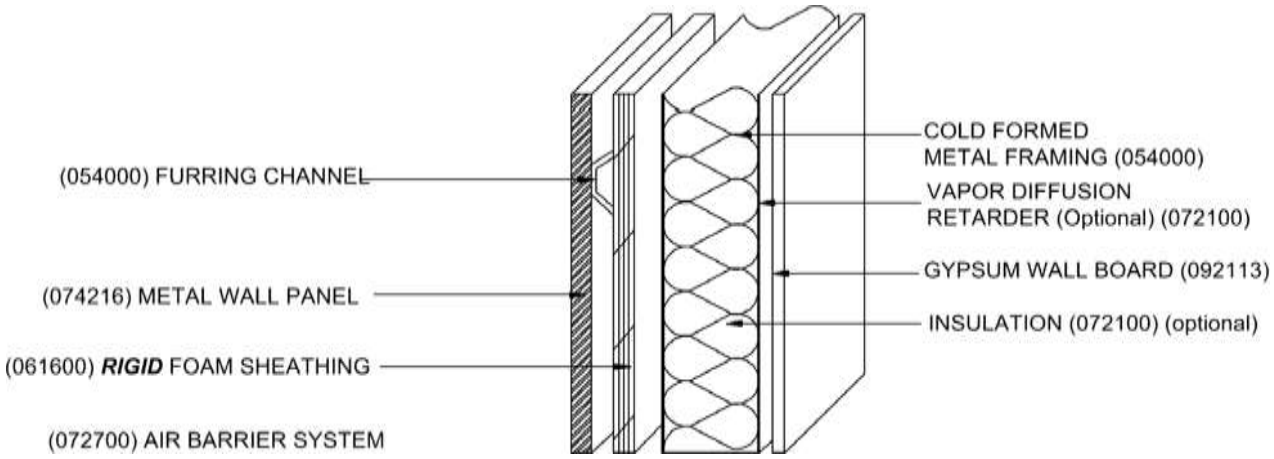
2. ***Rigid -Foam Sheathing***

3. ***Air Barrier System***

4. Backup Material
a. Cold-formed metal framing

C. PERFORMANCE

1. Detail roof/wall intersection ***and all openings and penetrations*** to provide a continuous air barrier system.



Metal Panel On Metal Framing
Figure A-1

A. APPLICATION

1. All wall to roof conditions

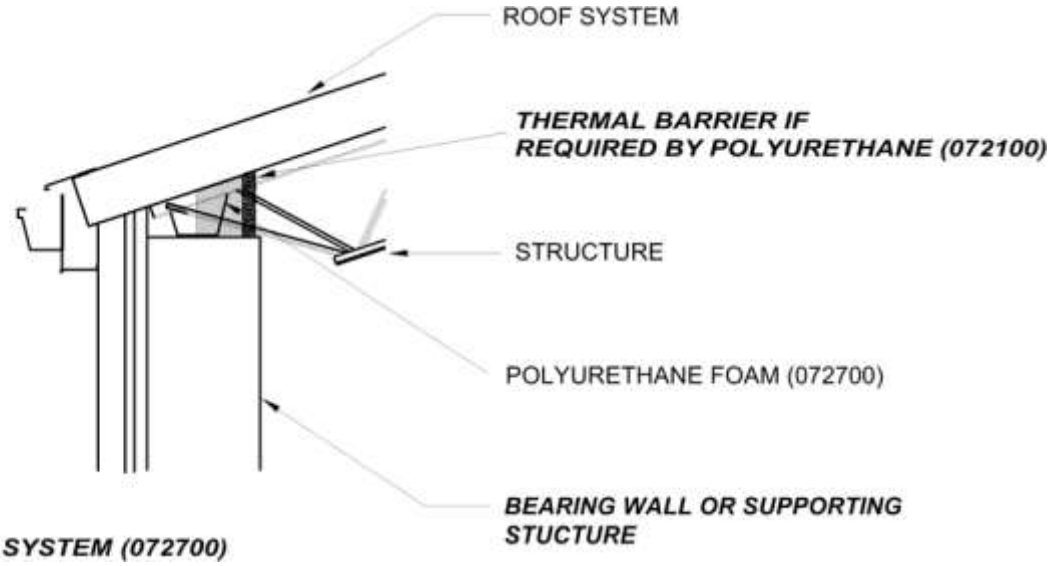
B. COMPONENTS

1. Roof and Wall Systems – selected by Design Professional
2. Structural System – selected by Design Professional
3. Sprayed-On Insulation
4. Thermal Barrier ***if required by insulation***
5. ***Air Barrier System***

C. PERFORMANCE

1. Foam seal all roof/wall intersections (low wall, high wall, rake wall) and all openings and penetrations, ridges and valleys to provide a continuous air barrier. Provides a continuous seal against infiltration.

Provide continuous air barrier system to seal juncture of walls and roofs



Recommended Exterior Wall/Roof Closure
Figure A-1

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A. APPLICATION

1. Steep Roofing
2. Slope - Minimum 4:12
3. Hip roofs require special consideration

B. COMPONENTS

1. Roof Membrane
   a. Shingles
   b. Underlayment
   c. Nailable sheathing

2. Roof Insulation
   a. (Vented) nailboard/insulation (2" minimum air space)
   b. Rigid insulation

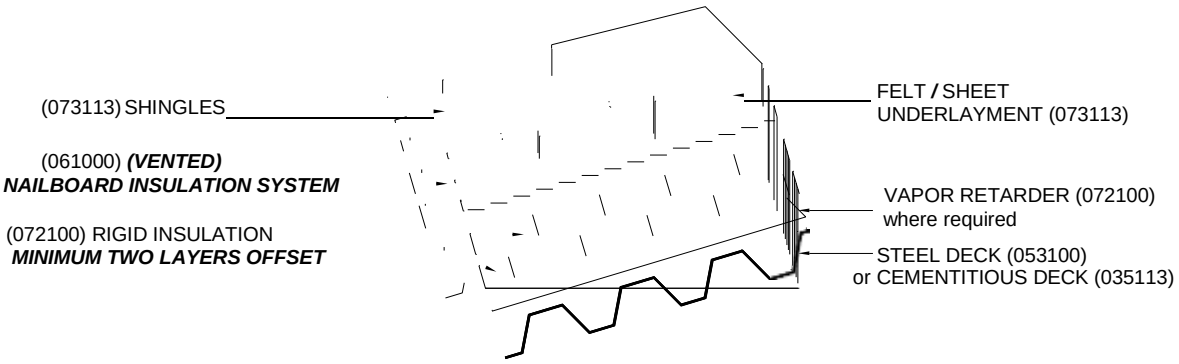
3. Vapor Retarder
   a. Where required. Refer to Chapter 9.

4. Structural Support
   a. Steel deck or cementitious deck

5. Air Barrier System Required

C. PERFORMANCE

1. Features
   a. Detail roof/wall and roof plane intersection and all openings and penetrations to provide a continuous air barrier system.
   b. Refer to NRCA Roofing Manual: Chapter 3, "Condensation Control & Ventilation for Steep-Slope Roof Assemblies"



Shingle Roof System
Figure A-1

A. APPLICATION

1. Steep Roofing

2. Slope – Minimum 3:12
   2:12 will be considered for uncomplicated roofs

B. COMPONENTS

1. Roof Membrane
   a. Metal roof

2. Roof Insulation
   a. Rigid insulation

3. Vapor Retarder
   a. Where required. Refer to Chapter 9.

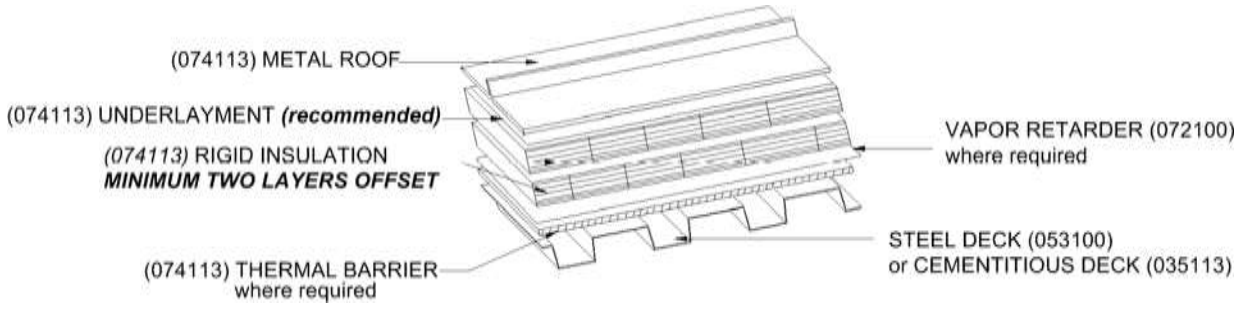
4. Thermal Barrier
   a. Where required. Refer to Chapter 9.

5. Structural Support
   a. Steel roof deck or cementitious deck

6. Air Barrier System Required

C. PERFORMANCE

1. Features
   a. Detail roof/wall intersections and all openings and penetrations to provide a continuous air barrier system.



Metal Roof with Rigid Insulation
Figure A-1

A. APPLICATION

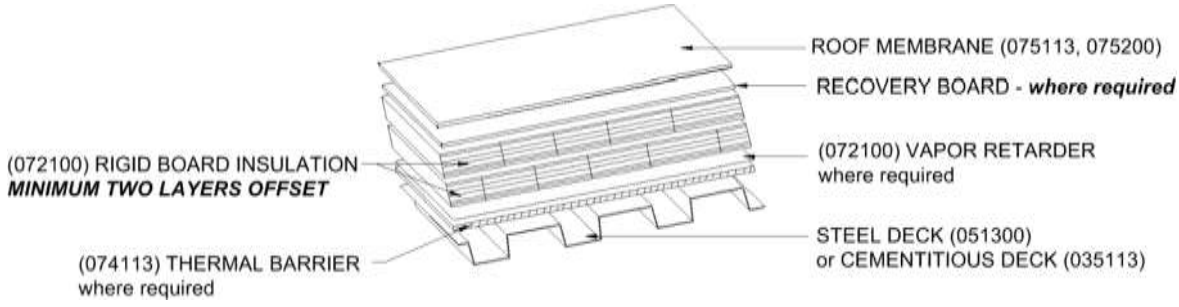
1. All low sloped roof areas
2. Slope – Minimum 0.25:12

B. COMPONENTS

1. Roof Membrane
   a. Built-up/polymer modified bitumen
2. Recovery Board ***– if required***
3. Roof Insulation
   a. Rigid insulation
4. Vapor Retarder
   a. Where required. Refer to Chapter 9.
5. Thermal Barrier
   a. Where required. Refer to Chapter 9.
6. Structural Support
   a. Steel deck or cementitious deck
7. Air Barrier System

C. PERFORMANCE

1. Features
   a Detail roof/wall intersections and all penetrations and openings to provide a continuous air barrier system.



Built-Up Roof
Figure A-1

ROOFS
MEMBRANE ROOF

A. APPLICATION

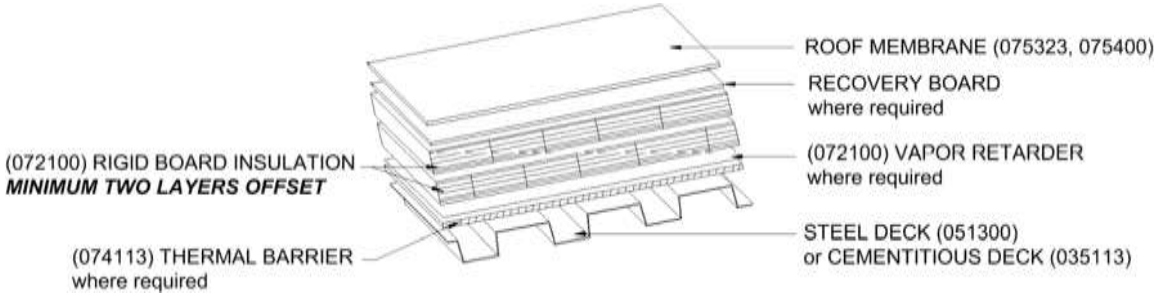
1. All low sloped roof areas
2. Slope – Minimum 0.25:12

B. COMPONENTS

1. Roof Membrane
   a. Thermoplastic/thermoset
2. Recovery Board/Slip Sheet
   a. Where required. Refer to Chapter 9.
3. Roof Insulation
   a. Rigid insulation
4. Vapor Retarder
   a. Where required. Refer to Chapter 9.
5. Thermal Barrier
   a. Where required. Refer to Chapter 9.
6. Structural Support
   a. Steel deck or cementitious deck
7. Air Barrier System Required

C. PERFORMANCE

1. Features
   a. ***Detail roof/wall intersections and all openings and penetrations to provide a continuous air barrier system***.



Membrane Roof
Figure A-1

A. APPLICATION

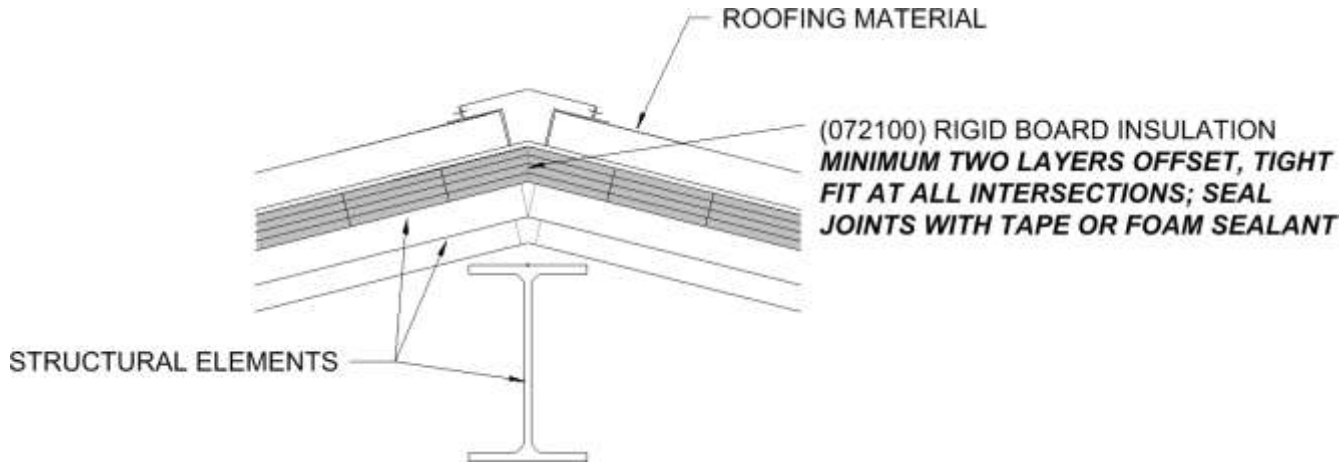
1. All sloped roof ridge conditions.

B. COMPONENTS

1. Roof System - Selected by Design Professional
2. Structural System – Selected by Design Professional
3. Air Barrier System Required

C. PERFORMANCE

1. Detail all roof plane intersections and all openings and penetrations to provide a continuous air barrier system.



NOTE: Provide continuous air barrier system in roof system.

Recommended Roof Ridge
Figure A-1

EXTERIOR WALL SYSTEM

A. APPLICATION

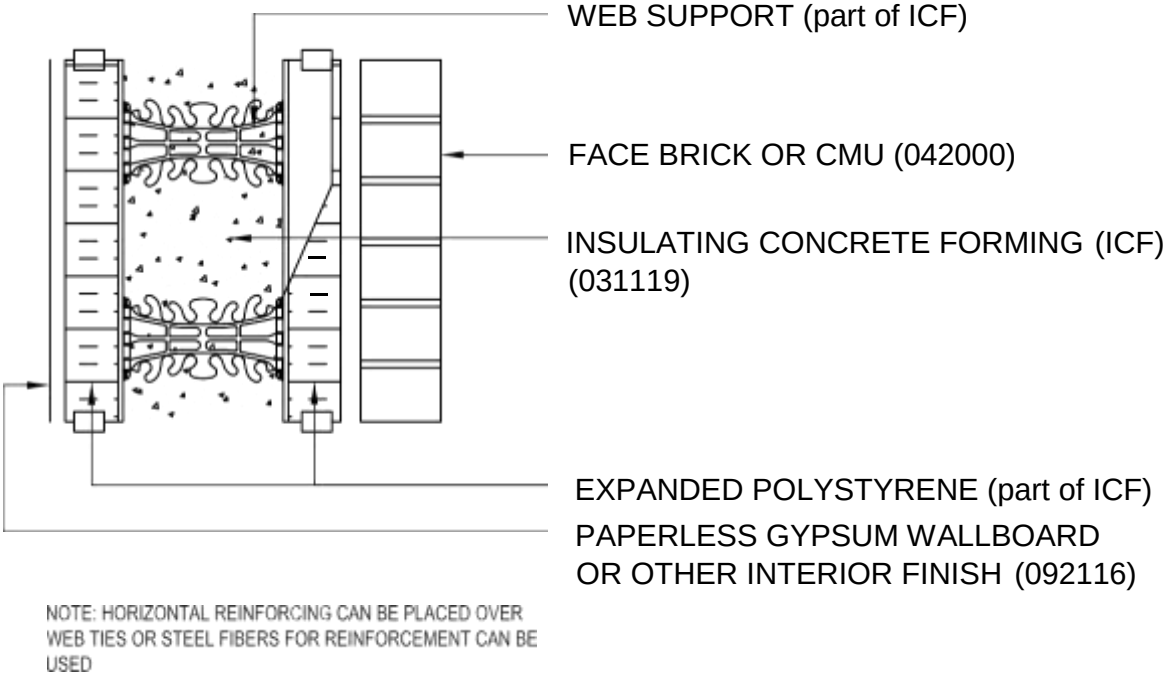
1. All conditions where cost effective.

B. COMPONENTS

1. Expanded Polysytrene (bead board)
2. Non-Metallic Web-Ties
3. Reinforcing – Selected by Design Professional
4. Varying Widths of Concrete Wall
5. Optional Finishes for Interior and Exterior Faces

C. PERFORMANCE

1. Good insulating and acoustical performance.
2. Ease of installation.
3. Qualifies for LEED credits.



Insulating Concrete Forming (ICF)
Figure A-1

A. APPLICATION

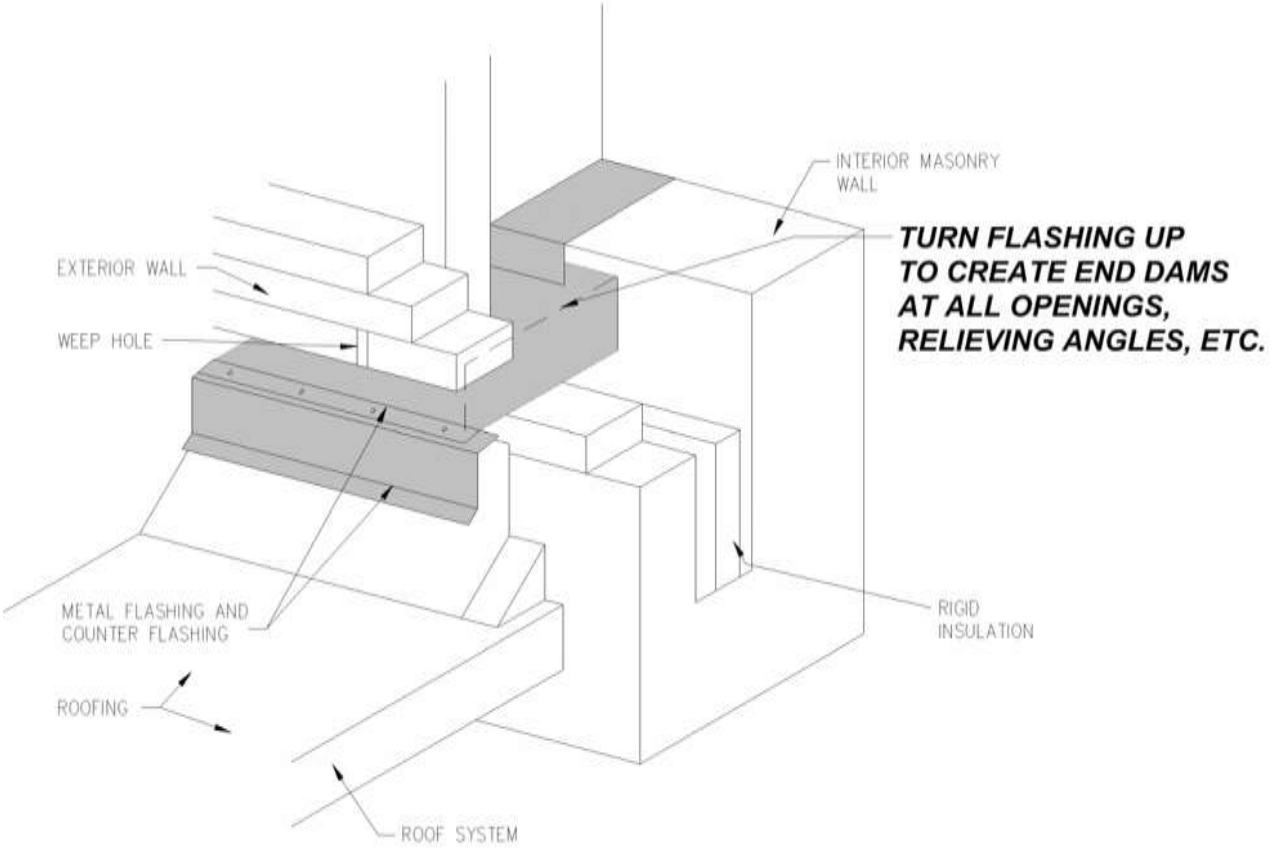
1. Low Roof to Vertical Masonry Wall

B. COMPONENTS

1. Roof and Wall Systems - Selected by Design Professional
2. Metal Flashings and Counter Flashings – Selected by Masonry (Sub)Contractor
3. Vertical leg of metal flashing at inside of masonry wall could be anchored with termination bar
4. Air Barrier System Required
   a. Self-adhering sheets
   b. Close-cell polyurethane spray foam

C. PERFORMANCE

1. Prevent water from entering cavity and into interior space.
2. Provides path for water in cavity to exit to exterior.
3. Detail roof/wall intersections to provide a continuous air barrier system.



Recommended Wall-Low Roof
Figure A-1

Note: Provide continuous air barrier system to seal juncture of roof and wall.

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INTERIOR WALLS

STEEL STUD AND WALLBOARD

A. APPLICATION

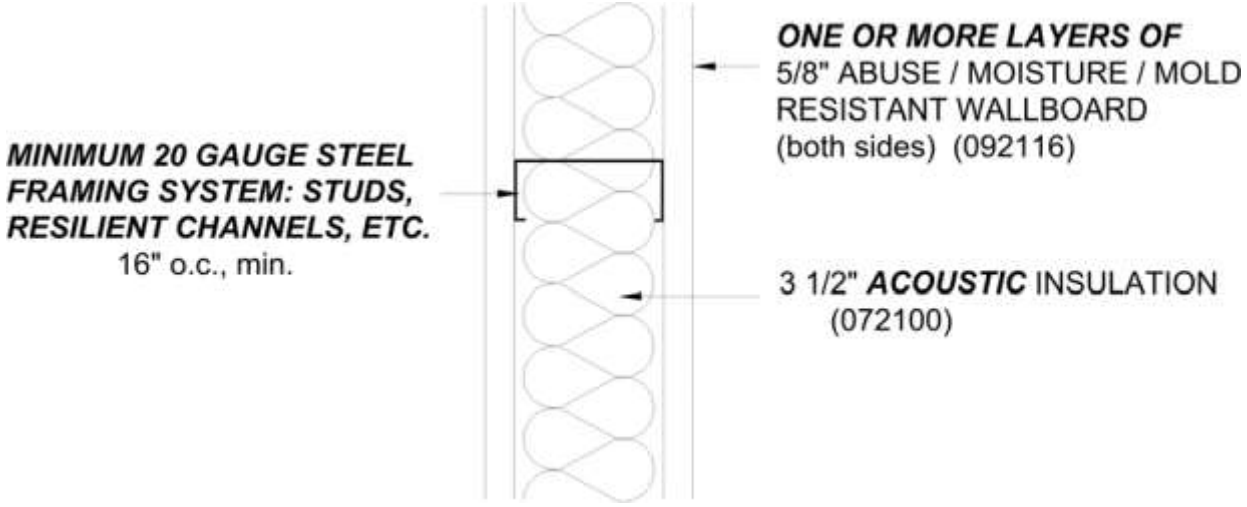
1. ***Do not use at physical education spaces, large group restrooms, receiving/loading areas, mechanical room, music room and kitchen***.
2. ***Extend to deck and seal perimeter.***

B. COMPONENTS

1. Screw attached to studs ***or resilient channels.***
2. Fire resistance rating
3. ***Acoustic rating***
4. ***Level 4 finish***

C. PERFORMANCE

1. ***System shall provide abuse resistance and acoustic separation.***
2. ***Seal all openings and penetrations.***



Steel Stud and Wallboard
Figure A-1

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1.01 GENERAL

A. The Structural Design Professional shall be responsible for the adequacy, economy, and serviceability of all structures for which he/she is assigned design responsibility. Good engineering judgment shall be used in addition to compliance with all national, local, and applicable codes.

B. School building structures and exterior enclosures shall be designed and constructed of materials which will perform satisfactorily for 40 years, with only minor maintenance and repairs, and for 100 years before major repairs or replacement of primary structural or exterior enclosure elements is required.

C. School buildings shall provide a safe, secure shelter for students, faculty, and staff, generally capable of resisting forces from wind, earthquake, airborne debris, and man-made elements.

D. Structural and building enclosure systems shall be selected on the basis of life cycle costs, safety, durability, constructability, availability of materials, and aesthetic considerations.

1.02 FOUNDATION AND RETAINING STRUCTURES

A. Selection of Foundation Types Shall Be Based On:

1. Recommendations of the Geotechnical Engineer

2. Economical comparison of foundation systems when the Geotechnical Engineer offers foundation alternatives.

3. Soil design strengths, criteria, and loads

4. Deep foundations when recommended by the Geotechnical Engineer, and when more economical than shallow foundations

5. Shallow foundations when recommended by the Geotechnical Engineer, and when determined to be more economical than deep foundations

    a. Spread and wall footings
        1) Earth-formed footings shall be considered where cohesive soil is encountered and the sides of the excavation can be cut true and maintained through the concrete placement.
        2) Earth-formed excavations shall be to a tolerance of +6 inches, -0 inches.
        3) Formed footings shall be used in granular soil and where the sides of the excavation cannot be cut true and maintained through the concrete placement.
        4) Minimum concrete compressive strength of 3,000 psi at 28 days
        5) Minimum reinforcing according to American Concrete Institute 318

1.02 FOUNDATION AND RETAINING STRUCTURES (cont'd)

b. Trenched footings shall be considered where:
   1) Recommended by the Geotechnical Engineer
   2) Cohesive soil is encountered
   3) Sides of the excavation can be cut true and maintained through the concrete placement
   4) The footing can be combined with the foundation wall in one structural element
   5) Minimum concrete compressive strength of 3,000 psi at 28 days
   6) Minimum reinforcing according to American Concrete Institute 318
   7) Excavation shall be to a tolerance of +6 inches, -0 inches.

c. Reinforced concrete foundation walls
   1) Minimum concrete compressive strength of 4,000 psi at 28 days
   2) Minimum reinforcing according to American Concrete Institute 318

d. Reinforced and fully grouted concrete masonry foundation walls
   1) Minimum design flexural strength of 1,500 psi at 28 days
   2) Use normal weight concrete masonry unit (CMU) for buried foundation walls
   3) Grout all concrete masonry unit cores
   4) Minimum reinforcing in accordance with reinforced masonry criteria in American Concrete Institute 530, American Society of Civil Engineers 6, and TMS 402.

e. Other special foundation systems may be used if acceptable to the Geotechnical Engineer and the Structural Design Professional.

B. Retaining Structures

1. Reinforced concrete retaining walls
   a. Minimum concrete compressive strength of 4,000 psi at 28 days if exposed to exterior
   b. Minimum concrete compressive strength of 4,000 psi at 28 days if within a building enclosure
   c. Use 6 percent (+/- 1.5%) air entrainment for exterior concrete
   d. Minimum reinforcing in accordance with American Concrete Institute 318
   e. Minimum concrete cover of reinforcing steel in accordance with American Concrete Institute 318
   f. Space vertical control joints at 25 feet on center or less. Extend horizontal reinforcing through control joints.
   g. Space vertical expansion joints at 75 feet on center or less. Stop horizontal reinforcing at each side of expansion joints and provide a full-height keyway. Install 1 inch thick minimum preformed joint material in expansion joints.

1.02 FOUNDATION AND RETAINING STRUCTURES (cont'd)

2. Reinforced concrete masonry retaining walls
   a. Minimum design flexural strength of 1,500 psi at 28 days
   b. Grout all concrete masonry unit cores below grade
   c. Use 9-gauge W1.7 or 0.148 inch hot dipped galvanized, horizontal joint reinforcing at maximum spacing of 8 inches
   d. Use vertical reinforcing at maximum spacing of 48 inches
   e. Locate reinforced bond beams at top of wall and at maximum vertical spacing of 12 feet
   f. Minimum reinforcing in accordance with American Concrete Institute 530, American Society of Civil Engineers 5, and TMS 402 as "reinforced masonry"
   g. Space vertical control joints at 24 feet on center or less. Extend horizontal reinforcing through control joints.
   h. Space vertical expansion joints at 72 feet on center or less. Stop horizontal reinforcing each side of expansion joints.
   i. Use normal weight concrete masonry units.

3. Proprietory unit masonry retaining walls may be used if recommended and certified by the Structural Design Professional, or if accepted by the school district and the Ohio Facilities Construction Commission on the basis of certification of the system by a Professional Engineer selected by the manufacturer of the system.

4. Steel sheet piling may be used in lieu of concrete or masonry retaining walls where acceptable to the Geotechnical Engineer, the Structural Design Professional, and the school district.

1.03 FRAMING SYSTEMS

A. General

1. Use American Institute of Steel Construction, Type 2 "simple framing" systems with shear walls or braced frames wherever possible.

2. Use columns and beams ***rather than*** masonry bearing walls for interior lines of support in classroom areas to allow for maximum flexibility for future use of these spaces.

3. The use of light-gauge framing shall be avoided for ***walls in physical education spaces, large group restrooms, receiving/loading areas, mechanical room, music room and kitchen*** areas of buildings, but can be ***used*** for interior walls of steel-framed buildings and for administrative areas, or where used as a finish on the space plate.

1.03 a ROOF FRAMING SYSTEMS

B. Steel Roof Deck on Open Web Steel Joists

1. Roof deck
   a. Minimum galvanizing ASTM A525, G60 (60 ounces per square foot)
   b. Minimum 22-gauge deck
   c. Use puddle welds, self-tapping screws, or pneumatic fasteners ***(rivets)*** to attach deck to supporting structural steel members.

2. Open web steel joists
   a. For roof slopes greater than 1:12, joists shall preferably span parallel to the slope. These joists shall be detailed as special joists.
   b. For roof slopes greater than 1:12, where joists span perpendicular to the slope and are canted, cross bridging shall be used between joists.

C. Cementitious Deck on Steel Subpurlins on Open Web Steel Joists
1. Steel purlins shall be galvanized.

2. Cementitious decks shall be resistant to deterioration due to moisture.

3. Cementitious deck systems shall be certified by a Professional Engineer as being capable of supporting the design loads as shown on the construction documents.

4. The Structural Design Professional shall verify that the purlin and deck system provides adequate lateral bracing for open web steel joists.

5. The Structural Design Professional shall verify that cementitious deck systems provide required diaphragm strength.

D. Composite ***Roof Systems***
1. Where shingle roofing is to be used, composite roof systems consisting of metal deck, rigid insulation, and mineral (nonorganic) nail base connected so as to produce composite action between the material shall be considered in lieu of wood sheathing over rigid insulation.

E. Prefabricated wood trusses with plywood or particleboard sheathing shall not be used for roof systems.

F. Glue laminated beams with wood decking shall not be used for roof systems.

G. Precast concrete roof systems may be used where justified based on cost comparisons with other systems, fire-resistance, and impact on the design of supporting structural elements.
1. Prestressed single and double tees
2. Precast plank

H. Light-gauge metal framed or light-gauge metal truss framed roof systems may be used for roof systems.

I. Plywood and oriented strand board shall not be used as structural roof deck.

1.04 FLOOR FRAMING SYSTEMS

A. Metal Deck/Concrete Slab

1. Comply with SDI *Design Manual (Publication No. 27)*

2. Concrete on steel form deck
   a. Concrete Deck Fill; minimum compressive strength of 3,500 psi at 28 days
   b. Use minimum reinforcing of 0.0018 of the area of concrete.
   c. Fibrous reinforcement shall not be substituted for welded wire fabric or deformed bar reinforcement, but may be used in addition.
   d. Use G60 galvanized deck

3. Concrete on steel composite floor deck
   a. Concrete deck fill; minimum compressive strength of 3,500 psi at 28 days
   b. Use minimum reinforcing of 0.0018 of the area of concrete
   c. Use G60 galvanized deck

4. Cast-in-place flat slabs (1 way or 2 way)
   a. Use minimum compressive strength of 4,000 psi at 28 days

5. Precast concrete plank
   a. Use minimum 2-inches of concrete topping with 1.5 pounds per cubic foot of fibrillated polypropylene fibrous reinforcing

B. Framing Members

1. Open web steel joists
   a. Comply with Steel Joist Institute *Standard Specifications*

2. Composite open web steel joists
   a. Comply with joist manufacturer's design recommendations.
   b. The Professional Engineer shall certify that the system has the capacity to support the design loads shown on the contract documents.

3. Rolled steel members
   a. Use ASTM A992, Grade 50; ASTM 572, Grade 50; steel for wide flange shapes.
   b. Use ASTM A36 or ASTM A572, Grade 50 for angles and plates.

4. Composite rolled beams shall be considered when justified on the basis of cost and serviceability.

5. Precast concrete floor systems shall be considered when justified on the basis of cost, fire-resistance, and impact on the design of supporting members.

1.04 FLOOR FRAMING SYSTEMS (cont'd)

C. Columns

1. Steel rolled sections
   a. Use ASTM A992, Grade 50; ASTM A572, Grade 50; steel for wide flange shapes.
   b. Comply with AISC *Manual of Steel Construction*

2. Hollow structural sections (HSS)
   a. Use ASTM A500, Grade B (46,000 psi yield strength) or ASTM A53, Grade B.
   b. Comply with AISC *Manual of Steel Construction*
   c. Comply with AISC *HSS Connections Manual*

3. Reinforced concrete columns
   a. Minimum concrete compressive strength of 3,500 psi at 28 days
   b. Minimum reinforcing of 0.01 percent of the gross area of column
   c. Comply with American Concrete Institute 318 *Building Code Requirements for Structural Concrete*

4. Precast concrete columns
   a. Precast concrete systems shall be certified by a Professional Engineer to be capable of supporting the design loads shown on the construction documents.

5. Masonry columns
   a. Minimum flexural strength of 1,500 psi at 28 days
   b. Minimum reinforcing of 0.005 percent of the gross area of column

1.05 MASONRY WALL SYSTEMS

A. Engineered masonry systems shall be used for load-bearing and shear walls, and are recommended for exterior walls.

B. Minimum reinforcing in exterior walls shall be in accordance with American Concrete Institute 530/American Society of Civil Engineers 5/TMS 402 for either "reinforced masonry walls" or "partially reinforced masonry walls." In no case shall vertical reinforcement in exterior masonry walls be less than the following:

Nominal Wall Thickness	Reinforced Size and Spacing
6"	#3 at 72"
8"	#4 at 96"
10"	#5 at 96"
12" and 14"	#6 at 96"

C. Minimum reinforcing in masonry bearing walls shall be in accordance with American Concrete Institute 530/American Society of Civil Engineers 5/TMS 402 for either "reinforced masonry walls" or "partially reinforced masonry walls." In no case shall vertical reinforcement in masonry bearing walls be less than the limits shown for exterior masonry walls.

1.05 MASONRY WALL SYSTEMS (cont'd)

D. Minimum horizontal joint reinforcing in interior walls shall be 9-gauge W1.7 or 0.148 inch horizontal joint reinforcing at 16-inch spacing vertically.

E. Minimum horizontal joint reinforcing in exterior walls shall be in accordance with American Concrete Institute 530/American Society of Civil Engineers 5/TMS 402 for "reinforced masonry walls." Use reinforced masonry bond beams to supplement the area of reinforcing steel furnished by horizontal joint reinforcing to meet the minimum reinforcing requirements.

F. Floor and roof members supported by load-bearing masonry shall bear on bond beams with embedded bearing plates designed to resist bearing, uplift, and lateral loads. Anchor rods on bearing plates shall be a minimum of two 1/2-inch diameter headed studs or two #3 hooked anchor rods with 6-inch embedment.

1.06 LATERAL BRACING SYSTEMS

A. Reinforced Concrete

1. Minimum concrete compressive strength of 3,500 psi at 28 days

2. Use minimum reinforcing in accordance with American Concrete Institute 318

B. Masonry Shear Walls

1. Masonry shear walls shall be reinforced in accordance with American Concrete Institute 530/American Society of Civil Engineers 5/TMS 402 as "reinforced masonry walls." In no case shall vertical reinforcement for masonry shear walls be less than that shown for exterior masonry walls.

2. Vertical reinforcing shall be lapped with dowels projecting from the footing.

3. Attachment of steel frames ***used to resist lateral loads*** to masonry shear walls shall be through embedded or adhesive anchor bolts in fully grouted or solid masonry units. Expansion ***sleeve and*** wedge anchors ***can*** be used to ***transfer lateral loads*** to masonry shear walls.

C. Steel

1. Wide flange shapes
   a. Use ASTM A992, Grade 50; ASTM A572, Grade 50

2. Hollow Structural Sections (HSS)
   a. Use ASTM A500, Grade B (46,000 psi yield strength) or ASTM A53, Grade B.

3. Rods, clevises, and turnbuckles
   a. Use ultimate safeties factor of not less than 4.5:1 for the manufacturer's breaking load.

4. Angles and plates
   a. Use ASTM A36 or ASTM A572, Grade 50.

1.07 SLABS ON GRADE

A. Comply with American Concrete Institute SCM-25 *Concrete Slabs on Grade*

B. For classroom and corridor areas, use a minimum 4-inch thick concrete slab with 6 by 6-W1.4 by W1.4 welded wire fabric.

C. Concrete minimum compressive strength of 3,500 psi at 28 days

D. Consider design recommendations for preventing elevated radon levels in new buildings as prescribed in the EPA booklet “Radon Prevention in the Design and Construction of Schools and Other Large Buildings”. (EPA/625/R – 92/016, Jan. 1993)

1.08 LINTELS

A. Lintels in exterior walls consisting of angles, tees, and wide flange shapes, 8 inches or less in depth and 12 feet or less in length, shall be hot-dipped galvanized in accordance with ASTM A123, Grade 65 (1.5 ounces per square foot).

B. Steel lintels in exterior walls, consisting of members larger than 8 inches in depth and 12 feet in length, shall be mill galvanized in accordance with ASTM A641.

C. Steel lintels, other than angles supporting masonry, shall have rigid masonry anchors or dowels at 32-inch maximum spacing to secure masonry to steel.

D. Reinforced masonry or concrete lintels shall be used in exterior walls wherever possible.

E. Lintels in the exterior veneer shall be thermally isolated or separated from the interior masonry load bearing wall or structural system.

END OF SECTION

1.01 GENERAL

A. Structural systems shall be selected during the early stages of the Design.

B. Structural systems shall be designed in strict conformance with national, state, and local codes and with current structural material codes and specifications.

C. Structural design calculations shall be performed for major structural members.

1.02 FOUNDATIONS AND RETAINING STRUCTURES

A. Geotechnical Investigation and Report

1. Geotechnical engineering investigations and reports are required for all new construction and for additions to existing buildings.

2. For all new buildings and all additions larger than 10,000 SF to existing buildings the geotechnical engineering and investigation shall include one boring of sufficient depth to accurately evaluate the Site Class in accordance with Article 1615.1.1 of the Ohio Building Code. If a test boring is not made to a depth of 100 feet, the Geotechnical Engineer is permitted to estimate soil properties below the depth of the boring based on the information obtained from the borings and known geological formation.

3. For all new buildings 10,000 SF and smaller, Site Class D shall be used, unless Site Class E or F soil is likely to be present at the site.

4. Shear Wave Velocity tests shall be required only where the size of the project, the potential construction cost savings, and the likelihood of the recommendation of a Site Class C or less is considered probable.

5. Where foundation system design is based upon presumed soil conditions, the following shall be included in the Construction Documents:
   a. Structural Design Professional shall identify all pertinent soil strength criteria used in his design within the Contract Documents.
   b. Soil bearing capacity values shall be verified in writing during construction by a registered Geotechnical Engineer, confirming such conditions.

1.03 ROOF FRAMING SYSTEMS

A. Roof systems shall be designed in strict conformance with national, state, and local codes and with current structural material codes and specifications.

B. Steel Roof Deck on Open Web Steel Joists

1. Roof deck
   a. Design in accordance with SDI *Design Manual (Publication No. 27)*
   b. Design deck as a diaphragm in accordance with SDI *Diaphragm Design Manual*

1.03 *ROOF* FRAMING SYSTEMS (cont'd)

2. Open web steel joists
   a. Design in accordance with SJI *Standard Specifications and Load Tables*
   b. Design low slope or flat joists to resist ponded water in accordance with SJI *Technical Digest #3 - Ponding*
   c. Supplier of joists shall furnish certification by a Professional Engineer that joists comply with SJI *Standard Specifications and Load Tables*

3. Steel framing members
   a. Design in accordance with AISC *Manual of Steel Construction*

C. Cementitious Deck and Composition Deck on Steel Subpurlins on Open Web Steel Joists

1. Systems shall be certified, by a Professional Engineer, to be capable of supporting the design loads as shown on the Construction Documents.

1.04 FLOOR FRAMING SYSTEMS

A. Deck/Slab

1. Concrete on steel form deck
   a. Design in accordance with Steel Deck Institute *Design Manual*
   b. Design deck/slab as diaphragm in accordance with Steel Deck Institute *Diaphragm Design Manual*

2. Concrete on steel composite floor deck
   a. Design in accordance with Steel Deck Institute *Design Manual*
   b. Design deck/slab as diaphragm in accordance with Steel Deck Institute *Diaphragm Design Manual*

3. Cast-in-place flat slabs (1 way or 2 way)
   a. Design in accordance with American Concrete Institute 318

4. Precast concrete plank
   a. Design in accordance with ACI 318 and PCI *Prestressed Concrete Design Handbook*

B. Horizontal Framing Members

1. Open web steel joists
   a. Design in accordance with SJI *Standard Specifications*
   b. Floor Vibrations
      1) Design of floor members shall include consideration of the relative perceptability of floor vibrations based on the use of the space.

1.04 FLOOR FRAMING SYSTEMS (cont'd)

2) Floor vibration analysis and design shall generally conform to the "Criteria for Human Comfort" as indicated in Figure 2.1 in the AISC "Steel Design Guide Series II – Floor Vibrations Due to Human Activity".

c. Verify that standard camber in joists is accurate for anticipated dead load deflection and that any residual camber does not significantly reduce capacity of floor deck. Specify nonstandard camber where required.

d. Joists shall be certified by a Professional Engineer as capable of supporting the design loads as shown on the construction documents.

2. Composite open web steel joists
   a. Design in accordance with joist suppliers design criteria.
   b. The joist manufacturer shall furnish certification by a Professional Engineer that composite joists are capable of supporting design loads as shown in the contract documents.

3. Rolled steel beams and channels
   a. Design in accordance with AISC *Manual of Steel Construction and Specifications*
   b. Specify camber for all rolled steel members in floor systems requiring ½ inch camber or larger.

4. Composite rolled beams and channels
   a. Design in accordance with AISC Manual of Steel Construction and Specifications
   b. Composite rolled shapes shall be used where floor vibration is considered by the Design Engineer as being an important serviceability criteria.

5. Precast concrete beams
   a. Design in accordance with American Concrete Institute 318 and PCI *Prestressed Concrete Design Handbook*

C. Columns

1. Steel rolled sections
   a. Design in accordance with AISC *Manual of Steel Construction*

2. Hollow structural sections
   a. Design in accordance with AISC *Manual of Steel Construction*
   b. Detail connections in accordance with AISC *HSS Connections Manual*

3. Reinforced concrete columns
   a. Design in accordance with American Concrete Institute 318
   b. Reinforced concrete columns shall be used where practical for columns exposed to the weather and the use of deicing salts.

1.04 FLOOR FRAMING SYSTEMS (cont'd)

4. Precast concrete columns
   a. Design in accordance with American Concrete Institute 318 and PCI *Prestressed Concrete Design Handbook*

5. Masonry columns
   a. Design in accordance with American Concrete Institute 530/ASCE 5/TMS 402 and National Concrete Masonry Association *Design Specifications*

D. Floor Vibrations

1. Design steel floor systems to generally conform to the Acceptance Criteria for Human Comfort as indicated in Figure 2.1 in the AISC, "Steel Design Guide Series 11, Floor Vibrations Due to Human Activity."

2. Analyze steel framed floor systems using the procedures in the AISC, "Steel Design Guide Series 11, Floor Vibrations Due to Human Activity."

3. Precast concrete floor systems designed for normal stress or strength criteria are generally within acceptable limits for floor vibrations.

1.05 MASONRY WALL SYSTEMS

A. Engineered masonry design procedures shall be used for all masonry elements in load-bearing, exterior enclosures and shear walls in school buildings.

B. Empirical masonry design procedures shall not be used for load-bearing, exterior enclosure walls and shear walls.

C. Design all exterior, load-bearing and shear walls for moments, shears, and axial stress or capacity criteria in accordance with American Concrete Institute 530/ASCE 5/TMS 402 as reinforced masonry walls.

1.06 LATERAL LOAD SYSTEMS

A. The Structural Design Professional shall ensure that code-required lateral loads are applied to the structure and that systems and connections between systems are adequate to transmit the loads to the ground.

1. Seismic load resisting systems shall be designed and detailed in accordance with the current provisions from the Ohio Building Code and standard provisions from the materials code for that system (i.e. American Concrete Institute, American Institute of Steel Construction, etc.) Seismic Use Group, as defined in OBC Section 1616.2 shall be Group II ***minimum.***

2. Wind loads shall be based upon the current provisions of Ohio Building Code, using a minimum wind speed of 90 mph (3-second gust), unless local weather data supports higher wind loads.

3. Importance factors for Snow load and Wind load shall be obtained from OBC Table 1604.5, using Category II structure (minimum).

1.07 SLABS ON GRADE

A. Design in accordance with American Concrete Institute 318 and American Concrete Institute SCM-25 *Concrete Slabs on Grade*.

1.08 LINTELS

A. Design all lintels supporting masonry to limit deflection to ***1/600*** of the span or ***0.3"***, whichever is smaller.

B. Design steel lintels in accordance with AISC *Manual of Steel Construction and Specifications.*

C. Design masonry lintels in accordance with ACI530/ASCE 5/TMS 402.

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1.01 GENERAL

A. This section establishes the minimum design requirements that must be met by the Plumbing Design Professional. Local codes and standards may take precedence over these requirements.

1.02 SITE DESIGN PARAMETERS

A. Determination of the available site services with regard to gas service, sanitary systems, domestic water system, and fire suppression system is necessary as a part of the site selection process. Refer to Chapter 3, Site Design, for additional information.

B. The building plumbing system design is to be complete to 5 feet outside the perimeter of the building foundation system. There may be some exceptions to this requirement for placement of food service grease interceptors, science room acid neutralizing sumps, water services, gas piping and regulators, and storm water structures. In these cases, the piping structures will be included as part of the building plumbing system design.

C. The Plumbing Design Professional is required to evaluate the need and method to provide gas service to the building. If natural gas service is not available, the installation of liquid propane gas should be investigated. The estimated gas loads for operation of the heating water boilers, domestic water heaters, food service equipment, science program usage, and miscellaneous items are obtained from the appropriate disciplines by the Plumbing Design Professional and totaled with the inclusion of a 10 percent safety factor. Discussion with the local gas company is necessary, both to determine potential service costs and to determine the responsibilities of the building owner and the gas company regarding installation. It is also important to determine the gas pressure requirements for the equipment in the building and communicate this need to the gas company. The Plumbing Design Professional shall design the gas service.

1.03 POTABLE WATER SYSTEM

A. All buildings shall include a potable ***"lead free"*** domestic water system serving all sinks, toilets, showers, food service, custodial needs, hose bibbs, heating and chilled water plant fill systems, and drinking water coolers/fountains. All municipal domestic water entering the building must pass through a reduced pressure backflow preventer to protect the outside water source from contamination in the building. A main pressure-reducing valve is required if the incoming water pressure exceeds 80 psi.

B. Water distribution throughout the facility will be through piping systems located above ceiling areas. Piping installed under slab areas will not be permitted, unless accessible for maintenance on the system. Cross-linked polyethylene (PEX) hot and cold water piping will be acceptable under slab if it is installed in a conduit or sleeve stubbed above the floor. Piping under floor is permitted to be connected to the floor drains/trap primer connections.

C. Domestic water systems within the building shall be copper tubing. The use of polyvinyl chloride, chlorinated polyvinyl chloride, polyethylene, or polybutylene material will not be permitted. An option to the copper pipe is polypropylene SDR 11 (cold water) and SDR 7.4 (hot water supply and return). Piping in ceiling plenum spaces shall have an approved foil fire wrap.

1.03 POTABLE WATER SYSTEM (cont'd)

D. Water piping and gas piping to island sinks shall be in an accessible trench in the floor with a removable cover.

E. The required pressure for operation of the furthest fixture from the incoming service will determine if a pressure booster system will be required. The booster system should be a packaged unit that includes all controls. Provide a constant-speed or VFD drive duplex pump package with bladder-type compression tank to meet the flow requirements. It will be necessary to consider the installation of an emergency power system in order to maintain the operation of the booster system in the event of power outages, if the building is to be used during emergency-type occupancies. Coordination with the Electrical Design Professional will be necessary. Minimum pressure required at the furthest fixture connection shall be 30 psi.

F. Insulate the piping to minimum requirements of current ASHRAE 90.1 standard.

1.04 WATER CONDITIONING/SOFTENING SYSTEMS

A. The water shall be tested for quality to determine the makeup of the water including hardness, mineral content, and chemicals. The recommendation for installation of a water conditioning/softening system should be directly related to the results of the water testing. A total hardness of less than 5 grains will not require a softener system.

B. If the water analysis tests recommend softening, the hot water supply shall be softened. The softening of the cold water can be considered if there is a history of mineral build-up in the cold water piping.

C. Review with school personnel before incorporating water softening in the design.

D. Also provide treatment of sulfur, iron, arsenic, or other chemicals if present in the water, per Ohio EPA standards.

1.05 DOMESTIC WATER HEATER SYSTEM

A. Provide life cycle costs analysis for evaluation of the domestic water supply in the building. This evaluation shall apply to proposed central heating with recirculation vs. point of use equipment heating vs. main heating with maintenance cable for group and/or individual restrooms/locker shower rooms and usage of hot water in main portions/wings of the building.

B. A hot water return system with a recirculating pump ***or heat maintenance cable*** shall be required if the building hot water piping is more than 25 feet in length.

C. The on/off operation of the domestic hot water return pumps shall be controlled by a ***7-day*** time clock or the temperature control system.

D. Instantaneous water heaters with a storage tank shall be required for high use applications in buildings with kitchens and/or shower room facilities, or a combination of 2 power vented heaters installed in a common tank could be used. Tank-type water heaters shall be considered for use in elementary school applications having no dishwasher facilities and no locker rooms.

1.05 DOMESTIC WATER HEATER SYSTEM (cont.)

E. The use of thermostatic mixing valves is required to maintain hot water temperature consistent with the plumbing code requirement to hand washing sinks and showers. Use a single valve or a high/low valve system based on minimum and maximum flow rates.

F. An optional application to the building-wide hot water system is the use of a point-of-use instantaneous water heaters for remote locations.

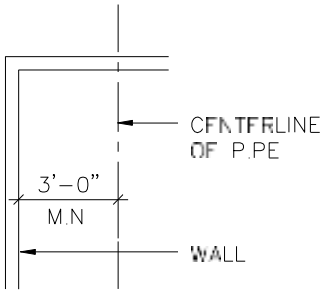
G. An option to the piped hot water return system/pump shall be the hot water temperature maintenance cable system to keep the domestic hot water piping at a consistent temperature. The wiring shall be accessible for repair.

1.06 SANITARY PIPING SYSTEM

A. Piping materials shall include Schedule 40 polyvinyl chloride with solvent joints, cast iron, no hub, or cast iron, hub and spigot. Do not use Schedule 40 polyvinyl chloride piping where water temperatures could exceed 140 degrees F.

B. Fill material around piping below slab shall be compacted granular material to 95 percent-modified proctor. Piping shall not be installed parallel/directly under walls. Minimum parallel distance from a wall to the pipe shall be 3 feet for repair access. See Figure B-1.

Figure B - 1



C. Piping above grade shall be Schedule 40 polyvinyl chloride or cast iron, no hub with approved hanger spacing. Piping in a plenum shall be cast iron, no hub. Schedule 40 polyvinyl chloride is not approved for use in a plenum space.

D. Acid waste piping below grade will be Schedule 40 polypropylene with fusion joints or Schedule 40 CPVC chemical waste with solvent weld joints. All acid waste piping above grade shall be Schedule 40 polypropylene with mechanical joints. Acid waste piping in a plenum shall be fire- and smoke-rated polyvinylidene fluoride or glass. Acid neutralizing sumps shall be located on the exterior of the building with access to grade and shall be accessible to staff for ease of inspection and maintenance.

E. Provide information to the Site Design Professional as to the depth of the sewer(s) exiting the building. Provide information to the Structural Design Professional as to the location and depths of the sewer in relationship to footings and columns as they pertain to the project.

1.06 SANITARY PIPING SYSTEM (cont.)

F. Where the temperature of water in the sanitary line can reach 140 degrees, cast iron waste and vent piping shall be installed. Kitchen waste piping is an example.

G. Sanitary sewer cleanouts shall be installed at 50 feet on center up to 4" diameter/ 100 foot on center for ***above 4"*** diameter, and at changes in direction of 90 degrees or more, at the bottom of vertical risers and as the sewer exits the building.

H. All cast iron piping shall comply with ASTM A 888 (or A 74) and be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.

1.07 PLUMBING FIXTURES/PLUMBING SPECIALTIES

A. Water closets shall be china, white, standard flush valve, wall hung, and low water consumption type. Automatic/battery or direct wired flush valve is optional.

B. Urinals shall be china, white, standard flush valve, wall hung, and low water consumption type. Automatic/battery or direct wired flush valve is optional. Waterless-type urinals are acceptable.

C. Lavatories shall have lever handles for hot and cold water. An option to the lever handle faucet shall be a battery or hardwired infrared faucet. Faucets accessible to students shall be infrared sensor battery with the battery and electronics/solenoid built into the spout. Temperature control shall be integral with the faucet or remote mixed.

D. Showers shall be low water consumption, pressure-balanced type.

E. Drinking water coolers/fountains shall be handicap accessible.

F. Sinks shall be 18-gauge, 302 or 304 stainless steel.

G. Science lab sinks shall be connected with acid-resistant material. The science casework manufacturer shall provide sinks.

H. In large group restrooms with 3 or more lavatories, the lavatories can be substituted with a comparably sized wash fountain with infrared sensing.

I. All plumbing fixtures and trim designed or designated for use by the handicapped shall meet the Americans with Disabilities Act guidelines.

J. Water supply (hot and/or cold) to the lavatories, sinks, and drinking fountains shall have angle stops with loose key handles.

K. All lavatories, water closets, and urinals shall have wall carriers.

L. Floor drains shall be installed in each large group restroom, locker room, mechanical room, and kitchen area. Provide a sediment bucket in the floor drain if conditions exist where solids may enter the drain.

1.07 PLUMBING FIXTURES/PLUMBING SPECIALTIES (cont.)

M. Sanitary and storm sewer cleanouts shall be installed at 50 feet on center up to 4" diameter and 100 feet on center for 6" diameter and above, and at changes in direction of 90 degrees or more, at the bottom of vertical risers and as the sewer exits the building.

N. Showers shall have a hot and cold, single lever pressure balancing valve with a vandal-resistant head.

O. Service sinks shall be floor-mounted, molded stone, 10 inches high, with a wall-mounted faucet. ***Hot and cold water supply shall have inline check valves located in an accessible location.***

P. Install a cold water hose bibb in each large group restroom, locker room, and mechanical room. The hose bibb shall be recessed mounted behind a lockable door in restrooms and locker rooms, with access by a removable key handle.

Q. Reduced pressure backflow preventers are required on the water supplies to each HVAC makeup water system.

R. A water pressure reducing station requiring 2 pressure reducing valves sized for 1/3 and 2/3 flow shall maintain the water pressure in the building to a maximum of 80 psi, if the incoming water pressure can exceed 80 psi.

S. Clay traps shall be provided in art rooms or where required to prohibit clay and solids from entering the sanitary sewer. The clay trap shall be accessible to clean out the trap.

T. Trap primers are required at all floor drains. Trap primers shall be accessible for replacement.

U. For elementary schools (K-5) and combination schools (K-8 and K-12), provide a stainless steel, wall mounted drinking fountain which is freeze proof, has push button activation, and is ADA accessible. Mount to the exterior wall.

V. Provide floor drain sinks with hinged covers in custodial closets and the main mechanical room for emptying of the power floor cleaning units, where required by the Owner.

W. Provide an emergency thermostatic mixing valve to provide tempered water to the emergency eye wash and/or showers.

1.08 PLUMBING SYSTEMS FOR FOOD SERVICE AREAS

A. Ware washing system will have a booster heater to provide 180-degree water.

B. Provide 3-compartment sink with 140-degree water.

1.08 PLUMBING SYSTEMS FOR FOOD SERVICE AREAS

C. Provide a grease interceptor to serve the kitchen sanitary waste system laden with grease. The grease interceptor shall be located in the interior if serving one fixture or on the exterior if serving two or more fixtures. The exterior interceptor shall be minimum of 500-gallons. The interceptor shall be sized based on the kitchen grease loading and fixture flow. The interceptor shall meet all State and local codes. The exterior tank shall be fiberglass or concrete and meet traffic loading and shall be located a minimum of 10'-0" from the building.

D. Provide 140-degree water to all kitchen equipment except hand washing lavatories**.**

1.09 BUILDING FIRE SUPPRESSION SYSTEMS

A. All buildings shall have a complete fire suppression (sprinkler) system throughout. Available static water pressure, residual pressure, and water flow must be evaluated as a part of this determination.

B. Installation of a water storage system along with the fire pump installation may be required where insufficient water, flow, and pressure are present.

C. A backflow preventer shall be included on all incoming systems.

D. Provide a fire pump (with water storage tank if necessary) if flow/quantity and/or water pressure cannot be met by the on-site water distribution system.

E. Review seismic requirements as required concerning supports, attachments, pipes,and equipment per NFPA, life safety, and state and local requirements.

1.10 ROOF DRAIN/STORM SEWER SYSTEMS

A. Piping materials shall include Schedule 40 polyvinyl chloride with solvent joints, cast iron, no hub or cast iron, hub and spigot.

B. Fill material around piping below slab shall be compacted granular material to 95 percent-modified proctor. Piping shall not be installed parallel/directly under walls. Minimum parallel distance from a wall to the pipe shall be 3 feet for repair access. See Figure B-1.

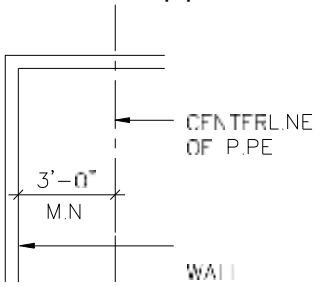


Figure B - 2

C. Piping above grade shall be Schedule 40 polyvinyl chloride or cast iron, no hub, with approved hanger spacing. Piping above plenum shall be cast iron, no hub. Schedule 40 polyvinyl chloride is not approved for use in a plenum space.

D. Provide connections to all roof drains.

1.10 ROOF DRAIN/STORM SEWER SYSTEMS (cont.)

E. Adherence to state and local plumbing codes will be required.

F. Provide information to the Site Design Professional as to the depth of the sewer(s) exiting the building. Provide information to the Structural Design Professional as to the location and depths of the sewer in relationship to footing and column pass as they pertain to the project.

G. Storm sewer cleanouts shall be installed at 50 feet on center up to 4" diameter/100 foot on center for ***above 4"*** diameter, and at changes in direction of 90 degrees or more, at the bottom of vertical risers and as the sewer exits the building.

H. Insulate roof drain piping/overflows and vents as required to prevent condensation. Insulate piping and drain body that services condensate from an AHU unit on an upper floor.

I. All cast iron piping shall comply with ASTM A 888 (or A 74) and be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.

1.11 GAS PIPING SYSTEMS

A. Gas piping shall be Schedule 40 black steel with screw fittings for piping 1 1/2 inches or less and welded fittings for piping 2 inches or larger.

B. Gas piping in plenums shall not contain valves or unions.

C. A gas regulator shall be provided to maintain the correct inlet pressure to each gas appliance. The inlet and outlet piping to each regulator shall be valved with American Gas Association approved valves.

D. The maximum gas pressure into the building shall be as established by the local gas company. Provide the gas company with the gas load for each appliance, and the minimum and maximum operating pressures for each appliance as early in the design process as possible.

E. Provide a valve and a dirt leg at each appliance connection.

F. LP gas piping shall not be concealed.

G. Natural gas piping to island sinks shall be in an accessible trench in the floor with a removable cover.

H. An alternative to the steel piping for natural gas is the use of corrugated stainless steel tubing with a yellow vinyl outer coating for the final low pressure connection to the gas equipment in an accessible / concealed space not accessible to the student.

1.11 GAS PIPING SYSTEMS (cont.)

I. An option to the Schedule 40 steel piping for natural gas in the plenum space can be corrugated stainless steel tubing up to 2 inches in diameter per NFPA S4 state and local gas company requirements. Also follow manufacturer's installation procedures. Tubing shall be approved for plenum use per ASTM E84.

1.12 VALVING

A. Valves will be installed to isolate individual plumbing fixtures and groups of plumbing fixtures to permit shut down of the fixture or equipment item without affecting the remainder of the building.

B. The domestic water system valves shall be bronze construction with a ball-type conventional port.

C. The gas supply to science rooms and art rooms shall have an emergency solenoid-type, automatic shutoff valve with a manual reset. The purpose of the valve is for shut down of the gas in case of an emergency or when the fire alarm system is activated. A solenoid-type, automatic shutoff valve with a manual reset shall be installed to shut the gas off to the gas fed appliances under the kitchen hood in the event there is a fire under the hood. The valves are designed normally closed and are held open by an electric solenoid valve. A mushroom-type wall switch shall be located in the room for solenoid activation.

1.13 HANGERS

A. Provide hangers for all horizontal, suspended, domestic, water, gas, sanitary, and storm piping with distances as noted in the state and local codes.

1.14 IDENTIFICATION

A. Piping shall be identified in mechanical rooms, unfinished spaces without ceilings, above suspended lay-in acoustical ceilings, and crawl spaces for the type of service and direction of flow. Equipment shall be identified with nameplates.

1.15 TESTING

A. Domestic water, storm and sanitary sewers, sprinkler, air, and gas piping shall be tested per state and local codes.

1.16 ENERGY USAGE

A. All systems shall be designed in compliance with the correct ASHRAE STANDARD 90.1 "Energy Standard for Building Except Low-Rise Residential Buildings", and the energy usage requirements prescribed by the Ohio Building Code and the Department of Energy.

1.17 OPTIONAL SYSTEM COMPONENTS FOR EMERGENCY POWER

A. The intent of connecting emergency power to selected components of the Plumbing System is to avoid system damage from freezing weather and allow life safety equipment to operate during power outages.

B. System Components Requiring Emergency Power:

1. Fire pump

C. Components for Emergency Power:

1. Foundation drainage sump pump.

END OF SECTION

1.01 GENERAL

A. This Design Manual includes four heating, ventilating, and air conditioning systems for consideration. Refer to Section 8430. These systems may be used by the HVAC Design Professional without a detailed evaluation. Systems other than the four systems listed will be considered if a completed evaluation detailing the impact the proposed system has on the annual operating cost of the proposed building, including maintenance costs and installation costs, is submitted for approval by the Ohio Facilities Construction Commission.

1.02 APPROVED COMPUTER ENERGY PROGRAMS

A. The following programs are acceptable for use in generating a detailed evaluation of proposed heating, ventilating, and air conditioning systems. Further, the building load calculations necessary for the design of each building will require the use of computer--generated data. Equivalent computer programs that are able to generate the necessary data for evaluation of the proposed heating, ventilating, and air conditioning systems and for generation of the building load data will be considered, but must be submitted for approval prior to use.

1. Trane Trace 700

    a. The Trane Trace 700 program is a PC based program used by the HVAC Design Professional for generation of detailed building system air conditioning loads, energy consumption analysis, and economic analysis. The current version can be obtained from the Trane Company, Customer Direct Service (CDS) Network, La Crosse, WI, 608-787-2000.

2. Carrier HAP

    a. The Carrier Hourly Analysis Program is a PC based program used by the HVAC Design Professional for generation of detailed building system air conditioning loads, energy consumption analysis, and economic analysis. The current version can be obtained by contacting the local Carrier equipment representative or by calling Software Systems Network, Syracuse, NY, 315-432-7072.

3. DOE-2.E

    a. The DOE-2.E is a detailed energy analysis program developed through the United States Department of Energy. A number of vendors across the country have developed software that operates to meet the intent of the DOE-2.E program.

1.03 COMPUTER INPUT DATA

A. The following information will be required in the event that a detailed evaluation of a proposed heating, ventilating, and air conditioning system is being prepared by the Design Professional. Portions of this data will be required for use in developing the building load calculations for sizing of system quantities and equipment.

B. Power utility rates for all types of energy to be investigated as part of developing the systems evaluation must be obtained by the HVAC Design Professional from the utilities that will provide service to the new facility. The types of energy should include electricity, natural gas, and fuel oil. It is probable that each fuel will be provided by a different company requiring multiple contacts. It will be necessary to obtain information regarding standard energy costs, demand costs, monthly charges, and time-of-use charges. The use of an interruptible natural gas service is possible and should be investigated. ***Actual utility rates for the facility are to be obtained from the local utility and used in all energy analyses.***

C. Building envelope data will include the following:

1. Exterior wall areas including separate areas for different wall types and exposures
2. All exterior glass areas by exposure
3. Roof areas - including separate areas for different types and exposures.
4. Floor area for overhangs, slab on grade, slabs above unconditioned spaces, etc.

D. Development of a building usage schedule will be required and must be developed through conversation between the school district personnel and the HVAC Design Professional. It will be necessary to obtain detailed information on the following:

1. Length of the school day
2. Community use of areas such as the gymnasium, student dining, and auditeria
3. Expected occupancy of the building, including specific expectations for areas such as the administrative area
4. Proposed summer usage of the facility

Note: The scheduling information is not critical to the development of the building load calculations, rather only for building system evaluation.

E. Occupancy loads and schedules will mirror the building usage schedules. Input occupancy at 90 percent of capacity during normal school hours for classroom areas and the administration area. After hours occupancy can be considered negligible in these areas. Activity areas such as gymnasiums should be calculated at no more than 25 percent of the full load capacity during unoccupied operation. Weekend occupancy loads are to be considered in the activity areas at 25 percent and the administrative areas at 90 percent for Saturday morning usage. Occupancy levels for generation of the building load calculations should be set at 90 percent of maximum capacity for all spaces. Each area (zone) shall be input for 100% occupancy for at least one hour during normal school occupied hours.

Recommended values for heat gain attributed to each occupant in these and similar spaces are as follows:

ACTIVITY/LOCATION	SENSIBLE (Btu/h)	LATENT (Btu/h)
Academic Core area	250	200
Gymnasium - players	710	1,090
Gymnasium - spectators	275	275
Student Dining	275	275

1.03 COMPUTER INPUT DATA (cont.)

F. Lighting systems shall be consistent throughout the building. The lighting load shall be input for consideration as a cooling load only, and should not be used to credit the winter heating load.

The HVAC Design Professional is required to coordinate and review proposed lighting requirements for each building with the Electrical Design Professional prior to generating a final energy load analysis. Usage of the lighting systems should mirror the occupancy scheduling for each area in the building. It will be necessary to maintain a minimum of 5 percent lighting energy throughout the unoccupied times to account for emergency and night lighting. ***The following lighting power densities shall be used to establish the base 90.1 energy model. The proposed lighting power densities must be obtained from the Electrical Design Professional.*** The following denotes maximum lighting load requirements (per the energy code):

BUILDING LOCATION	LOAD (watts/SF)
Academic Core	1.4
Administrative Area	1.1
Gymnasium	1.4
Student Dining	0.9
Media Center	1.2
Locker/Shower Room	0.6
Corridor	0.5
Restrooms	0.9
Electrical/Mechanical	1.5
Library	1.2
Student Dining/Auditeria	1.2

plus a direct load for proposed stage lighting. (Coordinate with Electrical Design Professional)

G. Computer locations and expected usage will impact every building designed. All classroom areas will be wired for computers. Include a minimum of 135 watts for each computer station in the building. This load includes the total expected heat gain for a desktop computer and color monitor. Additional loads can be expected for printers and TV monitors, but such loads can be considered negligible regarding the impact on the total building load.

Note: Refer to Chapter 4, Chapter 5, and Chapter 6 for references on equipment requirements and for additional information on quantities.

H. Miscellaneous equipment locations and usage includes equipment in the building such as copiers, refrigerators, microwave ovens, unusual lighting considerations, and general loads throughout the building. The consideration for the loads should be during the occupied time of day only. Miscellaneous loads will be considered negligible during the unoccupied time of day. The following denotes the miscellaneous equipment loads for consideration and the quantity of the load:

TYPE OF EQUIPMENT	AMOUNT OF LOAD
Copiers	400 watts
Refrigerators	500 watts
Microwave ovens	750 watts
Ice makers	*
Kitchen ware washer	*
Kitchen	10 watts per square foot
Stage/Platform area	5,000 watts for lighting

* Refer to ASHRAE handbook of fundamentals for equipment specific heat load.

1.03. COMPUTER INPUT DATA (cont.)

I. The infiltration expectation for each building must be included as part of each building load and energy evaluation. Consider only the effects of infiltration during the unoccupied times of the building. Both cooling and heating infiltration loads must be considered. The entry doors are to be calculated at a minimum of 100 CFM of air infiltration for each 3-foot wide exterior door. Window infiltration is to be considered negligible as to its affect on the building load.

J. The ventilation requirements for the building load are required to adhere to the Ohio Building Code requirements and ASHRAE Standard 62. Specific rates of flow per building occupant as scheduled in Section 8420.

1.04 SYSTEMS EVALUATION REQUIREMENTS

A. In the event a detailed systems evaluation is generated for a proposed heating, ventilating, and air conditioning system, it will be necessary that the evaluation generate cost values for the following specific items. This data will be presented in an organized form per ASHRAE 90.1 appendix G to the Ohio Facilities Construction Commission for review and consideration:

1. Installed cost per square foot
2. Annual operating cost per square foot
3. Annual maintenance cost per square foot

1.05 OPTIMIZE ENERGY PERFORMANCE

A. Demonstrate a 30% improvement in the proposed building performance (energy cost) rating compared to the baseline building performance rating per ASHRAE/IESNA Standard 90.1 ***2007*** (without amendments) by a whole building project simulation using the Building Performance Rating Method in Appendix G of the Standard.

1. Appendix G of Standard 90.1 ***2007*** requires that the energy analysis done for the Building Performance Rating Method include ALL of the energy costs within and associated with the building project. The proposed design:

a. Must comply with the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4) in Standard 90.1 ***2007*** (without amendments)

b. Must include all the energy costs within and associated with the building project

c. Must be compared against a baseline building that complies with Appendix G to Standard 90.1 ***2007*** (without amendments). The default process energy cost is 25% of the total energy cost for the baseline building. For buildings where the process energy cost is less than 25% of the baseline building energy cost, the submittal must include supporting documentation substantiating that process energy inputs are appropriate. For the purpose of this analysis, process energy is considered to include, but is not limited to: office and general miscellaneous equipment, computers, elevators and escalators, kitchen

cooking and refrigeration, laundry washing and drying, lighting exempt from the lighting power allowance (e.g. lighting integral to equipment) and other (e.g. waterfall pumps). Regulated (nonprocess) energy includes lighting (such as for the interior, parking garage, surface parking, façade, or building grounds, except as noted above), HVAC (such as for space heating, space cooling, fans, pumps, toilet exhaust, parking garage ventilation, kitchen hood exhaust, etc.), and service water heating for domestic or space heating purposes. Process loads shall be identical for both the baseline building performance rating and for the proposed building performance rating. However, project teams may follow the Exceptional Calculation Method (ASHRAE 90.1 ***2007*** G2.5) to document measures that reduce process loads. Documentation of process load energy savings shall include a list of the assumptions made for both the base and proposed design, and theoretical or empirical information supporting these assumptions.

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1.01 GENERAL

A. The heating, ventilating, and air conditioning system design criteria denoted as a part of this Design Manual have been developed or are obtained directly from accepted engineering design references such as the ASHRAE manuals and standards, the state of Ohio code references, and good engineering practice. The HVAC Design Professional should review each requirement and obtain or develop the necessary information for each specific building before proceeding with the systems evaluation as denoted in Section 8410.

1.02 OUTDOOR AIR DESIGN VALUES

A. Summer and winter outside air design values shall be derived from standard ASHRAE compiled weather data located in the latest edition of the ASHRAE Fundamentals Handbook. The city nearest the proposed construction project is to be selected for evaluation. Use the 99 percent design values for heating design dry-bulb and the 2 percent design values for cooling design dry-bulb and mean coincidental wet-bulb.

B. In addition, it is strongly recommended that outdoor conditions be considered in the overall design where there is a high wet bulb temperature coincident with an outdoor dry bulb temperature equal to the proposed building supply air temperature for any air handling units with ventilation. For instance, address what happens to building indoor humidity levels when the outside air is 75 deg F/90% relative humidity and a 100% outdoor air unit is supplying 75 deg. F supply air to the facility.

1.03 INDOOR AIR DESIGN VALUES

A. Indoor air temperature design values must reflect the need for energy conservation and shall be in accordance with the Ohio Building Code, Mechanical Code.

B. The occupied temperatures used for building load calculations shall be within the range denoted for summer and winter values. The HVAC Design Professional must consider occupant comfort, as well as energy conservation, in selecting the actual temperature for design and operation of the systems. Summer design values shall range from 75 degrees Fahrenheit to 78 degrees Fahrenheit. Winter design values shall range from 70 degrees Fahrenheit to 72 degrees Fahrenheit. The relative humidity of the building spaces shall be targeted at 50 percent during the summer. Humidification in the winter is not required. For mechanical and electrical spaces, the indoor winter design temperature shall be minimum 60 degrees Fahrenheit and the indoor summer design temperature (except for boiler rooms) shall be 85 degrees Fahrenheit.

C. Night setback temperatures shall be used for all systems. Winter setback temperature shall be 55 degrees Fahrenheit. The summer setup temperature shall be 85 degrees Fahrenheit with an additional requirement that the system shall operate as required to maintain a relative humidity in the building area that is between ***55*** and ***60*** percent, ***maintaining 65 percent during summer, unoccupied period and 60 percent at all other times.*** Maintaining humidity levels below 60 percent will result in the periodic operation of the HVAC system during the summer months to reduce the potential for mold and mildew in the building.

1.04 OUTDOOR AIR VENTILATION REQUIREMENTS

A. Outdoor ventilation rates shall be calculated for each occupied space and shall conform to the requirements for ASHRAE Standard 62.1(most recent as adopted by OBC or USGBC), and the requirements of the Ohio Building Code, Mechanical Code.

B. Each system (other than systems using dedicated outdoor air units, including water source heat pumps, chilled beams or variable refrigerant flow) shall include controls for a 100 percent economizer cycle to cool the building when outside air conditions are conducive to cooling.

C. Energy recovery shall be used as a part of the design for any system that provides more than 30% outside air at a minimum ventilation rate in order to reduce the energy consumption required to provide the necessary outdoor ventilation rates. The energy recovery systems will require both sensible and latent heat recovery necessitating the use of desiccant heat wheels or the equivalent. The design may omit the energy recovery on systems where demand ventilation control via a carbon dioxide measuring system is provided for large variable occupancy single-zone spaces such as gymnasium and dining/auditeria spaces.

D. Carbon dioxide levels shall be monitored through the direct digital temperature control system for proof of system operation to maintain a carbon dioxide level in the building of as recommended by ASHRAE Standard 62 and the Ohio Building Code. The use of space specific carbon dioxide sensors are recommended for this operation. Return air sensors may be considered provided accurate readings can be obtained. It is not the intention of this guideline to require the use of carbon dioxide sensors for a reduction of outside air quantities below the calculated minimum air flow requirements for all spaces, although is required in large variable occupancy single-zone spaces such as gymnasium and dining/auditeria spaces.

E. Ventilation calculations shall use the Ventilation Rate Method or the Indoor Air Quality Method. If the IAQ Method is used, complete calculation documentation shall be submitted at the Design Development Submittal, and specifications must include a performance test after installation. Use of the IAQ Method does not supercede any other system design requirements.

F. All mechanical ventilation systems shall utilize some means of mechanical dehumidification, unless analysis is done showing dehumidification is not needed at all outside air conditions.

G. Designer shall consider using 100% DOAS unit as supplemental heating by allowing recirculation of return air when designing systems such as heat pump, chilled beam,etc.

1.05 AIR FLOW RATES FOR BUILDING SPACES

The following air flows denote the recommended "design" airflow rates for each space. Supply airflow rates given shall be based on the volume of the breathing zone as defined in ANSI/ASHRAE Standard 62.1 ***(most recent as adopted by OBC or USGBC)***. When using VAV systems, it is not intended that these are the minimum airflow to the space. Exhaust air rates shall be the value shown below or as required by the Ohio Mechanical Code, whichever is higher, ***but not less than primary Supply Air. Exhaust air rates for Art Room, Science Lab and Life Skills Lab served by dedicated outside air systems (DOAS) shall be established at 125 percent of the primary supply air rate for the space and adjustments incorporated in to the sequences of operation to decrease relief air whenever the local space exhaust is energized.***

	SPACE	SUPPLY AIR	EXHAUST AIR
1.	Classroom	6 air changes/hour	N/A
2.	Administrative	6 air changes/hour	N/A
3.	Gymnasium	4 air changes/hour	N/A
4.	Art Room	6 air changes/hour	0.7 cfm/SF
5.	Student Dining	6 air changes/hour	N/A
6.	Locker Room	90% of exhaust	1.0 cfm/SF
7.	Science Lab	6 air changes/hour	1.0 cfm/SF
8.	Life Skills Lab	6 air changes/hour	0.7 cfm/SF
9.	Food Service	6 air changes/hour	canopy hood
10.	Storage Room	N/A	1.0 cfm/SF*****
11.	Toilet Room	N/A	75 cfm per fixture
12.	Media Center	6 air changes/hour	N/A
13.	Custodial	N/A	1.5 cfm/SF
14.	***Recycling***	***N/A***	***1.0 cfm/SF***

******* *Storage Rooms shall be not required to be exhausted if there is no possible objectional transfer (odors or hazardous gas) to adjacent spaces.*

1.06 TEMPERATURE CONTROL SYSTEM

A. All temperature control systems installed shall be electronic, direct digital controls. Pneumatic controls in all or portions of the control system will not be permitted. Each facility will be provided with the means to access the control system software with a desktop or laptop computer. It will be necessary for the HVAC Design Professional to advise the school district of the options for control and management of the building available through the direct digital control system.

B. Thermostatic zoning shall be developed using good engineering practice. Dissimilar spaces shall not be grouped on the same thermostat. Each classroom shall be an independent zone. Other zones may also be required to be separately thermostatically controlled; carefully review space requirements of the manual for these requirements. Occupied/unoccupied scheduling shall be based on the associated air handling system. Each thermostat zone associated with digital control shall have a means to override the schedule for temporary occupancy.

1.06 TEMPERATURE CONTROL SYSTEM (cont'd)

C. The discharge air temperature for each system shall be adjustable and shall be reset as a function of the direct digital control system.

D. The economizer control shall be set through the central direct digital controller based on global outside air temperature and humidity.

E. The direct digital control system shall be designed to place emergency calls to designated school personnel in the event of equipment failure.

F. Options shall be investigated with each direct digital control system for the operation of exterior, corridor, and restroom lighting systems through the energy management computer.

G. The commissioning agent, temperature control contractor, HVAC contractor, and design team shall have a temperature controls presubmittal meeting to discuss the scope of work and to review the proposed graphics package.

H. Designer is to have all temperature controls indicated on the drawings, including components, sensor locations, control point diagrams, and detailed sequences of operation for each item being controlled. Deferring to the temperature control contractor to develop sequences of operation is not acceptable.

1.07 ENERGY USAGE

A. All systems shall be designed in compliance with the ASHRAE STANDARD 90.1 ***(most recent as adopted by OBC or USGBC)*** "Energy Standard for Building Except Low-Rise Residential Buildings", and the energy usage requirements prescribed by the Ohio Building Code and the Department of Energy.

B. Systems shall be evaluated and considered to increase energy efficiency beyond requirements of ASHRAE 90.1 and reduce energy consumption costs. Electric resistance heating is discouraged from use while other fuel sources are readily available.

1.08 OPTION SYSTEM COMPONENTS FOR EMERGENCY POWER

A. The intent of connecting emergency power to selected components of the HVAC system is to provide an opportunity to limit damage from freezing weather during a power outage of a short duration.

B. System Components Not Required for Power, but optional if within budget:
1. Exterior heat tracing circuits.
2. DDC system controllers and components related to remote alarming.
3. Air handling unit preheat coil (heating coil) run-a-round pumps.
4. Cooling tower basin heaters.
5. Chilled water circulating pump, when used for chiller freeze protection.
6. Remote fire pump house heating system.
7. Fire pump.
8. Foundation drainage sump pump.

1.09 EXTERIOR NOISE CONTROL

A. The location of exterior mechanical equipment shall be reviewed by the Design Professional for its sound impact, both inside and outside the building.

B. Exterior equipment operation shall not cause indoor sound levels to exceed generally accepted levels for the space. Refer to ASHRAE for recommended guidelines.

C. Exterior sound levels shall be in compliance with the local governmental ordinances. When these values are not governed, the following shall be used for designs. The sound level created by the equipment shall not exceed the values listed measured at the property line.

Daylight hours:	55 dBA
Nighttime hours:	50 dBA

1.10 INTERIOR BACKGROUND NOISE LEVEL (HVAC equipment only)

A. Option 1 - Using the methodology described in annexes B through D of ANSI Standard S12.60-2002, achieve a maximum background noise level in classrooms and other primary learning spaces of 45 dBA.

- OR -

B. Option 2 - Design classrooms and other core learning spaces using the methodology listed in the 2003 HVAC applications ASHRAE Handbook, Chapter 47, on Sound and Vibration Control, and achieve an RC (N) Mark level of 37.

C. Achieve a maximum background noise level in classrooms and other core learning spaces of 45 dBA by calculating core learning space noise levels for the HVAC system design using mechanical system noise calculation methods as defined in the 2003 HVAC Applications ASHRAE Handbook, Chapter 47, Sound and Vibration Control. Submit calculations for all core-learning spaces, confirming compliance with the 45 dBA limit. Commercially-available software may be used to perform the calculations for core learning space noise levels, provided calculations are based on the 2003 HVAC Applications ASHRAE Handbook, Chapter 47, Sound and Vibration Control.

1.11 CUSTOM PACKAGED PENTHOUSE SYSTEMS

A. Application – The use of Custom Package Penthouse Systems may be applied to multistory schools where more than 40% of the building is above the first floor or on schools where land use restrictions prohibit putting cooling equipment (chillers, cooling towers, etc.) on grade.

B. General Construction – It is in no way the intent of using a Custom Packaged Penthouse System to compromise the system design, maintainability, or energy efficiency of the HVAC system. The use of a Custom Packaged Penthouse should conform to the following guidelines:

1. Penthouse is a part of the building and as such the square footage counts in the prescribed formulas.

1.11 CUSTOM PACKAGED PENTHOUSE SYSTEMS (cont'd)

2. All components in the Penthouse shall be installed with the manufacturer's recommended clearances and code requirements.

3. Walkway heights, widths, means of egress and life safety systems shall comply with the building code for mechanical spaces.

4. Access to the Penthouse shall include a fully code compliant interior stairway. Elevator access should be considered in buildings 3 stories or more.

5. Exterior appearance of the Penthouse shall be an integral part of the building design.

6. Penthouse shall attach in such manner that it becomes an integral part of the building.

C. Fire Suppression shall comply with the applicable sections of this manual.

D. Plumbing shall comply with the applicable sections of this manual.

E. HVAC shall be designed in compliance with the approved systems in this previously listed Chapter and components in compliance with Chapter 9.

1. Exception: A Penthouse System may use direct expansion cooling with evaporative condensing in lieu of a chilled water system, provided the following criteria is met.

a. All equipment is part of the Penthouse construction.

b. Capacity control is provided on air system supply temperature from full load to 10% of full load with an accuracy of +/- 2 deg. F. without the use of hot gas bypass.

c. DX cooling coils shall be intertwined design.

d. Refrigeration compressors are either scroll, screw or centrifugal type.

e. Sound levels inside the Penthouse comply with all OSHA regulations.

1.12 HVAC SYSTEMS COMMISSIONING

A. Refer to Commissioning Section 9101-019100 for additional information.

1.13 ELEMENTARY MERCURY

A. No elemental mercury or mercury-containing instruments, equipment, or other items shall be permitted anywhere on school property.

1.14 LOCAL OR GENERAL EXHAUST VENTILATION

A. All indoor areas subject to the regular or frequent emission of hazardous airborne contaminants shall be equipped with local or general exhaust ventilation systems designed to effectively control emissions and minimize human exposures. Such areas include visual arts rooms, career tech labs, science rooms, and chemical storage areas. 24-hour operation of exhaust fans servicing science prep areas and custodial spaces where hazardous chemicals are used or stored shall be required. Sanitary vent stacks shall extend 2 feet above outdoor air intakes within 10 feet.

1.15 INTAKE AND RELIEF LOUVER LOCATIONS

A. Locations shall comply with current version of Ohio Building Code and ASHRAE 62.1***(most recent as adopted by OBC or USGBC)***

B. Intakes shall be located a minimum of 3’-0” above grade or flat roof to reduce snowdrift blockage.

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1.01 GENERAL

A. The descriptions of the four accepted heating, ventilating, and air conditioning systems have been included in this manual as listed below. It will be the responsibility of the HVAC Design Professional to utilize a system as described in this section, unless suitable documentation to justify a different system type has been submitted.

1.02 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH HOT WATER REHEAT TERMINALS

A. Central Heating Plant

1. A minimum of 2 heating water boilers shall be provided. Boiler selection shall consider the operating efficiency of the heating plant. Boiler shall be capable of providing up to 95% efficiency and shall not be below 83% efficiency at any point in the operating range. Electric resistance heating is discouraged from use when other fuel sources are readily available.
   a. Gas-fired, forced draft boilers
   b. Gas-fired, atmospheric boilers
   c. Fuel oil boilers
   d. Dual-fuel (fuel oil and gas) boilers
   e. Gas-fired, high efficient, forced draft boilers

2. Total heating capacity of the boiler plant shall be approximately 130 percent of the building design load.

3. Design water supply temperatures shall be in the range of 130 to 190 degrees Fahrenheit. Heating plant shall be capable of resetting supply water temperature in order to optimize performance based on equipment efficiency ratings and reduced heating requirement. Reset supply water temperature shall be lower than design supply water temperature. Low supply water temperatures will necessitate the use of at least one condensing boiler. If a combination of condensing and non-condensing boilers is selected, care shall be given to ensure that non-condensing boilers do not operate when return water temperature is below 140 degrees Fahrenheit. ***The Design Professional shall evaluate the impact in first cost and operating cost of a system with low supply water design temperature versus a system with a high supply water design temperature with a more aggressive reset schedule.***

4. Design water temperature drop in the system shall be maintained between 20 degrees Fahrenheit and 40 degrees Fahrenheit.

5. Heating water distribution loop shall make use of a reverse return or direct return piping arrangement. Direct return systems shall use flow controllers for water balancing.

6. The use of a primary/secondary-piping loop is not mandatory.
7. A minimum of 2 pumps shall be used for water circulation to the building system. It is recommended to use 2 pumps, each sized between 50-75 percent of the total system flow at 100 percent of the required pressure. Design Professional shall evaluate pump operation range against the system curve to ensure stable operation with one or both pumps operating. Additional pumps will be required if a primary/secondary-piping loop is included. Direct return systems shall use automatic flow controllers for water balancing.

1.02 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH HOT WATER REHEAT TERMINALS (cont'd)

a. A parallel pumping configuration is required (not necessarily running at the same time).

b. The heating water system shall be capable of a minimum 50 percent flow reduction through the use of two-way control valves, three-way control valves, and variable speed pumps.

8. Variable speed pumping shall be utilized on systems that require 10 horsepower or greater pump horsepower. Variable speed pumping shall not be utilized where detrimental to the equipment. Each pump shall have its own variable frequency drive and is not permitted to share a variable frequency drive with another pump.

9. Air removal and/or containment methods are required on closed loop applications.
   a. Expansion tanks
   b. Air separators
   c. Air vent

10. Each system shall be provided with water treatment system to prevent corrosion and scaling in the heating water system.

11. A combustion air system for each boiler shall be installed to meet the code. The HVAC Design Professional must provide a means for preheating the incoming air or maintaining a minimum of 55 degrees Fahrenheit within the boiler room area. Control of the dampers shall be through the direct digital control system and will include dampers and control for the water heater system.

12. The heating water plant shall be designed to account for the effect of the heat recovery equipment.

B. Central Cooling Plant

1. Chiller system shall be either air-cooled or water-cooled and shall utilize one of the following compressor types:
   a. Centrifugal
   b. Rotary screw
   c. Scroll

2. It is recommended that the quantity of chillers be determined based on the total building cooling requirement. Each chiller shall have the ability to reduce down to a minimum of 10% capacity without surging.

Total Chiller Plant Capacity	Number of Chillers
≤300 tons	One
<300 tons, <600 tons	Two
≥600 tons	Two minimum, with chillers added so that no chiller is larger than 800 tons

1.02 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH HOT WATER REHEAT TERMINALS (cont'd)

3. Design Professional shall consider incorporating strategies to further reduce energy consumption of the Central Cooling Plant. Such strategies may include:

a. Hot gas heat recovery.

b. Variable speed compressors.

4. Outdoor chillers exposed to freezing weather conditions must include some method of freeze protection. The following options are recommended for investigation.

a. Glycol solutions can be used throughout the entire chilled water system to prevent freezing.

b. Heat exchangers may be used to isolate exterior chiller systems and allow glycol use in only the exterior piping.

c. Circulating pumps can be used to keep water flowing through the chillers when ambient temperatures are below freezing.

d. Electric heat tracing for the evaporator barrel and any piping located above the frost line.

e. Remote indoor evaporator barrels.

f. Indoor evaporator and compressor with remote outdoor, air-cooled condenser.

5. Outdoor chillers exposed to freezing weather conditions must include some method of freeze protection. The following options are recommended for investigation:

a. Glycol solutions can be used throughout the entire hilled water system to prevent freezing.

b. Heat exchangers may be used to isolate exterior chiller systems and allow glycol use in only the exterior piping.

c. Circulating pumps can be used to keep water flowing through the chillers when ambient temperatures are below freezing.

6. Chillers should be selected using the occupant capacity of the building instead of the sum of occupants in the spaces.

7. Chillers should be selected at 100 percent of the building design load.

8. Design water supply temperatures shall range between 40 degrees Fahrenheit and 45 degrees Fahrenheit.

9. Design water temperature rise in the system shall be maintained between 14 degrees and 16 degrees Fahrenheit.

10. Chilled water distribution loop shall make use of a reverse return or direct return piping arrangement.

11. The use of a primary/secondary-piping loop is required when multiple chillers are used. Multiple chillers are to be set up in a parallel arrangement.

1.02 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH HOT WATER REHEAT TERMINALS (cont'd)

12. ***A minimum of one pump shall be used for water circulation to the building system. It is recommended to use 2 pumps, each sized between 50-75 percent of the total system flow at 100 percent of the required pressure. Design Professionals shall evaluate pump operating range against the system curve to ensure stable operation with one or both pumps operating. Additional pumps will be required if a primary/secondary-piping loop is included and each chiller shall have a dedicated primary pump. Direct return systems shall use flow controllers for water balancing.***
    a. ***A parallel pumping configuration is required (not necessarily running at the same time.)***
    b. The chilled water system shall be capable of a minimum 50 percent flow reduction through the use of two-way control valves, and variable speed pumps.

13. Variable speed pumping shall be utilized on systems that require 10 horsepower or greater. Variable speed pumping shall not be utilized where detrimental to the equipment. Each pump shall have its own variable frequency drive and is not permitted to share a variable frequency drive with another pump.

14. Air removal and/or containment methods are required on closed loop applications.
    a. Expansion tanks
    b. Air separators
    c. Air vent

15. Each closed loop system shall be provided with a water treatment system to prevent corrosion and scaling in the chilled water system.

16. Cooling towers are required for water-cooled chiller systems and should include one of the following cooling tower types:
    a. Induced draft (cross-flow)
    b. Forced draft (counter-flow)

17. Cooling towers shall be located at the rear of the building or on the roof. If roof mounting is selected, vibration isolation methods must be utilized.

18. Cooling towers shall be sized to maintain condenser water temperature to the chillers during a design day with ambient wet-bulb temperatures equal to the 2 1/2 percent design wet-bulb value. This value is different than the Mean Coincident wet-bulb value.

19. ASHRAE 90.1 baseline system on large schools is to provide water cooled chillers. Condenser water temperatures shall be selected to obtain maximum energy efficiency. Condenser water optimization to minimize the total equipment energy (including pumping) is required for various wet bulb temperatures during the cooling season. The optimal setpoint will vary for different compressor (screw, centrifugal and scroll) types and their unloading method. The use of increased condenser water delta T from 10 degrees F to 15 degrees F shall be reviewed during design to decrease pumping energy. The goal is to optimize the chilled water system total operating power to its lowest practical value.

1.02 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH HOT WATER REHEAT TERMINALS (cont'd)

20. Capacity reduction methods for cooling towers, such as multiple fans, two-speed fans, variable frequency drives, inlet dampers, condenser water mixing valves, or dump valves, shall be used to maintain condenser water temperature during partial load conditions. If a variable frequency drive is used on the cooling tower fan, an interlock wire between the remote disconnect and the VFD shall be installed to shut down the drive if the disconnect is turned off.

21. A single condenser water-circulating pump shall be used for each water-cooled chiller. Pump components shall be suitable for cooling tower systems.

22. A remote tank capable of holding the water for the cooling tower system shall be provided below the cooling tower level within a tempered space. If a remote tank is not possible, heat tracing must be provided for piping exposed to freezing weather and the sump of the cooling tower.

23. The cooling tower water treatment system shall include a makeup water connection through a backflow preventer and shall be automatic in operation to prevent scaling, corrosion, and bacterial growth.

24. The chilled water plant shall be designed to account for the affect of the heat recovery equipment.

25. Thermal ice storage systems may be considered where local utility rates prove the system to be beneficial. Ice storage systems may be utilized where a simple payback of less than 5 years is realized. For simple paybacks between 5 and 10 years, a joint decision shall be made between the HVAC Design Professional and the school district as to whether ice storage should be utilized. Ice storage systems shall not be utilized if a simple payback of 10 years or less cannot be realized.

26. DX cooling shall only be utilized as described in paragraph G. Supplemental cooling systems.

C. Air Systems

1. ***All air handling units are to be investigated as to whether a modular or custom unit is needed. Whether the unit is a modular type or custom type is to be clearly called out on the air handling unit schedule.***

2. Variable Volume Air Handling Units

a. Air handling units should be located strategically throughout the building to distribute a constant temperature air to terminal units. Locations of air handling units can be dedicated mechanical rooms or mechanical decks. Air handling units may not be located exterior to the building.

b. Each air handling unit shall include the following components as a minimum: Supply air fan, cooling coil, heating coil, filters, and mixing box***. In addition, it is recommended that ultraviolet lighting upstream of the unit cooling coil be considered to reduce coil cleaning frequency and to help control pathogens.***

1.02 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH HOT WATER REHEAT TERMINALS (cont'd)

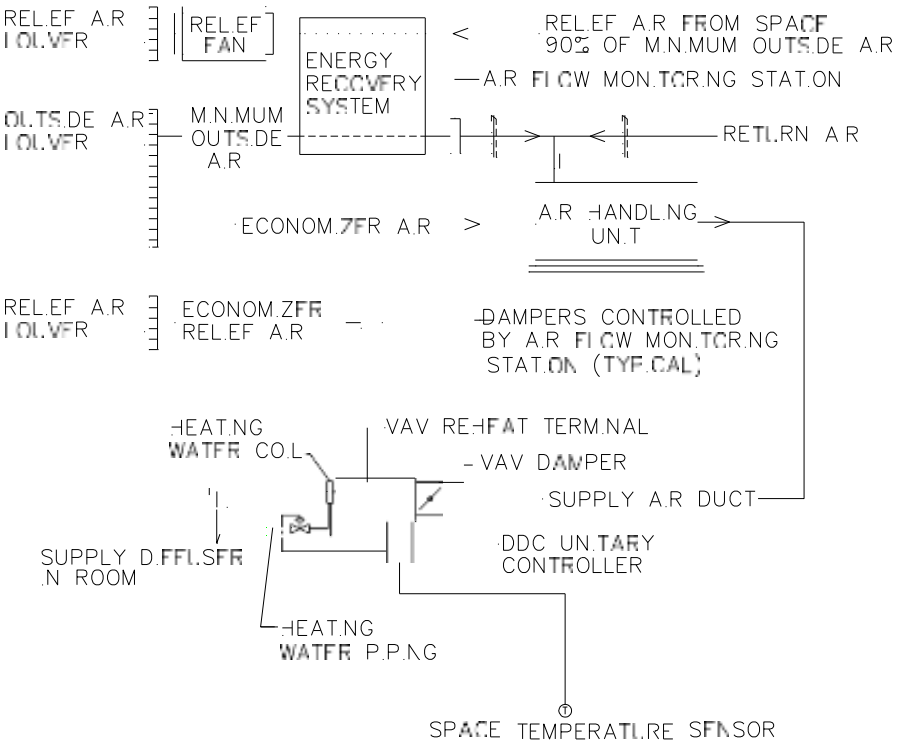
c. Supply air temperature distributed to the terminal units shall be designed for a duct temperature of 55 degrees Fahrenheit or as required by the computer-generated building load output data. Heating coils shall be sized for a minimum of 100 degrees Fahrenheit leaving air temperature during morning warm-up. Morning warm-up shall be with 100% AHU airflow and VAV boxes 100% open. ***In addition, it is recommended that ultraviolet lighting upstream of the unit cooling coil be considered to reduce coil cleaning frequency and to help control pathogens.***

d. Each air handling unit shall include a variable frequency drive for the fan motor to reduce the air volume available to the system.

e. Energy recovery methods such as desiccant wheels shall be included to precondition the outside air ***for any system that provides more than 30% outside air minimum ventilation rate***. The energy recovery method selected by the HVAC Design Professional must include latent heat recovery as well as sensible heat recovery.

f. Variable air volume systems should be investigated for classrooms, media centers, gymnasiums, student dining, auditerias, and food service, music, and administration areas.

g. All variable air volume systems shall include air flow monitoring systems to maintain the minimum outside air flow requirements as set forth in the Ohio Building Code, Mechanical Code and ASHRAE Standard 62 during occupied hours at all volumes of supply air.



VAV Reheat Schematic
Figure B-1

1.02 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH HOT WATER REHEAT TERMINALS (cont'd)

3. Single Zone Variable Volume Air Handling Units
   a. Air handling units should be located as close as possible to the space being conditioned. Locations of air handling units can be dedicated mechanical rooms or mechanical decks. Air handling units may not be located exterior to the building.
   b. Each air handling unit shall include the following components as a minimum: supply air fan, cooling coil, heating coil, filters, and mixing box. In addition, it is recommended that ultraviolet lighting upstream of the unit cooling coil be considered to reduce coil cleaning frequency and to help control pathogens.
   c. Supply air temperature distributed to the space during cooling mode shall be designed for a duct temperature of 55 degrees Fahrenheit or as required by the computer-generated building load output data. Air temperature distributed to the space during heating mode shall be as required to maintain space temperature; however, the heating coil should be sized to maintain a minimum of 100 degrees Fahrenheit leaving air temperature for morning warm-up. Morning warm-up shall be with 100% AHU airflow. Electric resistance heating is discouraged from use when other fuel sources or heating medium (heating water) are readily available.
   d. Each air handling unit shall include a variable frequency drive for the fan motor to reduce the air volume available to the system.
   e. Energy recovery methods such as desiccant wheels shall be included to precondition the outside air for any system that provides more than 30% outside air minimum ventilation rate. The energy recovery method selected by the HVAC Design Professional must include latent heat recovery as well as sensible heat recovery. Energy recovery may be omitted on large variable occupancy single zone systems where CO_2 demand ventilation control is provided.
   f. Spaces such as gymnasiums and student dining shall be designed to control humidity in the space.
   g. Locker room supply air systems shall include energy recovery equipment as a means of preconditioning the air. The air handling units will include heating and cooling coils for additional ***space conditioning*** and dehumidification.
4. Kitchen Supply and Exhaust System
   a. Makeup air shall be supplied by an air handling system or dedicated makeup air unit. Air handling unit shall be located as close to the kitchen as possible. Location of the unit shall be in a dedicated mechanical room or mechanical deck, with exception that a dedicated gas-fired makeup air unit is permitted to be installed on the roof of the kitchen, for compensation of the kitchen hood exhaust system.
   b. Air handling systems serving the kitchen area shall serve areas directly related to kitchen and dining functions, and shall not serve other spaces such as classrooms or administrative areas. Serving an office which is part of the kitchen operation is acceptable.
   c. Refer to paragraph 8430.1.02.F.4 e and f for kitchen hood and dishwasher exhaust systems. System design shall comply with the Ohio Mechanical Code.

1.02 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH HOT WATER REHEAT TERMINALS (cont'd)

d. Commercial kitchen Type I and Type II hood systems larger than 5,000 CFM shall have variable-speed control for exhaust and makeup air fans to reduce hood airflow rates at least 50 percent during those times when cooking is not occurring and the cooking appliances are up to temperature in a standby, ready to cook mode.

D. Ductwork Distribution Systems

1. Medium/High Pressure Supply Air Ductwork
   a. Air shall be distributed from the variable volume air handling units to terminal units located above the ceiling through a medium/high pressure ductwork system. Air velocities should be a maximum of 3,000 feet per minute. The system must be analyzed for acoustical attenuation in the form of dual-walled ductwork or manufactured sound attenuators. It is recommended the medium/high pressure ductwork system be routed through corridors to reduce potential sound problems.
   b. The HVAC Design Professional is required to evaluate the entire medium/high pressure ductwork system using an approved software program designated for this purpose. Examples of such programs include: United McGill's UNI-DUCT program, Trane's Varitrane program, or Tempmaster's AcuDuct program.
2. Variable Air Volume Reheat Terminal Units
   a. Terminal units shall be located above the ceiling and shall control the flow of air to the space based on a space temperature sensor. Terminal units should be located within 2 feet of an accessible ceiling (where ceilings exist) to allow for maintenance.
   b. On a rise in space temperature, the damper in the terminal unit will open and allow air from the medium/high pressure duct system into the space. As the space temperature falls, the damper will close to a minimum position as determined by the HVAC Design Professional. The minimum position shall be set to maintain the required ventilation rate in the space. On a continued fall in space temperature, the heating coil control valve at the terminal unit shall be opened to maintain space set point.
3. Low Pressure Supply Air Ductwork
   a. Air is distributed from the variable volume terminal units to air devices located throughout the space via a low pressure ductwork system. The maximum air velocity in this part of the ductwork system should be 1,200 feet per minute. Air is also distributed from single zone air handling units to air devices via a low pressure ductwork system.
   b. Supply air ductwork connections to ceiling-mounted air devices should be completed with flexible ductwork.
   c. Air devices should be ceiling-mounted, wherever possible, to prevent damage by students. If spaces do not include ceilings, the air devices should be wall- or duct-mounted out of the reach of students.
   d. Low temperature air systems (below 50 degrees Fahrenheit) require the use of special diffusers and air devices to prevent moisture accumulation.
   e. Each low pressure duct leading to an air device should include a manual volume damper to balance the system.

1.02 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH HOT WATER REHEAT TERMINALS (cont'd)

4. Return/Relief Air System for Variable Volume Air Handling Units

   a. The return air plenum on a variable volume system is the space between the ceiling and structure of the building. All materials inside the plenum area should be rated for this type of application to reduce smoke and fire potential.

   b. Return air is routed into the plenum through return grilles in the ceiling. Return air is pulled from the plenum by the supply air fan located in the air handling unit.

   c. Relief air shall be totally mechanically exhausted or by use of a combination of constant speed exhaust and a gravity relief system. Combination relief air exits the building through two paths. During normal operation, relief air is pulled back to the mechanical room by the relief air fan and exits the building through an energy recovery system. Roof-mounted gravity relief ventilators or exterior, wall-mounted louvers with backdraft dampers should be used as exit points for the relief air. During the economizer cycle, relief air exits the building through supplementary rooftop ventilators and wall louvers located around the building.

   d. The relief air fan of a combination relief system should be constant volume and sized to maintain a slight positive pressure in the space at minimum outside air conditions.

5. Return/Relief Air Systems for Single Zone Air Handling Units

   a. Return air is ducted back to the air handling unit versus using the return air plenum. It is recommended that return air devices be located near the floor for large rooms with high ceilings (gymnasiums, cafeterias, etc.)

   b. Relief air shall be totally mechanically exhausted or by use of a combination of ***variable*** speed exhaust and a gravity relief system. Combination relief air exits the building through two paths. During normal operation, relief air is pulled back to the mechanical room by the relief air fan and exits the building, ***maintaining building pressurization based on system outdoor air rate.*** Roof-mounted gravity relief ventilators or exterior, wall-mounted louvers with backdraft dampers should be used as exit points for the relief air. During the economizer cycle, relief air exits the building through supplementary rooftop ventilators and wall louvers located around the building.

   c. The relief air fan of a combination relief system shall be ***variable*** volume and sized to maintain a slight positive pressure in the space at minimum outside air conditions.

1.02 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH HOT WATER REHEAT TERMINALS (cont'd)

E. Ventilation Air Systems

1. There are two paths for outside air entering the air handling units.
   a. The minimum outside air required for ventilation enters the building through exterior wall louvers or roof-mounted ventilators near the air handling unit and immediately passes through a heat recovery system. The tempered air then enters the return air ductwork just before the air handling unit mixing box.
   b. During the economizer cycle, 100 percent of the air passing through the air handling unit enters the mixing box through a direct duct connection to exterior louvers or roof-mounted ventilators. Economizer air does not pass through the heat recovery system.

F. Exhaust Air Systems

1. General exhaust systems shall be located throughout the building to exhaust restrooms, electrical rooms, mechanical rooms, custodial closets, and storage rooms.

2. Roof-mounted fans shall be utilized wherever "low profile" roofs are located.

3. In-line or deck-mounted utility fans should be used to avoid penetration of sloped roof structures. In-line fans should not be located over sound sensitive areas such as classrooms, media centers, conference rooms, etc. Fans shall be installed within 2 feet of an accessible ceiling (where ceilings exist) to allow for maintenance.

4. Special Exhaust Systems
   a. Science and art rooms require general exhaust systems in addition to a supply/return air system to remove odors associated with experiments, paint, and chemicals. These exhaust systems shall be manually controlled using spring-wound timer switches within the space and not through the temperature control system. Exhaust requirements in these applications shall be such to create a slight negative pressure in the room and contain the odors to one classroom or lab. Makeup air for exhaust will be drawn from the building return air plenum.
   b. Fume hood exhaust systems shall be installed at all fume hood locations. Each fume hood shall be exhausted with its own exhaust fan. Exhaust fans for fume hoods shall be roof-mounted, wherever possible, or as close to the perimeter of the building as possible, if installed as an in-line or utility fan. ***Ductwork shall be stainless steel or epoxy coated steel rated for the products in the exhaust air. The location of the fume hood exhaust and intake air shall be closely reviewed during design.***
   c. Kiln systems shall include a dedicated exhaust system to remove heat. Control of the exhaust fan shall be based on a rise in space temperature.

1.02 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH HOT WATER REHEAT TERMINALS (cont'd)

d. Technology education systems require dedicated dust collection systems with exterior cyclone units and interior after-filter units. Dust collection system shall include floor sweeps and individual connection to dust generating equipment such as table saws, planers, jointers, etc. Special welding exhaust systems may be required if welding stations are provided. Welding exhaust should be completely separate from any dust collection exhaust system and should be connected directly to exterior wall louvers or rooftop ventilators.

e. Kitchen canopy systems shall be provided over kitchen cooking equipment where required by applicable codes. Kitchen canopies shall include exhaust and makeup air as required by code. Variable speed and time controls for exhaust hoods are recommended. They are to utilize a system with temperature and optical sensors to determine ventilation requirements based on exhaust temperature and smoke content.

f. Dishwasher exhaust shall be designed by the HVAC Design Professional to meet the requirements set forth by the Food Service Design Professional and will result in either a direct-connected system or an overhead exhaust hood arrangement.

5. Locker Room Exhaust Systems

a. Locker room spaces shall be exhausted independently from the building general exhaust systems. The quantity of exhaust shall be designed by the HVAC Design Professional to meet the minimum code requirements, but shall not be less than 1.5 cubic feet per minute per square foot in quantity.

b. The exhaust shall be grouped from specific spaces, such as male locker rooms or female locker rooms, and shall be routed through an energy recovery system in order to obtain usable energy from the exhausted air for use in preconditioning the supply air in the same locker room spaces.

G. Supplemental Heat Systems

1. Cabinet unit heaters shall be ceiling recessed versus wall mounted. The only acceptable use of a wall-mounted unit would be in an open roof structure design as developed by the HVAC Design Professional.
2. Propeller unit heaters shall be used for supplementary heat in mechanical rooms, shop areas, receiving, etc
3. Fintube/radiant ceiling panel heating shall be used to provide heat for large, exterior exposures. Radiant ceiling panels shall not be used where ceiling heights exceed 12 feet. The HVAC Design Professional should avoid the use of fintube in all applications where damage or vandalism is widespread.
4. Miscellaneous heat sources throughout the building may be required and should be evaluated on a case-by-case basis by the HVAC Design Professional.
5. ***Electric resistance heating is discouraged from use when other fuel sources or heating medium (heating water) are readily available.***

1.02 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH HOT WATER REHEAT TERMINALS (cont'd)

H. Electronic Temperature Control System

1. The building shall be split into different zones according to air systems, exterior exposure, and general occupied schedules. Example: Administration areas shall be a separate zone; classrooms with southern exposure shall be a separate zone from classrooms with northern exposure, etc.

2. Each occupied space in the building shall include space temperature control.

3. Zones shall be placed into occupied/unoccupied mode through the temperature control computer.

4. Variable volume air handling units shall provide air to match a discharge air temperature set point from the temperature control computer. Small, direct-expansion cooling systems shall be controlled from a return air set point in lieu of discharge air set point.

5. Single zone air handling units shall be controlled from a space-mounted temperature sensor. Space-mounted or return air humidity sensors shall be included in the event reheat is included for humidity control of gymnasiums and student dining. A return duct CO_2 sensor shall be provided for large single zone variable occupancy systems utilizing demand ventilation control.

6. Through the temperature control system, it shall be possible to reset the space temperature sensors to a night setback temperature of 55 degrees Fahrenheit for heating ***and 85 degrees Fahrenheit for cooling*** to reduce energy consumption.

7. During unoccupied hours, air handling units shall cycle only as required to maintain night setback temperatures.

8. Dry-Bulb controlled economizer for the building shall be controlled globally from the main temperature control computer. As the dry-bulb temperature of the return air rises above the dry-bulb temperature of the outside air, the entire building shall be placed into economizer mode. Return air temperature sensors shall be included for each air handling unit. Provide an outside air enthalpy high limit to end the economizer cycle if the outside air enthalpy exceeds the limit set point. Differential enthalpy economizer shall also be acceptable.

9. Graphic screens shall be included for each air handling unit, boiler plant, cooling plant, variable air volume terminal unit, and floor plan.

10. The heating water pumping system shall be enabled when ambient temperatures drop below 50 degrees Fahrenheit during unoccupied hours and 55 to 70 degrees Fahrenheit during occupied hours. Design Professional is to determine the occupied setpoint based on thermal balance. Boilers shall maintain water temperature while the pumping system is enabled. It is recommended with multiple boiler arrangements that a flow measuring device is used in conjunction with supply and return temperature sensors to calculate system Btu/h required and to then stage the boilers accordingly.

1.02 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH HOT WATER REHEAT TERMINALS (cont'd)

11. The chilled water pumping system shall be enabled when ambient temperatures rise above ***50*** degrees Fahrenheit during occupied hours ***or*** when the building relative humidity rises above 60. Chillers shall maintain water temperature while the pumping system is enabled. Systems will shut down ***during unoccupied hours*** when the relative humidity falls below 60%.

12. The temperature control system shall prevent the return water temperature from dropping below the required temperature allowable at the boilers.

13. All air handling units shall be controlled to cycle during unoccupied hours in order to prevent space relative humidity in excess of ***60*** percent. Systems will shutdown when the relative humidity falls below ***50 percent.***

1.03 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH FAN-POWERED REHEAT TERMINALS

A. Central Heating Plant
   1. Reference"Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

B. Central Cooling Plant
   1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

C. Air Systems
   1. Variable Volume Air Handling Units
      a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

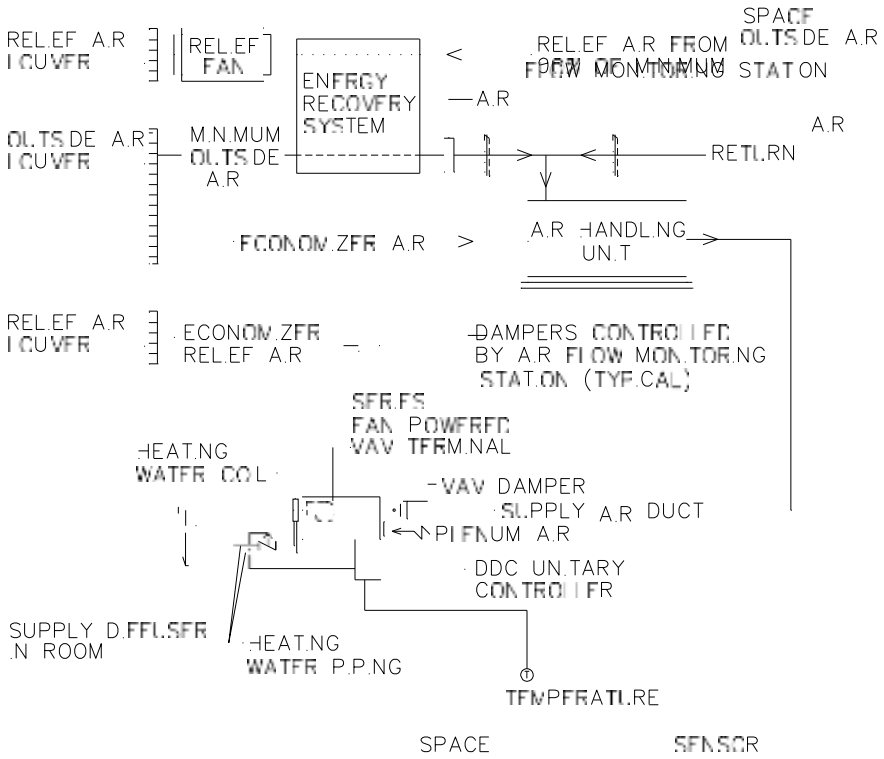
   2. Single Zone Variable Volume Air Handling Units
      a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

D. Ductwork Distribution Systems
   1. Medium/High Pressure Supply Air Ductwork
      a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

   2. Variable Air Volume Fan-Powered Reheat Terminal Units.
      a. Terminal units shall be located above the ceiling and shall control the flow of air to the space based on a space temperature sensor. Terminal units should be located within 2 feet of an accessible ceiling (where ceilings exist) to allow for maintenance.
      b. Each terminal unit shall include a fan and a supply air valve oriented in series. The fans shall operate continuously while the space is in occupied mode.

1.03 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH FAN-POWERED REHEAT TERMINALS (cont'd)

c. On a rise in space temperature, the damper in the terminal unit will open and allow air from the medium/high pressure duct system into the terminal fan. As the space temperature falls, the damper will close to a minimum position as determined by the HVAC Design Professional. The minimum position shall be set to maintain the required ventilation rate in the space. By reducing the amount of air available from the air handling unit, the terminal fan induces more air from the plenum space. The heat generated by lights is used to reheat the supply air. On a continued fall in space temperature, the heating coil control valve at the terminal unit shall be opened to maintain space set point.



Series Fan Powered VAV Schematic
Figure C-1

3. Low Pressure Supply Air Ductwork
   a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

4. Return/Relief Air System for Variable Volume Air Handling Units
   a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

5. Return/Relief Air Systems for Single Zone Constant Volume/Variable Temperature Air Handling Units
   a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

1.03 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH FAN-POWERED REHEAT TERMINALS (cont'd)

E. Ventilation Air Systems

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

F. Exhaust Air Systems

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

G. Supplemental Heat Systems

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

H. Electronic Temperature Control System

1. The building shall be split into different zones according to air systems, exterior exposure, and general occupied schedules. Example: Administration areas shall be a separate zone; classrooms with southern exposure shall be a separate zone from classrooms with northern exposure, etc.

2. Each occupied space in the building shall include space temperature control.

3. Zones shall be placed into occupied/unoccupied mode through the temperature control computer.

4. Variable volume air handling units shall provide air to match a discharge air temperature set point from the temperature control computer. Small, direct-expansion cooling systems shall be controlled from a return air set point in lieu of discharge air set point.

5. Single zone air handling units shall be controlled from a space-mounted temperature sensor. Space-mounted or return air humidity sensors shall be included in the event reheat is included for humidity control of gymnasiums and student dining. A return duct CO_2 sensor shall be provided for large single zone variable occupancy systems utilizing demand ventilation control.

6. Through the temperature control system, it shall be possible to reset the space temperature sensors to a night setback temperature of 55 degrees Fahrenheit for heating to reduce energy consumption.

7. During unoccupied hours, the variable volume terminal fans shall cycle as required to maintain night setback temperatures.

1.03 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH FAN-POWERED REHEAT TERMINALS (cont'd)

8. Dry-Bulb controlled economizer for the building shall be controlled globally from the main temperature control computer. As the dry-bulb temperature of the building return air rises above the dry-bulb temperature of the outside air, the entire building shall be placed into economizer mode. Return air temperature sensors shall be included for each air handling unit. Provide an outside air enthalpy high limit to end the economizer cycle if the outside air enthalpy exceeds the limit set point.

9. Graphic screens shall be included for each air handling unit, boiler plant, cooling plant, VAV terminal unit, and floor plan.

10. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals" for additional temperature control requirements.

1.04 WATER-SOURCE HEAT PUMP SYSTEM

A. Central Heat Rejection System

1. Cooling Tower or Fluid Cooler***: Induced draft (Cross-flow) or Forced draft (Counter-flow)***

a. Cooling towers shall be located at the rear of the building or on the roof. If roof mounting is selected, vibration isolation methods must be utilized. Coordinate final location of cooling tower with any outside air intake louvers. Tower shall be no closer than 30 feet from the nearest intake louver.

b. Cooling towers shall be sized to maintain heat pump condenser water temperatures during a design day with ambient wet-bulb temperatures equal to the 2 1/2 percent design wet-bulb value. This value is different than the Mean Coincident wet-bulb value.

c. Cooling tower water temperatures shall be selected with the heat pump condenser water temperature to obtain maximum efficiency.

d. Capacity reduction methods for cooling towers, such as multiple fans, 2-speed fans, variable frequency drives, inlet dampers, mixing valves, or dump valves, shall be used to maintain tower water temperature during partial load conditions. If a variable frequency drive is used on the cooling tower fan, an interlock wire between the remote disconnect and the VFD shall be installed to shut down the drive if the disconnect is turned off.

e. A remote tank capable of holding the water for the cooling tower system shall be provided below the cooling tower level within a tempered space. If a remote tank is not possible, heat tracing must be provided for all piping exposed to freezing weather and the sump of the cooling tower.

f. The cooling tower water circulation pumps shall be sized to maintain the design water flow through the cooling tower system. All pump components shall be suitable for cooling tower systems.

g. The cooling tower water treatment system shall include a makeup water connection through a back-flow preventer and shall be automatic to prevent scaling, corrosion, and bacterial growth.

1.04 WATER-SOURCE HEAT PUMP SYSTEM (cont'd)

h. The cooling tower water system shall be separated from the heat pump condenser water system by a plate and frame heat exchanger.

2. Hybrid Closed-Loop Geo-thermal borefield

a. A life cycle cost analysis shall be submitted for approval by the Ohio Facilities Construction Commission. The life cycle cost analysis shall include any extra site acquisition costs and a site variance request (if applicable). Life cycle cost shall be compared with AHSRAE 90.1***(most recent as adopted by OBC or USGBC)*** appendix G for the various systems.

b. Borefield shall be a hybrid design, sized to handle the less-dpminant load between heating and cooling. Supplemental heating (boiler) or cooling (tower or fluid cooler) shall be included to handle peak loads above the capability of the borefield. It is not the intent for the system to include both supplemental heating and cooling.

c. Design Professional shall utilize computer simulation sizing software to determine the quantity of bores.

d. Design Professional shall make adequate provisions for freeze protection based on design water temperatures. Propylene glycol should be considered for heating design values below 40°F.

e. Refer to 1.04 Paragraph K for additional guidelines.

B. Central Heat Absorption

1. Heating Water Boilers

a. A minimum of 2 heating water boilers shall be provided.
   1) Gas-fired, forced draft boiler
   2) Gas-fired, atmospheric boiler
   3) Fuel oil boiler
   4) Dual-fuel (fuel oil and gas) boiler
   5) Electric boiler
   6) Gas-fired, High efficient, forced draft boiler

b. A combustion air system for each boiler shall be installed to meet the intent of the code. The HVAC Design Professional must provide a means for preheating the incoming air or maintaining a minimum of 55 degrees Fahrenheit within the boiler room area. Control of the dampers shall be through the direct digital control system and will include dampers and control for the water heater system.

2. Hybrid Closed-loop Geo-thermal borefield

a. A life cycle cost analysis shall be submitted for approval by the Ohio Facilities Construction Commission. The life cycle cost analysis shall include any extra site acquisition costs and a site variance request (if applicable). Life cycle cost shall be compared with AHSRAE 90.1(most recent as adopted by OBC or USGBC) appendix G for the various systems.

b. Borefield shall be sized to handle the less-dominant load between heating and cooling. Supplemental heating (boiler) or cooling (tower or fluid cooler) shall be included to handle peak loads above the capability of the borefield.

1.04 WATER-SOURCE HEAT PUMP SYSTEM (cont'd)

c. Design Professional shall utilize computer simulation sizing software to determine the quantity of bores.

d. Design Professional shall make adequate provisions for freeze protection based on design water temperatures. Propylene glycol should be considered for heating design values below 40°F.

e. Refer to 1.04, Paragraph K for additional guidelines.

3. Total heating capacity shall be approximately 130 percent of the building design load minus the total heat pump heat of compression plus the heat loss of the exterior closed loop fluid cooler (where applicable.)

C. Heat Pump Condenser Water Circulation System

1. Temperature of the heat pump condenser water loop shall range between 60 degrees Fahrenheit and 90 degrees Fahrenheit. An exception to this noted range would be loop temperatures as low as 35 degrees Fahrenheit for ground-source water systems. Below 40 degrees Fahrenheit design water temperature, a glycol solution shall be specified to protect the equipment. Design professional must verify that equipment is designed to and rated for the condenser water loop temperature.

2. Heat shall be introduced to the heat pump condenser water loop using a three-way temperature control valve connection to the supplementary heating loop.

3. The heat pump condenser water distribution system shall make use of a reverse return or direct return piping arrangement. Direct return systems shall use automatic flow controllers for water balancing.

4. A minimum of 2 pumps shall be used for water circulation to the building heat pump condensers. It is recommended to use 2 pumps, each sized ***between 50-75*** percent of the total system flow ***at 100 percent design*** pressure.
   a. A parallel pumping configuration is required.
   b. The heat pump condenser water circulation system shall be capable of a minimum 50 percent flow reduction through the use of two-way control valves, three-way control valves, and constant speed pumps, or by the use of two-way control valves and variable speed pumps.

5. Variable frequency drives should be investigated for energy-saving potential on any heat pump condenser water distribution system with the use of modulating control valves at each heat pump. The HVAC Design Professional shall evaluate "fouling" of the condenser coils due to low flows in the heat pumps as part of the variable speed investigation.

6. Air removal and/or containment methods are required on closed loop applications.
   a. Expansion tanks
   b. Air separators
   c. Air vent

1.04 WATER-SOURCE HEAT PUMP SYSTEM (cont'd)

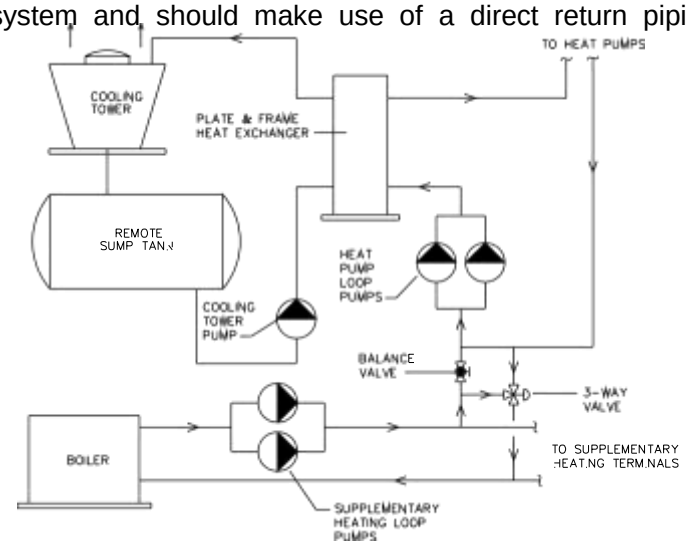
7. Each closed loop system shall be provided with a manual chemical water treatment system to prevent corrosion and scaling in the heat pump condenser water system. A side-flow filtration system will be required for the heat pump tower water loop system and should be located in the boiler room for de-coupled, open tower applications.

D. Supplementary Heating Water Circulation System

1. Supplementary heating water loop shall be designed to provide heat to all supplementary heating units as well as provide backup heat to the heat pump condenser water circulation system.

2. Design water supply temperatures shall 180 degrees Fahrenheit with morning warm-up reset up 20 degrees Fahrenheit to a maximum of 190 degrees Fahrenheit. High efficiency boilers that are rated for condensing may operate at a reduced supply water temperature of 130 degrees Fahrenheit to 160 degrees Fahrenheit.

3. The supplementary heat distribution system is separate from the heat pump condenser water system and should make use of a direct return piping arrangement.



Water Source Heat Pump Schematic

(open tower)

Figure E-1

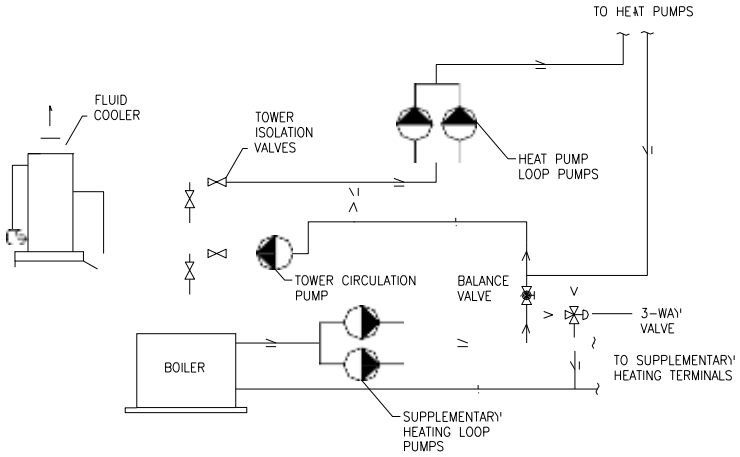
4. A minimum of 2 pumps shall be used for the supplementary water circulation system. It is recommended to use 2 pumps, each sized at 100 percent of the total system flow and pressure up to 300 gallons per minute. For total system flows above 300 gallons per minute or 10 brake horsepower, each pump should be sized for 50 percent of the total flow and 100 percent of the required pressure.
   a. A parallel pumping configuration is required.

5. A separate air removal and/or containment method is required on the supplementary heating water circulation system. ***The HVAC Professional may utilize the expansion tanks for heat pump condenser water circulation system provided that the tanks are sizes for the combined system volume and temperature range.***

1.04 WATER-SOURCE HEAT PUMP SYSTEM (cont'd)

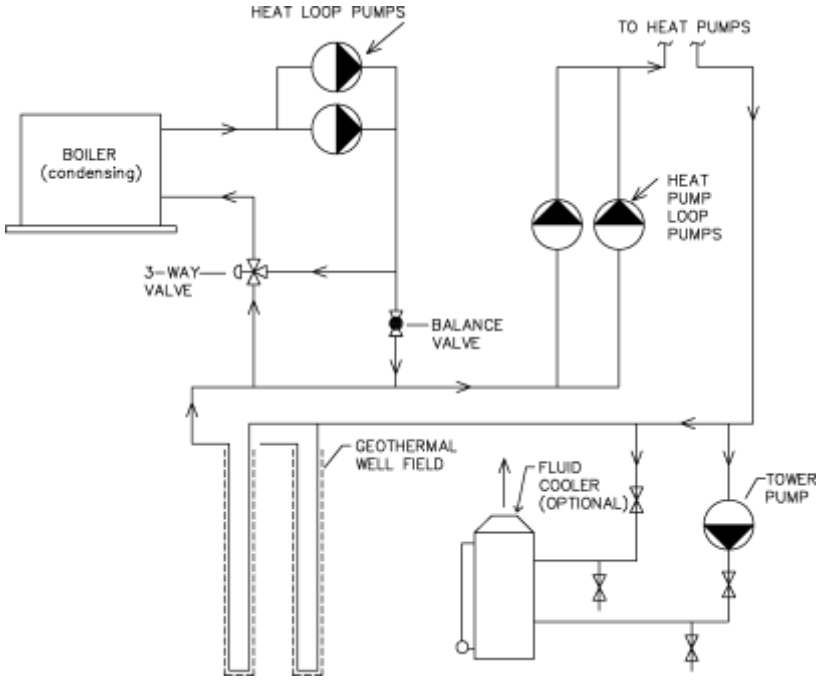
a. Expansion tanks
b. Air separators
c. Air vent

6. Chemical treatment of the supplementary heating water system is not required due to mixing available through the three-way valve connection to the heat pump condenser water distribution system.



Water Source Heat Pump Schematic

(closed circuit fluid cooler)
Figure E-2



Geothermal Heat Pump Schematic

(closed circuit geothermal)
Figure E-3

1.04 WATER-SOURCE HEAT PUMP SYSTEM (cont'd)

E. Ventilation Air System

1. 100 Percent Outside Air Handling Units

a. Locations of air handling units can be dedicated mechanical rooms or mechanical decks. Air handling units may not be located exterior to the building.

b. Each air handling unit shall include the following components as a minimum: supply air fan, cooling coil, heat recovery ***module,*** heating coil, and filters.

c. Ventilation air temperature distributed to the space being served shall have discharge air temperature reset schedule determined by the Design Professional for occupant comfort and energy savings. The unit shall be capable of dehumidification and reheat to maintain ***space absolute humidity below*** 65 grains of moisture per lb of dry air. The reheat shall be provided by an energy recovery method such as Hot Gas Reheat, Sensible Energy Recovery Wheel, or Heat Pipe System. Humidification in the winter is not required.

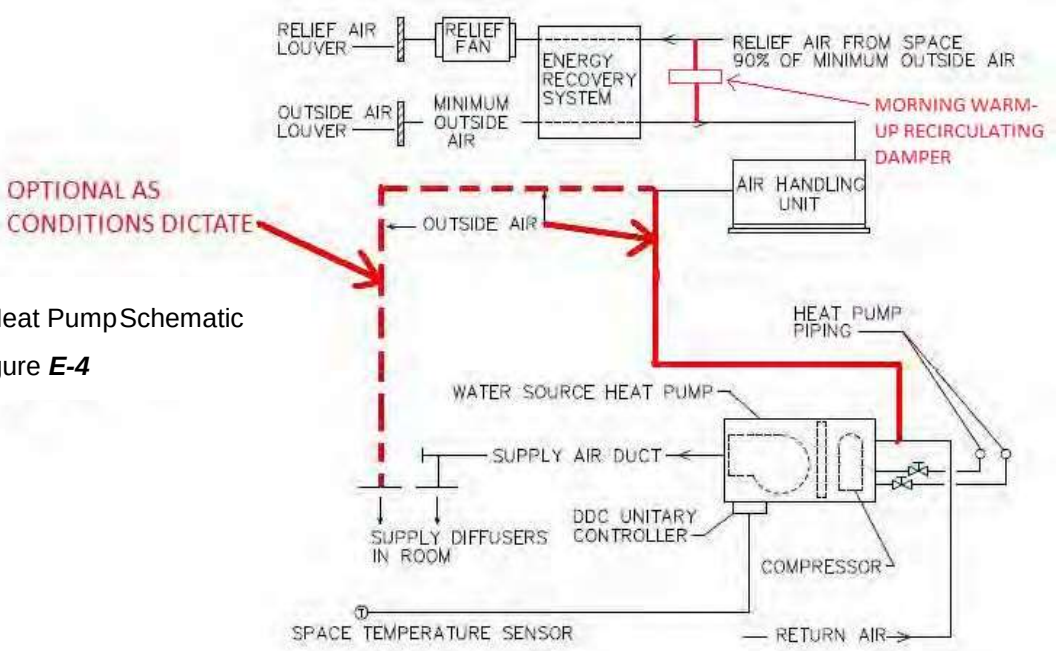
d. Energy recovery methods such as desiccant wheels shall be included to precondition the outside air. The energy recovery method selected by the HVAC Design Professional must include latent heat recovery as well as sensible heat recovery.

e. An outdoor, air-cooled condensing unit piped to a refrigeration coil in each air handling unit will be provided with the equipment or located as near the mechanical unit as possible and shall be controlled through the direct digital control system. Or as part of a packaged, indoor ventilation make-up air unit, the condenser may be water cooled and the unit may have an integral hot gas reheat coil.

f. The ventilation unit is to dehumidify the ventilation air to the level indicated in item c., above. Ventilation air dehumidification is not to be handled at the terminal heat pump level.

g. A return/recirculation damper shall be located in the air handler to allow unit operation during morning warm-up/cool-down. Unit shall revert back to 100 percent outside air operation when building enters occupied mode.

1.04 WATER-SOURCE HEAT PUMP SYSTEM (cont'd)



Water Source Heat Pump Schematic

Figure ***E-4***

2. Dual Technology 100 Percent Outside Air Handling Units
   a. Unit shall be configured similar to that described in a. above. However, shall incorporate both a total enthalpy energy wheel and a desiccant dehumidification wheel. The capacity of the Desiccant wheel shall be controlled by either space or return air humidistat modulating face and by-pass dampers at the desiccant wheel.
   b. Desiccant regeneration air shall be pulled from the exhaust air stream and shall be heated by gas or electric source.

F. Ductwork Distribution Systems
   1. Ventilation Air Ductwork
      a. Ventilation air is distributed from the air handling units to the classroom via a low pressure ductwork system. The maximum air velocity in this part of the ductwork system should be 1,200 feet per minute. ***Design Professional may consider Medium Pressure ductwork with cooling-only variable volume terminal units when Demand Control Ventilation strategies are incorporated. Reference "Central Plant Variable Volume System with Hot Water Reheat Terminals."***
      b. Ventilation air ductwork ***shall be introduced either directly to the space or to the return air path of the terminal heat pump.*** Do not introduce ventilation air directly to plenum space above the ceiling. In some cases, ventilation must be connected directly to the space being served (i.e. ventilation airflow required higher than terminal airflow required). The control sequence for building operation shall require the startup of all heat pump fans prior to the startup of the main ventilation fans for prevention of reverse fan operation of the heat pump units.

1.04 WATER-SOURCE HEAT PUMP SYSTEM (cont'd)

2. Classroom Water-Source Heat Pumps
   a. Heat pumps shall be located above accessible corridor ceilings, arranged together on a mechanical deck or other appropriate locations to minimize noise. Units will not be permitted over the classroom ceilings due to difficulty in servicing and associated noise. Refer to LEED for Schools noise requirements.
   b. Heat pumps shall be sized as required to maintain temperature throughout the space. Condenser water temperature will affect the selections of other equipment and should be coordinated by the HVAC Design Professional.
   c. Heat pump supply fans shall run continuously during occupied hours.
   d. Condensate piping shall be routed from each heat pump to an acceptable discharge location such as a custodial sink, floor drain, or exterior to the building. Condensate piping located within the plenum shall be suitable for plenum use. ***Design Professional shall consider condensate reclaim as prescribed in ASHRAE Standard 189.1 for systems greater than 65,000 Btu/h.***

3. Activity Spaces
   a. Spaces such as gymnasiums, student dining, and media centers shall be conditioned using heat pump units. These units will require placement on an adjacent mechanical deck.
   b. Heat pumps shall be sized as required to maintain temperature throughout the space.
   c. Heat pump supply fans shall run continuously during occupied hours.
   d. Condensate piping shall be routed from each heat pump to an open site floor drain located on the mechanical deck.

4. Low Pressure Duct Distribution System
   a. Air is distributed from the heat pump units to air devices located throughout the space via a low pressure ductwork system. The maximum air velocity in this part of the ductwork system should be 1,200 feet per minute.
   b. Supply air ductwork connections to ceiling-mounted air devices should be completed with flexible ductwork.
   c. Air devices should be ceiling mounted, wherever possible, to prevent damage by students. If spaces do not include ceilings, the air devices should be wall- or duct-mounted out of the reach of students.
   d. Each low pressure duct leading to an air device should include a manual volume damper to balance the system.

5. Return/Relief Air System
   a. The return air plenum for a water source heat pump system is the space between the ceiling and structure of the building. All materials inside the plenum area should be rated for this type of application to reduce smoke and fire potential.
   b. Return air is routed into the plenum through return grilles in the ceiling. Return air is induced from the plenum by the supply fan of the individual heat pumps.

1.04 WATER-SOURCE HEAT PUMP SYSTEM (cont'd)

c. Relief air is pulled back to the mechanical room by the relief air fan and exits the building through an energy recovery system. Roof-mounted gravity relief ventilators, or exterior, wall-mounted louvers with backdraft dampers should be used as exit points for the relief air.

d. The relief air fan should be sized to maintain a slight positive pressure in the space.

G. Exhaust Systems

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

2. Exhaust rates for Art Room, Science Labs and Life Skills Lab shall be established at 125 percent of the primary supply air rate for the space, but not less than required by state and local building codes. Adjustments shall be incorporated into the sequences of operation to decrease relief air whenever the local space exhaust is energized.

H. Supplemental Heat Systems

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

I. Electronic Temperature Control System

1. The building shall be split into different zones according to exterior exposure and general occupied schedules. For example: Administration areas shall be a separate zone; classrooms with southern exposure shall be a separate zone from classrooms with northern exposure, etc.

2. Each occupied space in the building shall include space temperature control.

3. Zones shall be placed into occupied/unoccupied mode by the temperature control computer.

4. Through the temperature control system, it shall be possible to reset the space temperature sensors to a night setback temperature of 55 degrees Fahrenheit to reduce energy consumption for heating applications.

5. During unoccupied hours, all heat pump units shall cycle as required to maintain night setback temperatures.

6. Graphic screens shall be included for each ventilation air handling unit, boiler plant, cooling tower, circulation pumps, heat exchanger, heat pump terminal unit, and floor plan.

7. The supplementary heating water pumping system shall be enabled when ambient temperatures are below system set points; for example, 40 degrees Fahrenheit during unoccupied hours and 55 to 70 degrees Fahrenheit during occupied hours. Engineer is to determine the occupied setpoint based on thermal balance. Boilers shall maintain water temperature while the pumping system is enabled.

1.04 WATER-SOURCE HEAT PUMP SYSTEM (cont'd)

8. The heat pump water circulation system shall be enabled continuously during occupied hours and when any heat pump is operational during unoccupied hours.

9. All heat pumps shall be controlled to cycle during unoccupied hours in order to prevent space relative humidity in excess of 65 percent.

J. Kitchen Supply and Exhaust System:

1. Make-up air shall be supplied by an air handling system or dedicated makeup air unit. Air handling unit shall be located as close to the kitchen as possible. Location of the unit shall be in a dedicated mechanical room or mechanical deck with exception that a dedicated gas-fired makeup air unit is permitted to be installed on the roof of the kitchen, for compensation of the kitchen hood exhaust system.

2. Air handling systems serving the kitchen area shall serve areas directly related to kitchen and dining functions, and shall not serve other spaces such as classrooms or administrative areas. Serving an office which is part of the kitchen operation is acceptable.

3. Refer to Paragraph 8430.1.02.f.4 e and f for kitchen hood and dishwasher exhaust systems. System design shall comply with the Ohio Mechanical Code.

4. Commercial kitchen Type I and Type II hood systems larger than 5,000 cfm shall have variable-speed control for exhaust and makeup air fans to reduce hood airflow rates at least 50 percent during those times when cooking appliances are up to temperature in a standby, ready to cook mode.

K. Closed-Loop Geothermal Well Piping System:

1. System must be validated by a life cycle cost energy model and project budget before proceeding with this type of system.

2. Design shall be in conformance with current Closed-Loop/Geothermal Heat Pump Standard from IGSHPA (International Ground Source Heat Pump Association).

3. Project shall have a minimum of two (2) test wells completed to evaluate geological conditions, thermal conductivity and thermal diffusivity in the well field during design. Testing shall comply with IGSHPA standard 1B "Design Method and Compliance" current edition with a written report.

4. All HDPE piping materials and heat-fused materials shall be manufactured from a virgin polyethylene extrusion compound material in accordance with ASTM-2513, Sections 4.1 and 4.2. Pipe shall be manufactured to outside diameters, wall thickness, and respective tolerances as specified in ASTM D-3035 or D-2447. Bore hole piping shall be a minimum of SDR11. U-Bend shall be closely evaluated during design and be constructed of heavy wall SDR9 minimum.

1.04 WATER-SOURCE HEAT PUMP SYSTEM (cont'd)

5. All connections shall be made using heat fusion in compliance with IGSHPA standard 1D "Pipe Joining Methods". Piping must be pressure tested before it is installed in the well.

6. Pressure grout the entire well using a pressure pump and tremie pipe, working from the bottom up. Grout material shall be thermally enhanced bentonite grout with a thermal conductivity value of 1.0.

7. Designer should evaluate if glycol is required for the design during the winter months.

8. Design shall comply with all EPA requirements and standards.

9. System shall be flushed and cleaned per OSDM section 23 25 00 HVAC Water Treatment. Piping shall remain capped during installation to prevent debris from entering the piping.

10. Geothermal field shall have electronic pipe markers. Electronic pipe markers shall be 4" diameter high-density polyethylene sphere type marker. A marker locator shall be provided with the electronic pipe markers and shall be capable of sensing the pipe markers up to minimum five feet underground. The mark locator shall include an electronics package and lightweight hand held probe. All horizontal geothermal piping shall have line marker tape with a tracer wire.

1.05 SUPPLEMENTAL COOLING SYSTEMS

A. General – Supplemental cooling systems are for dedicated loads that require cooling outside the general requirements of the building in general, and thus impractical to be included as part of the central main cooling systems. Further, these loads are generally small and cooling is required year-around. These loads are best handled using direct expansion (Dx) systems.

B. System Design:
   1. Systems shall be dedicated to the load served and be controlled by its own thermostat.

   2. The unit shall be located indoors with exception that the condensing unit or condenser may be outdoors. Packaged indoor units with supply and exhaust air directed outdoors is also acceptable.

   3. Units shall not be located over electronic equipment, or computers, or as prohibited by the Code.

C. Applications:
   1. Main Control/Equipment Room.
   2. Elevator equipment room.
   3. Remote offices – if an office is located in an otherwise un-air-conditioned part of the building such as an office in the area of the locker rooms, or a maintenance office adjacent to the boiler room.
   4. Administration areas.

1.05 SUPPLEMENTAL COOLING SYSTEMS (cont'd)

D. Design Requirements and Limitations:

1. Systems shall have low ambient operation to ***0*** deg. F or be provided with a full, outside air economizer.

2. Units serving widely varying loads shall have hot gas bypass and a head pressure control system.

3. Suction and hot gas lines shall be insulated on all piping exterior to the unit.

4. Liquid lines shall be insulated if they run through attics or other areas where the ambient temperature may elevate above the outdoor temperature.

5. Administrative Area – The main administrative area of a school which is determined to have significantly different operating hours than the remainder of the school shall be permitted to have a Dx cooling system in lieu of being served by the central chilled water plant. All of the following criteria must be met:
   a. The design day cooling load of the administrative unit (zone) is less than 10% of the total building cooling load.
   b. The administration area can be served by one air handling unit.
   c. The total cooling capacity of the unit does not exceed 15 tons (180 MBH).
   d. The central chiller water plant is not intended to run in the summer (except for unoccupied operation and humidity control).

1.06 CENTRAL PLANT WITH UNDERFLOOR AIR VENTILATION SYSTEMS

A. Central Heating Plant

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

B. Central Cooling Plant

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

C. Air Systems

1. Variable Volume Air Handling Units
   a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"
   b. Air handling system design for underfloor air distributions shall follow the recommendations as outlined in the Underfloor Air Distribution (UFAD) Design Guide (RP-1064) published by ASHRAE. Air handling system design for displacement ventilation systems shall follow the recommendations as outlined in the System Performance Evaluation and Design Guidelines for Displacement Ventilation (RP-949) published by ASHRAE.

1.06 CENTRAL PLANT WITH UNDERFLOOR AIR VENTILATION SYSTEMS (cont'd)

2. Single Zone Variable Volume Air Handling Units
   a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"
   b. Air handling system design for underfloor air distributions shall follow the recommendations as outlined in the Underfloor Air Distribution (UFAD) Design Guide (RP-1064) published by ASHRAE. Air handling system design for displacement ventilation systems shall follow the recommendations as outlined in the System Performance Evaluation and Design Guidelines for Displacement Ventilation (RP-949) published by ASHRAE.

D. Ductwork Distribution Systems

1. Medium/High Pressure Supply Air Ductwork
   a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

2. UFAD Exterior Zone Variable Air Volume Fan-Powered Reheat Terminal Units.
   a. Terminal units shall be located below the raised floor and shall control the flow of air to the space based on a space temperature sensor. Terminal units should be located for easy access to allow for maintenance.

   b. Each terminal unit shall include a fan and a supply air valve oriented in series. The fans shall operate continuously while the space is in heating mode. Refer to Figure I-2.

   c. On a fall in space temperature, the damper in the terminal unit will open and allow air from above the raised floor into the terminal fan. On a continued fall in space temperature, the heating coil control valve at the terminal unit shall be opened to maintain space set point.

3. Low Pressure Supply Air Ductwork
   a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

4. Return/Relief Air System for Variable Volume Air Handling Units
   a. Reference • Central Plant Variable Air Volume System with Hot Water Reheat Terminals •

5. Return/Relief Air Systems for Single Zone Constant Volume/Variable Temperature Air Handling Units
   a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

6. Air Distribution Devices
   a. Underfloor Air Systems – the Design Professional shall determine the final system design relating to either use active damper controlled or passive air distribution devices. If passive devices are selected the plenum pressure controls dampers shall be zoned to provide satisfactory space temperature control by controlling the plenum pressure.

1.06 CENTRAL PLANT WITH UNDERFLOOR AIR VENTILATION SYSTEMS (cont'd)

b. On a fall in space temperature, the zone pressure control damper pressure set point shall be reset downward. On a rise in space temperature the pressure control set point shall be increased.

E. Ventilation Air Systems

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

F. Exhaust Air Systems

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

G. Supplemental Heat Systems

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

H. Electronic Temperature Control System

1. The building shall be split into different zones according to air systems, exterior exposure, and general occupied schedules. Example: Administration area shall be a separate zone; classrooms with southern exposure shall be a separate zone from classrooms with northern exposure, etc.

2. Each occupied space in the building shall include space temperature control.

3. Zones shall be placed into occupied/unoccupied mode through the temperature control computer.

4. Variable volume air handling units shall provide air to match a discharge air temperature set point from the temperature control computer. Small, direct-expansion cooling systems shall be controlled from a return air set point in lieu of discharge air set point.

5. Single zone air handling units shall be controlled from a space-mounted temperature sensor. Space-mounted or return air humidity sensors shall be included in the event reheat is included for humidity control of gymnasiums and student dining. A return duct CO2 sensor shall be provided for large single zone variable occupancy systems utilizing demand ventilation control.

6. Through the temperature control system, it shall be possible to reset the space temperature sensors to a night setback temperature of 55 degrees Fahrenheit for heating to reduce energy consumption.

7. During unoccupied hours, the UFAD terminal fans shall cycle as required to maintain night setback temperatures.

1.06 CENTRAL PLANT WITH UNDERFLOOR AIR VENTILATION SYSTEMS (cont'd)

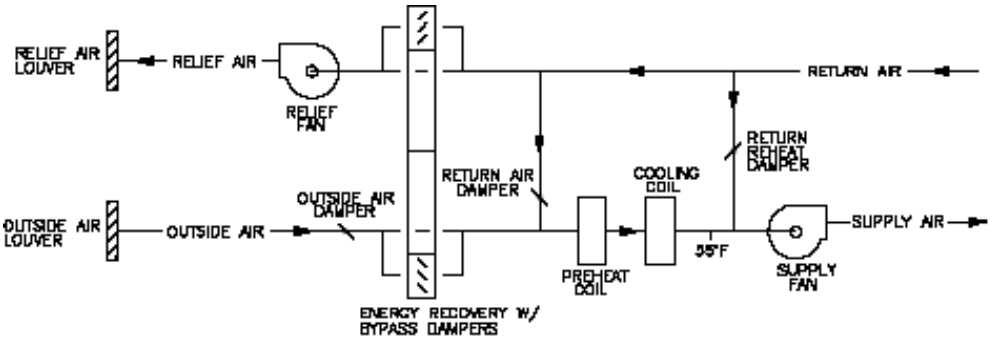


FIGURE I–1

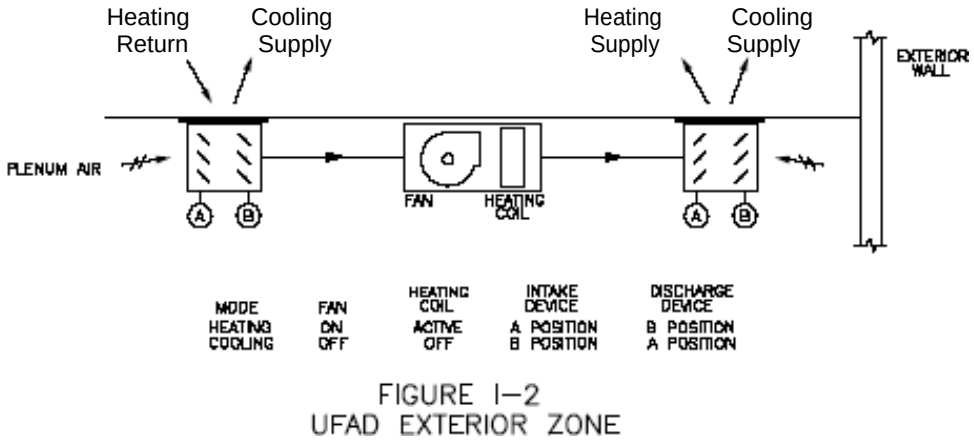


FIGURE I–2
UFAD EXTERIOR ZONE

1.07 CENTRAL PLANT WITH DISPLACEMENT VENTILATION SYSTEMS

A. Central Heating Plant

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

B. Central Cooling Plant

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

C. Air Systems

1. Variable Volume Air Handling Units
   a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

1.07 CENTRAL PLANT WITH DISPLACEMENT VENTILATION SYSTEMS (cont'd)

2. Single Zone Variable Volume Air Handling Units
   a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

D. Ductwork Distribution Systems

1. Medium/High Pressure Supply Air Ductwork
   a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

2. Variable Air Volume Reheat Terminal Units
   a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

3. Low Pressure Supply Air Ductwork
   a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

4. Return/Relief Air System for Variable Volume Air Handling Units
   a. Reference • Central Plant Variable Air Volume System with Hot Water Reheat Terminals •

5. Return/Relief Air Systems for Single Zone Constant Volume/Variable Temperature Air Handling Units
   a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

6. Air Distribution Devices
   a. Displacement Ventilation devices shall be specifically designed and tested by the manufacturer for the application. Design professional shall provide a space air distribution analysis as part of the design to assure the devices are located properly.

c. When a displacement ventilation system serves a space with an exterior wall a supplemental heating system shall be provided at the exterior wall.

E. Ventilation Air Systems

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

F. Exhaust Air Systems

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

G. Supplemental Heat Systems
1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals"

1.07 CENTRAL PLANT WITH DISPLACEMENT VENTILATION SYSTEMS (cont'd)

H. Electronic Temperature Control System

1. The building shall be split into different zones according to air systems, exterior exposure, and general occupied schedules. Example: Administration area shall be a separate zone; classrooms with southern exposure shall be a separate zone from classrooms with northern exposure, etc.

2. Each occupied space in the building shall include space temperature control.

3. Zones shall be placed into occupied/unoccupied mode through the temperature control computer.

4. Variable volume air handling units shall provide air to match a discharge air temperature set point from the temperature control computer. Small, direct-expansion cooling systems shall be controlled from a return air set point in lieu of discharge air set point.

5. Single zone air handling units shall be controlled from a space-mounted temperature sensor. Space-mounted or return air humidity sensors shall be included in the event reheat is included for humidity control of gymnasiums and student dining. A return duct CO2 sensor shall be provided for large single zone variable occupancy systems utilizing demand ventilation control.

6. Through the temperature control system, it shall be possible to reset the space temperature sensors to a night setback temperature of 55 degrees Fahrenheit for heating to reduce energy consumption.

7. During unoccupied hours, the air handling unit shall cycle as required to maintain night setback temperatures.

1.08 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH DUAL-DUCT VAIRABLE VOLUME TERMINALS

A. Central Heating Plant

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals."

B. Central Cooling Plant

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals."

C. Air Systems

1. Variable Air Volume Air Handling Units

a. This system requires the use of blow-thru heating and cooling air handling units. Air handling units should be located strategically throughout the building to distribute cooling air and heating air to terminal units. Locations of air handling units can be dedicated mechanical rooms or mechanical decks. Air handling units may not be located exterior to the building.

1.08 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH DUAL-DUCT VAIRABLE VOLUME TERMINALS (cont'd))

b. Each air handling unit shall include the following components as a minimum: supply air fan, cooling coil, heating coil, and filters.

c. Supply air temperature distributed to the terminal units shall be designed for a cold duct temperature of 55 degrees Fahrenheit and a hot duct temperature of 95 degrees Fahrenheit or as required by the computer-generated building load output data.

d. Each air handling unit shall include a variable frequency drive for the fan motor to adjust the air volume available to the system.

e. Energy recovery methods such as desiccant wheels shall be included to precondition the outside air. The energy recovery method selected by the HVAC Design Professional must include latent heat recovery, as well as sensible heat recovery.

f. The air handling unit shall provide ventilation air for the building.

g. Variable air volume systems should be investigated for classrooms, media centers, gymnasiums, student dining, auditerias, and food service, music, and administration areas.

h. Variable air volume systems shall include air flow monitoring systems to maintain the minimum outside air flow requirements as set forth in the Ohio Building Code, Mechanical Code, and ASHRAE Standard 62.1 during occupied hours at all volumes of supply air.

D. Ductwork Distribution Systems

1. Medium/High Pressure Supply Air Ductwork

a. Reference "Central Plant Variable air Volume System with Hot Water Reheat Terminals."

2. Dual-Duct Variable Volume Terminal Units

a. Terminal units shall be located above the ceiling and shall control the flow of air to the space based on a space temperature sensor. Terminal units should be located within 2 feet of an accessible ceiling (where ceilings exist) to allow for maintenance.

b. On a rise in space temperature, the cooling damper in the terminal unit will open and allow air from the cold duct systems into the space. As the space temperature falls, the cooling damper will close to a minimum position as determined by the HVAC Design Professional. The minimum position shall be set to maintain the required ventilation rate to the space. On a continued fall in space temperature, the heating damper shall be modulated open for a blended, final air condition to maintain space set point.

3. Low Pressure Supply Air Ductwork

a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals."

4. Return/Relief Air System for Variable Volume Air Handling Units

a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals."

1.08 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH DUAL-DUCT VAIRABLE VOLUME TERMINALS (cont'd))

E. Ventilation Air Systems

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals."

2. Ventilation for the building will be provided through the cooling air handling unit.

F. Exhaust Air Systems

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals."

G. Supplemental Heat Systems

1. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals."

H. Electronic Temperature Control System

1. The building shall be split into different zones according to air system, exterior exposure, and general occupied schedules. Example: Administration areas shall be a separate zone; classrooms with southern exposure shall be a separate zone from classroom with northern exposure, etc.

2. Each occupied space in the building shall include space temperature control.

3. Zones shall be placed into occupied/unoccupied mode through the temperature control computer.

4. Cooling and heating variable volume air handling units shall provide air to match a discharge air temperature set point from the temperature control computer. Small, direct-expansion cooling systems shall be controlled from a return air set point in lieu of discharge air set point.

5. Through the temperature control system, it shall be possible to reset the space temperature sensors to a night setback temperature of 55 degrees Fahrenheit for heating to reduce energy consumption.

6. During unoccupied hours, the heating site handling units shall cycle as required to maintain night setback temperatures.

7. Enthalpy economizer control for the building shall be controlled globally from the main temperature control computer. As the enthalpy of the building return air rises above the enthalpy of outside air, the entire building shall be placed into economizer mode as a part of the cooling air handling units. Return air sensors shall be included for each air handling unit.

1.08 CENTRAL PLANT VARIABLE AIR VOLUME SYSTEM WITH DUAL-DUCT VAIRABLE VOLUME TERMINALS (cont'd))

8. Graphic screens shall be included for each air handling unit, boiler plant, cooling plant, and dual-duct, variable air volume terminal unit.

9. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals" for additional temperature control requirements.

1.09 SYSTEMS FOR SMALL ADDITIONS TO EXISTING BUILDINGS

A. General – The intent of this section is to set forth criteria for small building additions to existing schools that are being renovated. Building additions of 8,000 square feet and smaller may use the systems described in this section. Additions larger shall follow the criteria of the pre-approved main systems listed in this section or as proposed per section 8410-D.

B. Fan Coil Systems

1. Fan Coil Units shall be four pipe hot, chilled water units with separate heating and cooling coils and DDC electronic controls.

2. Central Heating Plant
Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals" of this section.

3. Central Cooling Plant

   a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals" of this section.

4. Ventilation Air System

   a. The system shall have a dedicated 100% outside air ventilation system following the guidelines of this section "Water Source Heat Pump System", subparagraph 5, Ventilation Air System.

5. Ductwork Distribution Systems

   a. Shall follow section "Water Source Heat Pump System", subparagraph 6. Ductwork Distribution System.

6. Other systems required to complete the project such as kitchens, etc. shall follow the applicable requirements of this section.

7. Fan Coil System Temperature Control
   a. Each occupied space in the building shall include space temperature control.
   b. Zones shall be placed into occupied/unoccupied mode by the temperature control computer via schedule or over-ride at the graphic screen or zone thermostat push-button.

1.09 SYSTEMS FOR SMALL ADDITIONS TO EXISTING BUILDINGS (cont'd)

c. The temperature control system shall reset the space temperature sensors to a night setback temperature of 55 degrees Fahrenheit. During unoccupied hours, fan coil units shall cycle as required to maintain night setback temperatures.

d. Graphic screens shall be included for each fan coil unit, in addition to the screens for the boiler plant, chiller plant, circulation pumps and other HVAC primary components.

e. Fan coil units shall be controlled to cycle during unoccupied hours in order to maintain space relative humidity in the range of 60% to 65% RH.

C. Unit Ventilator Systems

1. Unit ventilators shall be four pipe hot and chilled water units with individual heating and cooling coils. Units shall have face and bypass dampers for capacity control and outside and return air dampers for economizer control.

2. Units shall be equipped with DDC electronic controls, including hot and chilled water valves, actuators for the F&B dampers and economizer. A variable speed controller shall be provided to vary the speed on the supply fan. The unit sequence of operation shall be VAV single zone. The ventilation air shall be controlled by a return air CO_2 sensor to provide a demand control ventilation sequence.

3. Central Heating Plant
   a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals" of this section.

4. Central Chilled Water Plant
   a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals" of this section.

5. Other systems required to complete the project such as kitchens, etc. shall follow applicable requirements of this section.

6. Unit Ventilator Temperature Controls
   a. Units shall be a single zone VAV unit with modulating fan speed, economizer, face and bypass dampers, a heating coil and serpentine cooling coil.
   b. Start-Stop – optimal start, morning warm-up and cool down shall be provided thru the digital control system.
   c. Minimum outside air shall be under control of a demand control ventilation sequence to maintain the CO_2 level in the room to less than 700 ppm above outside air condition.
   d. A zone (one sensor for each room) humidity sensor shall override the system off mode if the humidity in the space is greater than 60% RH for more than 8 hours.
   e. The fan speed, economizer, face and bypass dampers, heating, cooling coil valves and dehumidification mode shall be controlled in sequence from a room-temperature and humidity sensor and unit mounted CO_2 sensor.

1.09 SYSTEMS FOR SMALL ADDITIONS TO EXISTING BUILDINGS (cont'd)

f. Economizer shall be enabled when the outside air temperature is below 65 degrees F. and the outside air enthalpy is below 30 BTU/LB.

1.10 RECOGNIZED HVAC SYSTEMS REQUIRING SUBMISSION FOR VARIANCE APPROVAL

A. Alternate HVAC systems not specifically identified in this manual may be considered for inclusion in the building design though a Design Manual Variance Request. Systems identified in this section have been approved on a case-by-case basis with other districts.

B. Active Chilled Beams

1. Central Heating Plant

a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals."

2. Central Cooling Plant

a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals."

3. Chilled Beam Cooling Water

a. Design water supply temperatures shall be maintained one to two degrees Fahrenheit above the ambient dew point of the building to prevent condensation from developing on the chilled beam coils. This will typically be between 58 degrees Fahrenheit and 60 degrees Fahrenheit.

b. Design Professional shall determine the strategy to deliver chilled water that is maintained above the ambient dew point. Use of chilled water return as supply piping to chilled beams is not acceptable; return water temperature cannot be maintained above ambient dew point. Potential strategies may be investigated within the allocated funding:

1) Dedicated chiller

2) Heat exchanger

3) Three-way mixing valve with the Chilled Water system

c. Design water temperature rise in the chilled beam distribution shall be determined by the Design Professional.

d. Water distribution hall make use of a revers return or direct return piping arrangement.

e. A single pump shall be used for water circulation to the chilled beams. Direct return systems shall use flow controllers for water balancing.

f. The chilled beam distribution water shall be capable of a minimum 50 percent flow reduction through the use of two-way control valves, three-way control valves and variable speed pumps.

1.10 RECOGNIZED HVAC SYSTEMS REQUIRING SUBMISSION FOR VARIANCE APPROVAL (cont'd)

g. Air removal and/or containment methods are required on closed loop applications.
1) Expansion tanks
2) Air separator
3) Air vent
h. Each closed loop system shall be provided with a water treatment system to prevent corrosion and scaling in the distribution system.

4. Ventilation Air Systems
a. Reference "Water Heat Pump System."

5. Ductwork Distribution Systems
a. Ventilation air is distributed from the air handling units to the active chilled beams via a low pressure ductwork system. The maximum air velocity in this part of the ductwork system should be 1,200 feet per minute.
b. Supply air ductwork connections to chilled beams should be completed with flexible ductwork.
c. Each low pressure duct leading to a chilled beam should include a manual damper to balance the system.

6. Exhaust Air Systems
a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals."
b. Exhaust rates for Art Room, Science Lab and Life Skills Lab shall be established at 125vpercent of the primary supply air rate for the space, but not less than required by state and local building codes. Adjustments incorporated into the sequences of operation to decrease relief air whenever the local space exhaust is energized.

7. Supplemental Heat Systems
a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals."

8. Electronic Temperature Control Systems
a. The building shall be split into different zones according to air systems, exterior exposure and general occupied schedules.
b. Each occupied space in the building shall include space temperature control.
c. Zones shall be placed into occupied/unoccupied mode through the temperature control computer.
d. Through the temperature control system, it shall be possible to reset the space temperature sensors to a night setback temperature of 55 degrees Fahrenheit for heating and 85 degrees Fahrenheit for cooling to reduce energy consumption.
e. During unoccupied hours, air handling units shall cycle only as required to maintain night setback temperatures.

1.10 RECOGNIZED HVAC SYSTEMS REQUIRING SUBMISSION FOR VARIANCE APPROVAL (cont'd)

f. Graphic screens shall be included for each air handling unit, boiler plant, cooling plant, chilled beam zones and floor plan.

g. The heating water pumping system shall be enabled when ambient temperatures drop below 50 degrees Fahrenheit during unoccupied hours and 55 to 70 degrees Fahrenheit during occupied hours. Design Professional shall determine the occupied setpoint based on thermal balance. Boilers shall maintain water temperature while the pumping system is enabled. It is recommended with multiple boiler arrangements that a flow-measuring device is used in conjunction with supply and return temperature sensors to calculate system BTU/hr required and to then stage the boilers accordingly.

h. The chilled water pumping system shall be enabled when ambient temperatures rise above 50 degrees Fahrenheit during occupied hours or when the building relative humidity rises above 60 percent. Chillers shall maintain water temperature while the pumping system is enabled. Systems will shut down during unoccupied hours when the relative humidity falls below 60 percent.

i. The chilled beam water pumping system shall be enabled when ambient temperatures rise above 50 degrees Fahrenheit during occupied hours.

j. The temperature control system shall prevent the return water temperature from dropping below the required temperature allowable at the boilers.

k. All air handling units shall be controlled to cycle during unoccupied hors in order to prevent space relative humidity in excess of 60 percent. Systems will shut own when the relative humidity falls below 55 percent. 100% Outside Air Units shall include recirculation dampers for operation during unoccupied hours without the need to open outside air dampers.

C. Variable Refrigerant Flow/Variable Refrigerant Volume

1. Variable Refrigerant Flow (VRF) is an air-conditioning system configuration where one outdoor heat pump condensing unit is connected to multiple indoor evaporator fan coil units.

a. VRF systems should be located strategically throughout the building and zoned to handle areas with similar occupancy schedules.

b. Outdoor units should be selected with a capacity of not less than 125% of the connected indoor unit capacity.

c. Design Professional shall investigate whether VRF systems should include heat recovery to allow independent temperature zones to be in heating or cooling mode while the outdoor unit responds to the dominant load of the overall zone. It is recommended to include heat recovery unless all temperature zones within the system have a similar internal load profile and envelope exposure (i.e. all north facing classrooms.)

1.10 RECOGNIZED HVAC SYSTEMS REQUIRING SUBMISSION FOR VARIANCE APPROVAL (cont'd)

1) For systems without heat recovery, the automatic switchover time from heating to cooling of the outdoor unit shall not exceed 30 minutes.

d. Refrigerant piping should be extended from outdoor unit to all indoor units. Design Professional shall consult manufacturer requirements for maximum length of refrigerant circuit and minimum length before first branch take-off.

2. Ventilation Air Systems

a. Reference "Water Heat Pump System."

3. Classroom Fan Coil Units

a. Fan coils shall be located above accessible corridor ceiling, arranged together on a mechanical deck or other appropriate locations. Units will not be permitted over classroom ceilings due to difficulty servicing while school is operating. Ceiling cassette units are not acceptable.

b. Fan coils shall be sized as required to maintain temperature throughout the space. Fan coils are not intended to handle latent or sensible loads from ventilation air system.

c. Fan coil fans shall run continuously during occupied hours

d. Condensate piping hall be routed from each fan coil to an acceptable discharge location such as a custodial sink, floor drain or exterior to the building. Design Professional shall consider condensate reclaim as prescribed in ASHRAE Standard 189.1 for systems greater than 65,000 Btu/h. Condensate piping located within the plenum shall be suitable for plenum use.

4. Ductwork Distribution Systems

a. Ventilation Air Ductwork

1) Ventilation air shall be distributed from the air handling units to the classroom via a low pressure ductwork system. The maximum air velocity in this part of the ductwork should be 1,200 feet per minute.

2) Ventilation air ductwork shall be introduced with directly to the space or to the return air path of the terminal fan coil. Do not introduce ventilation air directly to the plenum space above the ceiling. In some cases, ventilation must be connected directly to the space being served (i.e. ventilation airflow required higher that terminal airflow required.)

b. Low Pressure Duct Distribution System

1) Air is distributed from the fan coil units to air devices located throughout the space via a low pressure ductwork system The maximum air velocity in this part of the ductwork system should not exceed 1,200 feet per minute.

2) Supply air ductwork connections to ceiling-mounted air devices should be completed with flexible ductwork.

1.10 RECOGNIZED HVAC SYSTEMS REQUIRING SUBMISSION FOR VARIANCE APPROVAL (cont'd)

3) Air devices should be ceiling mounted, wherever possible, to prevent damage by students. If spaces do not include ceiling, the air devices should be wall- or duct-mounted out of reach of students.

4) Each low pressure duct leading to an air device should include a manual volume damper to balance the system.

c. Return/Relief Air System

1) The return air plenum for the indoor fan coils is the space between the ceiling and the structure of the building. All materials inside the plenum areas should be rated forthis type of application to reduce smoke and fire potential.

2) Return air is routed into the plenum through return grilles in the ceiling. Return air is induced from the plenum by the supply fan of the individual fan coil.

3) Relief air is pulled back to the mechanical room by the relief air fan and exits the building through an energy recovery system. Roof-mounted gravity relief ventilators or exterior, wall-mounted louvers with backdraft dampers should be used as exit points for the relief air.

4) The relief air fan should be sized to maintain a slight positive pressure in the space.

5. Exhaust Air Systems

a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals."

b. Exhaust rates for Art Room, Science Lab and Life Skills Lab shall be established at 125 percent of the primary supply air rate for the space, but not less than required by state and local building codes. Adjustments shall be incorporated into the sequences of operation to decrease relief air whenever the local space exhaust is energized.

6. Supplemental Heat Systems

a. Reference "Central Plant Variable Air Volume System with Hot Water Reheat Terminals."

7. Electronic Temperature Control Systems

a. VRF/VRV system shall include BACnet or LON interface gateway to communicate with the Building Automation System (BAS). All control points within the VRF control system shall be mapped back to the BAS. BAS shall provide occupancy schedules and setpoint values to VRF control system.

b. The building shall be spilt into different zones according to air systems, exterior exposure and general occupied schedules.

c. Each occupied space in the building shall include space temperature control.

1.10 RECOGNIZED HVAC SYSTEMS REQUIRING SUBMISSION FOR VARIANCE APPROVAL (cont'd)

d. Zones shall be placed into occupied/unoccupied mode through the BAS. Duplicate occupancy schedules shall not reside in the VRF controls.

e. Through the temperature control system, it shall be possible to reset the space temperature sensors to a night setback temperature of 55 degrees Fahrenheit for heating and 85 degrees Fahrenheit for cooling to reduce energy consumption. ***Night setback temperature for VRF systems shall be adjustable.***

f. During unoccupied hours, air handling units shall cycle only as required to maintain night setback temperatures.

g. Graphic screens shall be included for each air handling unit, VRF outdoor unit, VRF indoor unit zones and floor plan.

h. All air handling units shall be controlled to cycle during unoccupied hours in order to prevent space relative humidity in excess of 60 percent. Systems will shut down when the relative humidity falls below 55 percent. 100% Outside Air Units shall include recirculation dampers for operation during unoccupied hours without the need to open outside air dampers.

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SECTION 8500

TECHNOLOGY SYSTEMS

1.01 INTRODUCTION

A. The Technology Systems Plans and Specifications shall be prepared in accordance with the latest edition of the BICSI Telecommunications Distribution Methods Manual (TDMM), the requirements of the OSDM as outlined herein, and shall be designed and approved by an RCDD with a minimum of 3-years experience. Refer to the OFCC Technology Phase Submission Form for ***DD and CD phase*** submittal requirements.

B. The Telecommunications Plans shall provide a minimum level of content as described herein. The guide below is intended to convey the basic information that is required to be included in Telecommunications Systems Plans. Additional information may be required based upon the scope and nature of the design. The guide below is not intended to set forth an exact organizational or numbering format for Telecommunications Plans.

1. T0 Site Plans - Projects where new telecommunications services are being provided shall be included with a site plan. The plan shall indicate proposed routing of incoming services including any required underground or aerial pathways. Site plan should also indicate approximate location within building outline of any exterior pathways' termination point as well as inter-building backbone cabling in a Campus setting. This information may be included on the Electrical Site Plan.

2. T1 Composite Plans - Complete building composite floor plans for each floor at a scale no less than 1"=20'-0". The composite floor plans shall indicate locations of Telecommunications Rooms, cable assignment for each TR, major cable pathways including cable tray and conduit risers. Other information which may be included on the plans are security zones, wireless access points, and security camera locations.

3. T2 Floor Plans– Building floor plans at a scale of not less than 3/32"=1'-0", broken down with appropriate match lines for large buildings and key plan on each sheet to correspond to plan location within building. Floor plans shall include all technology outlets and equipment. Where loose equipment is presented in a table format, drawing symbols for these items may be omitted. Floor plans must include room numbers and names within the sheets for each space.

4. T3 Telecommunications Spaces – Large scale plans of the Telecommunications Spaces at a scale of not less than ½"=1'-0". The large scale plans shall include a floor plan, rack elevations and wall elevations for each telecommunications space. Floor plans shall indicate all equipment including racks, cabinets, ladder rack, conduit sleeves, etc. In addition, electrical requirements such as outlet types and locations must be referenced to coordinate with electrical drawings. Rack elevations must be to scale and show actual equipment to be installed for each rack. Where equipment size varies based upon manufacturers used, the largest equipment shall be included in the elevations. Wall elevations must show, at a minimum, dedicated spaces with approximate size for the various wall mounted items of equipment for the various systems.

5. T4 Details - Technology details including symbol legends, system schematic wiring diagrams, system riser diagrams, specialty details for equipment mounting, etc. The technology details must provide a clear and accurate picture of each system and the interconnectivity associated with that system and the integration between systems.
6. Miscellaneous Drawings. Additional drawings that can be used in conjunction with the above-listed drawings.

C. The Technology Designer should endeavor to reduce the quantity of Telecommunications Rooms (TRs) by centralizing the TRs and/or using one TR to serve multiple floors. For example, in a 3-story building, place the TR on the second floor and serve the 1st, 2nd, and 3rd floors from the same closet. The Technology Designer should consider locating the Equipment Room (ER) in a central building location if feasible. Coordinate the location, quantity, and size of the ER and TRs required early in the design process with the Design Professional.

D. The Technology Designer shall endeavor to centralize as many Technology and Control Systems as possible for the District into one school building or Network Operations Center (NOC) and interconnect the buildings and systems via fiber-optic cables whenever economically feasible.

E. The Technology Designer should consider using the savings from the centralization of systems to offset the cost of inter-building, fiber-optic cabling. Capital costs for Inter-Building, Fiber-Optic Cables can be included in the project, provided the overall Project Technology Budget is not exceeded.

F. E-Rate grant opportunities for “Internal Connections” shall be considered for all OFCC projects. The Technology Designer shall coordinate all Technology Designs and Schedules with the Construction Manager, the School District, and the eTech Ohio E-Rate Coordinator.

G. Since many of the Technology Systems could be operational for life-safety purposes and building evacuation purposes, the Technology Designer is to connect these systems and their associated UPS units to the Building’s Emergency Generator System when available. Coordinate the electrical loads, outlet types, and circuit locations with the Electrical Design Engineer. These systems include:
1. Security Systems (CCTV, Access Control, and Intrusion)
2. Telecommunication rooms UPS circuits
3. Telephone System
4. Paging and Central Sound System

H. The Technology Designer shall coordinate all ER and TRs equipment BTU loads, cooling and hours of operation requirements with the HVAC Design Engineer.

I. The Technology Designer shall assure all specifications require Contractors to submit shop drawings detailing the specific equipment provided for the project as well as O&M manuals containing project specific data. Generic equipment or system information is not acceptable. Additionally, requirements for “as-built” drawings from the Contractors for wiring diagrams, final system configurations, etc. are to be part of the specifications. The School District is to receive record documentation of the final actual installation of all technology systems.

J. The specification of Technology Equipment (computers, A/V displays, etc.) that have the Energy Star label is preferred, when applicable.

K. The Technology Designer shall coordinate specific requirements of extended learning areas (ELAs) with the School District. As a minimum, provide access to the data network and one (1) video port for each ELA.

L. The Technology Designer shall verify with the School District during the Programming Phase if they will be implementing any special technology applications or interfacing with third party entities (i.e. hosting or cloud computing solutions) that would affect the Technology or Facility Design.

M. The Technology Designer shall submit required technical data validating the WLAN design to achieve ***ubiquitous high-density coverage throughout the building*** with the technology phase submissions. Refer to Section 27 21 33 for requirements.

N. The Technology Designer shall coordinate with other Design Professionals adequate dedicated rooftop space to accommodate current or future system antennas.

O. The Technology Designer shall coordinate with the District regarding their on-line testing assessment procedures and policies. This is to ensure that the technology design and infrastructure will meet the District requirements.

P. The Technology Designer shall coordinate with the District regarding the bandwidth needs of the District. The increase of wireless devices and increased bandwidth requirements , may necessitate an increase of bandwidth coming into the District building(s). Review should also consider ongoing maintenance cost for increased bandwidth.

Q. Note that an OSDM Technology and Security Checklist is located on the OFCC website. It is intended as a reference tool for use by the Technology Designer.

1.02 TECHNOLOGY SYSTEMS

A. Each OFCC Construction Project for new and remodeled facilities shall provide the baseline Technology systems. Additional non-baseline (optional) systems shall be added based on budget limitations.

B. The Technology Designer shall design the following required Technology Systems for all new and remodeled buildings. Refer to the OSDM sections listed below for additional information:

1. COMMUNICATIONS – DIVISION 27

   a. Section 27 05 26 -- Grounding and Bonding for Communications Systems.

   b. Section 27 11 00 -- Communications Equipment Room Fittings.

   c. Section 27 13 13 -- Communications Copper Backbone Cabling.

   d. Section 27 13 23 -- Communications Optical Fiber Backbone Cabling.

e. Section 27 15 13 – Communications Copper Horizontal Cabling.

f. Section 27 15 43 -- Audio-Video Communications Horizontal Transport System.

g. Section 27 21 00 -- Data Communications Network Equipment.

h. Section 27 21 33 -- Data Communications Wireless Access Points.

i. Section 27 31 13 -- IP-Enabled PABX System.

j. Section 27 31 23 -- IP Only PABX System.

k. Section 27 41 19 -- Video Display Equipment.

l. Section 27 41 25 -- Digital Media Management System.

m. Section 27 51 21 -- Student Dining / Auditeria Sound Reinforcement System – High School.

n. Section 27 51 22 -- Student Dining / Cafeteria Sound Reinforcement System.

o. Section 27 51 23 – Central Sound and Paging System

p. Section 27 51 24 -- Gymnasium Sound Reinforcement System.

q. Section 27 51 25 -- Music Room Audio Program Playback System - Middle School.

r. Section 27 51 26 -- Music Room Audio Recording/Playback System - High School

s. Section 27 51 27 -- Classroom Sound Reinforcement System.

t. Section 27 53 13 -- Clock Systems.

2. ELECTRONIC SAFETY AND SECURITY – DIVISION 28

a. Section 28 13 00 -- Access Control System.

b. Section 28 16 00 -- Intrusion Detection System.

c. Section 28 23 00 -- Video Surveillance System.

d. Section 28 26 00 – Area of Refuge Intercommunication System

C. The following items summarize the Technology Systems provided. The Base Line (required) systems are listed as well as the Optional Systems.

1. TECHNOLOGY ELECTRICAL WORK

a. These items are generally bid out as the Technology Electrical Package and are usually included in the Project's Electrical Bid Package.

b. Back Boxes.
   1) Includes back boxes and floor boxes that are part of the Technology system

c. Cable Tray
   1) Includes an OSDM Compliant, wire mesh, Cable Tray system.

d. Conduits.
   1) Includes Technology conduit sleeves and conduits back to the cable tray as per OSDM.

e. Entrance Conduits – typical.
   1) Includes an allowance for a typical Service Provider UG Conduit System - if you have an unusually long Entrance (greater than 400 feet) adjust as required.

f. Telecom Grounding.
   1) Includes Telecom Grounding System, Ground Bars, and Cable Tray Grounding.

g. Backboards.
   1) Includes Painted Plywood backboards in Telecom Closets.

h. Power.
   1) Includes Rack and Cabinet Power Conduits, Stubs and pigtails to Junction Box only.
   2) Does NOT include Technology Power wiring -- part of Electrical Package.

2. TECHNOLOGY CABLING

a. This Section includes the Technology Data Cabling and is based on an OSDM Compliant CAT - 6 system.

b. Wireless Access Points (WAP's) are to be served by ***a shielded*** CAT-6a system.

c. User Cabling Drops, Faceplates and Jacks.
   1) Includes all Technology related Data Cables.

d. Patch Panels.
   1) Includes Data and backbone patch panels.
   2) Cable Organizers.

e. M/M & S/M Fiber Cabling.
   1) Includes internal fiber cabling and materials

f. Backbone Copper and Fiber Cabling.
   1) Includes internal copper and fiber cables.
   2) M/M fiber shall be 50 micron OM4 laser optimized for new work or special applications.
   3) SM fiber shall be OS2.
   4) IP-Enabled PBXs include copper backbone cabling and associated 110 blocks and patch panels. All-IP PABX systems may not require copper backbone cabling and associated 110 blocks and patch panels.

g. Fiber Patch Panels
   1) Includes fusion spliced ends for all M/M and S/M cables or preterminated fiber and associated cassette system.

h. 110 Blocks.
   1) Includes miscellaneous backbone cable blocks -- PBX & Paging blocks in other sections.

i. Telecom Racks.
   1) Includes Telecom Closet Racks, Cabinets and associated Cable Ladder Rack.

j. Monitor/Projector Brackets.
   1) Includes projector ceiling brackets, conduits and monitor brackets (NO Electrical).

3. NETWORK ELECTRONICS

a. This Section includes the Network Electronics as based on an OSDM Compliant Network.

b. L-3 Core Switch.
   1) Includes Layer-3 Chassis Core switch and associated Copper and Fiber Interfaces.
   2) Includes ***GB*** TX ports for common devices and local ***GB*** switches.
   3) Includes F/O ports for remote switches and WAN interface.
   4) Switch shall include both 1GB and 10GB interfaces.
   5) 10 GB interface for WLAN minimum 10GB.

c. ***GB*** User Switches
   1) Switches shall provide user ports equal to the number of devices plus 15% spare.
   2) Provide either switch stacks utilizing 48 port switches or modular chassis. ***All switch ports shall be 802.11ac at POE+.***
   3) Provide dual 10GB uplinks to each switch stack/chassis.

d. Wireless Access Points (APs).
   1) ***802.11ac standard shall be followed*** and ubiquitous high-density coverage throughout the building.

2) Includes CIPA Compliant System with building-wide ***ubiquitous*** coverage and rogue signal protection.

e. Wireless Controller/Switches.
- ***1)*** Includes Central Wireless Controller, Control Software and Server Appliance ***or a "cloud-based" controller.***
- ***2)*** Includes Location Tracking.
- ***3)*** Include Mobile Device Management (MDM.)
- ***4)*** Include App Management Software.

f. Radius Authentication Server.
- ***1)*** Includes Radius Server and Software for Network Authentication.
- ***2)*** Assumes District supplied Authentication Data base.

g. POE+
- ***1)*** Provide Power over Ethernet (POE+) ***for all ports,*** plus 15% spare.

h. UPS Units
- ***1)*** Includes UPS Units for Main and Auxiliary Telecom Rooms.
- ***2)*** Standby based on connection to Building Generator for all Technology Closets.
- ***3)*** Power Stub up to Junction Boxes in TE Item above.
- ***4)*** Electrical Circuits to Generator in Separate Electrical Package.

i. Fiber Patch Cords.

j. Copper Patch Cords.

4. IP-ONLY PABX SYSTEM ***– New System IP-Based Designs***

a. This section includes an IP-Only phone system based on OSDM requirements.
- ***1)*** The typical system shall include Voice Mail and carrier circuits interfaces – these are based on whether the District has a central, redundant, IP-Only phone system that links all buildings together. If a central, redundant, IP-Only phone system exists, then Call Processing, carrier circuits, and Voice Mail are provided at the central location and the remote buildings are interconnected over the fiber-optic WAN. The remote buildings shall have Survivable Remote Units for call processing in the event of a fiber WAN failure.
- ***2)*** Hosted Solution – Technology Designer to coordinate with the School District if a hosted IP-Only PABX system is the District's preference. An OFCC variance shall be obtained if it is determined that a hosted IP-Only PABX system is to be implemented. Specific items to review include:
  - a) Method of incorporation into the designed technology system(s).
  - b) Total cost of ownership / annual costs, etc.
  - c) Training requirements.

d) Cost for systems and equipment not located in the District and/or owned by the District is not OFCC funded.

b. IP-Only PBX
   1) An IP-Only PBX supports both IP phones and analog devices (FAXes, etc.) and IP Trunking between buildings.
   2) Includes software for connection to Central District IP-Only PBX.

c. Digital Display Speaker Phone IP-Instruments
   1) Includes classroom and administration phones as per OSDM.
   2) Refer to specification sections 273113 and 273123 which describe when full duplex speaker phones for classroom and other spaces could be optional.
   3) Shall include E-911 room identification.

d. 2 Wireless Phone Instruments
   1) Includes OSDM compliant wireless phones and chargers.

e. 2 Attendant Consoles
   1) Includes 2 Attendant, PC-based consoles, per OSDM.

f. Power Failure Transfer (PFT) Unit
   1) Includes Power Failure Transfer Unit for E-911 and emergency backup.
   2) Includes 2 analog PFT Emergency backup phones.

g. Interconnect Cables

h. Analog Trunk Interfaces
   1) Includes Analog Trunk Interfaces for E-911 Backup.

i. Analog Station Interfaces
   1) Includes Analog Station Interfaces for FAXes, etc.

j. Digital Trunk Interfaces – include a minimum of one of the following:
   1) PRI Interface (exception see above, add capacity as required at central location to support facility)
   2) SIP Trunk Interface (exception see above, add capacity as required at central location to support facility)

k. Voice Mail System
   3) Include a minimum of one mail box for each staff member located at facility plus miscellaneous mailboxes as required by District. (exception see above, if voice mail system is centralized provide additional mail licenses at central location to support facility)

l. Copper Patch Cords.

m. IP Trunking
1) Includes IP trunking software for Inter IP-Only PBX Communication.

n. POE+ Switches
1) Includes POE+ Ports for connection of all IP instruments.
2) Includes additional L-3 Core Switch interfaces for the POE+ switches.

5. IP-ENABLED PABX SYSTEM – Optional if extending ***an*** existing system

a. This Section includes an IP Enabled Phone System based on OSDM Requirements.

1) The system shall include Voice Mail and adequate circuits to local carrier to support outside call requirements. If this system is part of a district-wide phone system, then the Voice Mail and primary outside carrier circuit capacity may be provided from the central PBX location as long as the local system is connected (networked) to central PBX over the school district WAN.
2) Hosted Solution – Technology Designer to coordinate with the School District if a hosted IP-Enabled PABX system is the District's preference. An OFCC variance shall be obtained if it is determined that a hosted IP-Enabled PABX system is to be implemented. Specific items to review include:
a) Method of incorporation into the designed technology system(s).
b) Total cost of ownership / annual costs, etc.
c) Training requirements.
d) Cost for systems and equipment not located in the District and/or owned by the District is not OFCC funded.

b. IP-Enabled PBX.
1) An IP Enabled PBX supports TDM, analog devices (FAXes, etc.), and IP Phones and IP Trunking between buildings.
2) Includes software for connection to Central District PBX.

c. Digital Display Speaker Phone Instruments.
1) Includes Classroom and Administration Phones as per OSDM.
2) Refer to specification sections 273113 and 273123 which describe when full duplex speaker phones for classroom and other spaces could be optional.
3) Shall include E-911 room identification.

d. 2 Wireless Phone Instruments.
1) Includes OSDM Compliant Wireless Phones and chargers.

e. 2 Attendant Consoles.
1) Includes 2 attendant consoles and busy lamp fields as per OSDM.

f. Power Failure Transfer (PFT) Unit.
   1) Includes Power Failure Transfer Unit for E-911 and emergency backup.
   2) Includes 2 Analog PFT Emergency backup phones.

g. Interconnect Cables.

h. Analog Trunk Interfaces.
   1) Includes Analog Trunk Interfaces for E-911 Backup.

i. Analog Station Interfaces.
   1) Includes Analog Station Interfaces for FAXes, etc.

j. Digital Trunk Interfaces – include a minimum of one of the following:
   1) PRI Interface (exception see above, add capacity as required at central location to support facility)
   2) SIP Trunk Interface (exception see above, add capacity as required at central location to support facility)

k. Voice Mail System
   1) Include a minimum of one mail box for each staff member located at facility plus miscellaneous mailboxes as required by District. (exception see above, if voice mail system is centralized provide additional mail licenses at central location to support facility)

l. Copper Patch Cords.

m. IP Trunking
   1) Includes IP trunking software for Inter PBX Communication.

6. CCTV SYSTEM – NEW SYSTEM IP BASED DESIGNS

a. This section includes the IP CCTV Camera System based on OSDM Requirements.
   1) The system includes a typical CCTV Coverage system with internal and external cameras – both fixed and PTZ.
   2) The camera coverage is typical of an urban school setting and includes complete building coverage – adjust as required if more coverage is required.

b. Interior Cameras
   1) Includes interior dome, vari-focus camera, and UTP data cable.

c. Exterior Cameras
   1) Includes exterior dome, vari-focus camera, housing, and UTP data and power cables.

d. Exterior PTZ Cameras
   1) Includes exterior PTZ camera, housing, UTP data, power and control cables.

e. Power Supplies
   1) Connected to technology closet UPS and building emergency generator circuit(s).
   2) Includes POE+ Switches for powering internal cameras.

f. Control Units
   1) Includes networked Central Networked Camera Servers.
   2) Includes Central Network Attached Video Storage and associated Controllers.
   3) Includes Central Network Storage Fiber-Channel Switch.
   4) Includes Central KVM Switch.
   5) Includes integration with Access and Intrusion System.
   6) Includes Central Office Mic.
   7) Includes Remote Client Viewing Software.

g. CCTV Cables
   1) Includes UTP data cables and patch panels.

7. CCTV SYSTEM – LEGACY DVR BASED SYSTEMS – Optional if extending an existing system.

   a. This Section includes the CCTV Camera System based on OSDM Requirements.
      1) The system includes a typical CCTV Coverage system with internal and external cameras -- both fixed and PTZ.
      2) The Camera coverage is typical of an urban school setting and includes complete building coverage - adjust as required if more coverage is required.

   b. Interior Cameras
      1) Includes interior dome, vari-focus camera, coax and power cable.

   c. Exterior Cameras
      1) Includes exterior dome, vari-focus camera, housing, coax and power cable.

   d. Exterior PTZ Cameras
      1) Includes exterior PTZ camera, housing, coax and power and control cables.

   e. Power Supplies.
      1) Connected to technology closet UPS and building emergency generator circuit(s).

   f. DVR Units
      1) Includes networked DVR with local KVM switch.
      2) Includes integration with Access and Intrusion System.
      3) Includes Central Office Mic.
      4) Includes Remote Client Viewing Software.

g. CCTV Cables
   1) Includes Coax patch panels.

8. ACCESS AND INTRUSION SYSTEM

   a. This Section includes the Building Access Control AND Intrusion System based on OSDM Requirements.
      1) The system includes a typical Card reader, and Door Control system.
      2) The System is typical of an urban school setting and includes complete building coverage - adjust as required if more coverage is required.
      3) The system is based on complete integration with CCTV and Intrusion Detection System.
      4) Central District NOC Control Software and Consoles are NOT Included - Depends on District Configuration -- see above.

   b. Motion Detectors - Optional
      1) The Technology Designer shall verify use and coverage areas with the School District.

   c. Card Readers.
      1) Includes Proximity Readers with Keypads for Controlled Doors.
      2) Includes Elevator Reader.
      3) Includes Tech Closet Reader.

   d. Intrusion Panels.
      1) Includes Intrusion Control Panels.

   e. Door Control.
      1) Access/Control Cables.

   f. Power Supplies.
      1) Connect to Technology Room UPS and Building Emergency Generator Circuit(s).

   g. Central Control Software is Optional -- see above.

9. PAGING & CENTRAL SOUND SYSTEM.

   a. This Section includes the Building Central Sound and Paging System based on OSDM Requirements.
      1) The system is based on a micro-processor based two-way intercom, paging and program distribution system connected to the PBX System via a multi-zone paging adapter as per OSDM.
      2) The Central Office CD/***Digital Player/***FM Tuner is connected to the Paging System as per OSDM.
      3) The Central Office Emergency Evacuation Switch and Tone Generator are connected to the Paging System as per OSDM.
      4) An FM Antenna system is provided for feeding the various FM tuners located in the building.

5) The Central Bell/Clock system is connected to the paging system.

b. Paging Speakers.
- ***1)*** Includes speaker and ceiling tile bridge or paging horn as required.
- ***2)*** Paging Speaker Cable.
- ***3)*** Includes paging speaker(s) and call-button cable installed in cable tray.
- ***4)*** All Educational space speaker(s) and call-button cables are home-run to Central Closet. Common area paging zones (i.e. corridors) may utilize daisy chain cabling for speaker(s) associated with that particular zone.

c. Call Buttons
- ***1)*** Technology Designer to review with District. Base line item, variance request if District elects not to include. Each Educational space to have wall-mounted call-in button. Review need for conduit/box rough-in for future if District elects not to include.
- ***2)*** Call-button cabling is included in baseline system whether the call button is installed or not. Extend to speaker location if call button is not installed.

d. Paging Adapter.
- ***1)*** Includes multi-zone microprocessor controlled paging adapter in central Telecom Closet.

e. Paging Blocks.
- ***1)*** Includes 110 cross-connect blocks for multi-zone connections.

f. Paging Power Supplies.
- ***1)*** Includes Amplified Speaker Power supplies -- connected to ` UPS/Generator.

g. Tone Generator.
- ***1)*** Includes multi Tone Generator for emergency signals.

h. Emergency Switch.
- ***1)*** Located in Central Office.

i. Central FM Tuner.
- ***1)*** Located in Central Office.

j. Call Annunciator
- ***1)*** Base line – Main office to have LCD/LED room call-in annunciator. Variance required if District elects not to include.

k. Central CD / Digital Player.
- ***1)*** Located in Central Office.

l. FM Antenna.
   1) FM Amplifier Coax Cabling.

m. Admin. Console
   1) System Programming Console.

n. Mass Notification System - Optional
   1) Additional features may be added to the paging system to provide mass notification capabilities.

10. WIRELESS CLOCK SYSTEM

a. This Section includes the Building Wireless Clock System based on OSDM Requirements.

b. Wireless Clocks
   1) Single sided in rooms, double sided in hallways
   2) Wireless Clock Guards as required -- Gym areas, etc.

c. Wireless Transmitter and Receiver and Antennas
   1) Larger buildings may require additional transmitters

d. Wireless Tone Generator and Scheduling System
   1) Includes interface to Paging System

11. CLASSROOM A/V SYSTEMS

a. This Section includes the Classroom and Misc. A/V Systems based on OSDM Requirements.

b. Technology Designer shall coordinate with other Design Professionals for an integrated classroom design to accommodate features such as daylighting.

c. The Design is based on Classroom interactive projectors integrated with the ***Classroom Sound Reinforcement*** system and Digital Media Delivery and Scheduling.

d. The Central Media Server and Scheduling system is NOT included and is assumed to be centrally located at the District's NOC.

e. Classroom Interactive Projectors.
   1) Includes Network controlled/monitored Interactive Projector. Refer to 274119 for Lumen requirements.
   2) Ultra-short throw interactive projector is wall-mounted and integrated with Classroom Sound and other audio/visual sources.
   3) Interactive Projector is integrated with Instructor's PC.
   4) Associated in-wall cabling is included.
   5) Web-based Control shall be achieved either through direct network connectivity at projector or through the use of an external IP/RS-232 and control software.

6) Projector control shall be open source and support multiple projector manufacturers.

7) Wall Bracket for ultra-short throw.

8) ***Interactive projectors shall have the capability to display classroom mobile devices (tablets, iPads, etc.) via wireless interface. Interface shall be open source and support concurrent multiple remote display software.***

f. ***Classroom Sound Reinforcement*** System & Speakers.

1) Includes min of 4 speakers, IR or RF Receiver, Amp and 2 Mics.

2) Integrated with Projector, PC, and video sources.

3) Amp is located at classroom technology center.

g. Classroom A/V Cabling.

h. Classroom Blu-Ray Player.

1) Includes Standard Blu-Ray player located at classroom technology center.

2) Optional if teacher PC is utilized as the classroom DVD player.

i. Central Blu-Ray Player.

1) Blu-Ray Player and Digital Encoder for Central Usage.

j. Bulletin Board Unit.

1) Includes BBS PC and associated Digital Encoder.

k. Media Center Cart

1) Includes 1 Media Center Camera, Cart and Digital Encoder.

l. Flat panel TVs for Selected Rooms.

1) Includes wall mounted flat panel TV and associated STB.

2) Bracket included in Technology TE Package.

m. Provide digital video switcher (HDMI) in rooms where multiple A/V devices and outlets are required to simplify the connection to projector. Locate switcher at the classroom technology center.

12. SPECIALIZED AUDIO SYSTEMS

a. This Section includes the Specialized Audio Systems based on OSDM Requirements.

1) Note that not all systems are required in every building type.

13. REQUIRED SYSTEMS -- IF NO NOC EXISTS

a. This Section includes Systems that must be added to the Estimate if there is NO centralized NOC Location for the District.

b. These systems are generally located at one building in the District and used to serve all District Facilities over a fiber-optic WAN.

c. The following systems are Base Line required systems if no NOC exists.

1) Voice Mail if no Central IP-Enabled or IP-Only PBX Exists.

2) PBX PRI Interface if No Central IP-Enabled or IP-Only PBX Exists.

3) Access Control Software & Console if no Central Unit Exists.

4) Digital Media Management System if no Central System exists.

5) Legacy only - CATV Head End and Coax System. Optional if extending an existing system.

6) If the District has NO Digital Headend for Broadcast Media, then provide a Digital Broadcast Media District Head End – 6 or 12 Channels, as required.

7) Redundant Central IP Call Processing Units if no Central IP-Only PBX Exists.

14. CURRICULUM TECHNOLOGY

a. This section includes various types of technology which specifically relates to use within the educational space by the instructor and students alike. The Technology Designer shall review the various technologies that are available with the School District to determine what combination of system(s) should be selected that will meet the needs of the District, within the allotted Baseline Budget. Note that some systems have minimum base line quantities suggested.

b. Baseline Systems:

1) Digital Media Management System

a) System shall consist of server portal that will enable web-based viewing, uploading, and downloading of digital content; management of title database operations; and logging of system parameters. System to allow for multicasting. System shall be sized according to number of users, number of titles, and network bandwidth. Baseline is 1 per District/School. Optional equipment in educational spaces may include: set-top boxes and digital encoders for video sources.

b) Hosted Solution – Technology Designer to coordinate with the School District if a hosted Digital Media Management System is the District's preference. An OFCC variance shall be obtained if it is determined that a hosted Digital Media Management System is to be implemented. Specific items to review include:

.1 Method of incorporation into the designed technology system(s).
.2 Total Cost of Ownership / Annual Costs, etc.
.3 Training requirements.
.4 Cost for systems and equipment not located in the District and/or owned by the District is not OFCC funded.

c) Alternative Digital Media Content Solution - Technology Designer to coordinate with the School District if alternative methods to obtain digital media content is preferred versus local system equipment or a hosted solution. An OFCC variance shall be obtained if it is determined the District prefers to redirect digital media management system budget monies towards other technologies. Specific items to review in the variance submittal includes:

.1 District reason to not include a digital media management system via district owned equipment or hosted solution.

.2 Proposed method to obtain digital media content in District Technology Plan.

.3 Proposed use of re-directed technology budget monies associated with the baseline system, including Total Cost of Ownership/Annual Costs/Training Requirements, if applicable.

.4 Cost for systems and equipment not located in the District and/or owned by the District is not OFCC funded.

2) Interactive Projectors

a) Interactive Projector – Baseline is 1 per educational space. Shall be mounted within room and provide interface with instructor's workstation in the room and provide the ability to record, save and recall presentations. Includes equipment that can transform any writing surface into an interactive surface. Utilize either wired or wireless connections to the instructor's workstation.

15. OPTIONAL SYSTEMS – Not Baseline Systems

a. This Section includes Optional Systems that can be added to the Estimate based on Local Requirements if the budget permits.

b. Interactive Tablets

1) ***System shall be wireless***, utilizing RF, ***802.11ac,*** or Bluetooth technology. System shall provide ***wireless*** interface with instructor's workstation ***and display device(s)*** in the room ***including*** the ability to record, save and recall presentations. System shall be of the integrated display type or non-display type tablet.

c. Classroom Digital STBs.

1) Includes Digital STB for delivery of IP Video into Classroom.

2) Web-based Control via Projector IP Connection.

3) Bracket included in Technology TE Package.

d. Digital Signage

a. Single unit flat panel displays utilized for Visitor Information, General Way-Finding or Display Education Content.

b. The quantity of Digital Signage shall be minimal and is an Optional System based on budget constraints.

c. Digital Signage unit(s) utilized for video walls, sport or food services applications are not OFCC funded.

e. High School Auditorium
   1) The auditorium system is for Districts that construct a large formal auditorium and is only used for special situations.

f. Enhanced Security Package
   1) Based on local conditions, select this option to add additional camera coverage and security enclosures for classroom projectors – added cost and based on local conditions.

g. AV Control Systems
   1) Central control panels for classroom AV systems. Optional based on budget constraints.

h. TV Studio

i. Area of Refuge Assistance
   1) The system shall be a multiplexed intercom system, designed specifically to meet the Area of Refuge Assistance communication requirements of the ADAAG and the OBC. During an emergency, building occupants can use the system to call for assistance from an Area of Refuge to either a local master station or to 911 services through the building telephone system.

   2) The system shall consist of remote call-in stations in the areas of refuge (typically stairwells) and a master station. The system shall also provide telephone connections to the master station for access to 911.

   3) Note that this system is listed under optional systems category, as it typically would not be installed as a baseline system. It is listed here to advise the Technology Designer to verify building requirements with the Project Architect, to determine if it is a code required system and integrate with the telephone system accordingly.

j. Emergency Responder Radio Coverage

   1) The OBC requires approved radio coverage for emergency responders within the building.
   2) Note that this system is listed under optional systems category, as it may or may not be required based on several factors.
   3) The Technology Designer needs to determine compliance methodology with the Design Professional and AHJ during initial project phases.

k. Interactive Flat Panel Displays (IFPDs)
   1) IFPDs may be utilized instead of classroom interactive projectors. Refer to 27 41 19 for requirements.
   2) Optional method based on budget constraints.

END OF SECTION

SECTION 8600

ELECTRICAL SYSTEMS

1.01 ELECTRICAL DISTRIBUTION

A. Electrical systems distributed throughout the building shall be based upon the 480-volt or 208-volt, three-phase configuration.

B. Transient voltage serge protection and lightning arrester devices shall be located on main service distribution equipment. Transient voltage surge protection shall be provided on branch distribution electrical equipment serving electronic equipment.

C. Current carrying conductors shall be a minimum No.12 American Wire Gauge. Conductors shall only be copper. Conductor size No. 12 and No. 10 may be stranded or solid type. Conductors larger than No. 10 shall be stranded. Aluminum lugs for terminating copper conductors are acceptable. At the Electrical Design Professional's discretion, along with school district's approval, aluminum conductors may be used for service entrance wiring, branch circuit feeders to panelboards, and distribution panels. Aluminum conductors shall not be used as branch circuit wiring to light fixtures, receptacles, or mechanical/electrical motor circuits. Minimum size aluminum conductor shall be No.6.

D. Current carrying conductors shall be installed in conduit systems conforming to the National Electrical Code.

E. Continuous equipment grounding conductors shall be installed in all circuits bonded to all ground lugs, bussing, switches, receptacles, equipment frames, etc., per the National Electrical Code. The main facility grounding field electrode system to ground shall be 5 ohms or less.

F. Electrical systems main service equipment shall be designed with a 15 percent spare amperage capacity and 20 percent spare space capacity. Panel boards shall be designed up to 80 percent of capacity and be provided with a minimum of six (6) spare over current protection devices. Provide spare over current protection devices in branch distribution panelboards and main service equipment boards.

G. Electrical energy distribution equipment shall be located in dedicated electrical rooms or on mechanical decks. Main electrical service (switchboards) distribution equipment shall not be located in the main heating or cooling generating room. Branch circuit distribution panelboards recessed in corridor walls will not be acceptable.

H. Coordinate service entrance requirements with local utility service companies for electrical energy, telephone, and cable television. Separate entrances may be required depending on placement of utility services.

I. Dry type transformers shall be ***type TP-1 in compliance*** with the Department of Energy Policy Act of 2005 ***or NEMA Premium efficient transformers complying with the*** United States Department of Energy Candidate Standard Level 3 (CSL3) per 10 CFR Part 430 dated July 2004.

J. Electrical branch circuits to five (5) horsepower, 3-phase, and larger motors for air-handling units, exhaust fans, pumps, chillers, and condensing units shall be provided with phase loss protection. Protection shall prevent equipment from single phasing. Phase loss protection equipment shall be integral to starters or variable frequency drives serving the equipment.

K. Voltage drop of feeders between the service entrance equipment and the branch-circuit distribution equipment shall conform to the requirements of the ASHRAE standard 90.1 ***(most recent as adopted by OBC or USGBC.)***

L. Emergency power shall be delivered by an on-site, standby power generator. Provide emergency power distribution to serve required systems per the NEC and the Ohio Building Code including:

1. Emergency egress and exit lighting systems indicated in Section 1.02.
2. Fire Alarm System
3. Security Systems (CCVT, Access and Intrusion.)
4. Telecommunication Rooms UPS Circuits
5. Telephone System
6. Paging and Central Sound System

M. Coordinate emergency circuit location, UPS electrical requirements, and electrical loads with the Technology Designer.

N. The intent of connecting standby power to selected components of the HVAC system is to provide an opportunity to limit damage from freezing weather during a power outage of short duration. The following components are not required to be connected to the standby power source and are optional within budgets:

1. Exterior heat tracing circuits.
2. DDC system controllers and components related to Remote alarming.
3. Air handling unit pre-heat coil (heating coil) run-a-round pumps.
4. Cooling tower basin heaters.
5. Chilled-water circulating pump, when used for Chiller freeze protection.
6. Independent, separate raceway, wiring, and transfer switches shall be provided for emergency life safety systems and no-emergency standby systems.

O. The overall electrical distribution system power factor as seen by the local electric utility company shall be greater than the minimum factor established by local electric utility serving the building.

P. Within the base building electrical cost, the Electrical Design Professional has the option of including a digital sub-metering device within the main electrical switchboard to monitor electrical usage voltage and current.

1.02 LIGHTING

A. Interior instructional spaces shall be artificially illuminated with energy-efficient and high-efficiency fluorescent light fixtures with electronic ballasts and lamps. The Design Professional has the option of providing fluorescent lighting with electronic, digital dimming ballasts connected to photo-electric cells sensing sunlight for automatic illumination level control for daylight harvesting.

B. ***At the Electrical Design Professional's discretion, the interior instructional spaces may be artificially illuminated with fluorescent linear direct/indirect fixtures, pendant mounted. With this option the Design Professional shall give consideration to raising ceiling heights and building structure heights to accommodate distance from the floor elevation to the bottom of pendant fixtures.***

C. ***When daylighting strategies per Chapter 7 are implemented, provide photo-cell control of lights/lamps in the room.***

D. High volume spaces such as gymnasiums ***shall be illuminated with high-efficiency or linear fluorescent-type high-bay fixtures where mounting is 40 feet o less with metal enclosure and wire guard.***

E. ***Other high volume spaces within the facility shall be illuminated using a combination of lamps, ballast and fixtures that are the most energy efficient meeting illumination levels and functionality of the space.***

F. The minimum illumination (footcandle) levels shall conform to the established Illuminating Engineers Society guidelines. See illumination chart at the end of this section. Footcandle calculation shall be developed by using the room cavity ratio method with work plane surface being 30 inches above the floor. Ceiling, wall, and floor material reflectances shall be verified with the Electrical Design Professional.

G. ***Lighting designs shall comply with Illuminating Engineers Society recommended practices entitled "Lighting for Educational Facilities and Sports and Recreational Area Lighting".***

H. Emergency means of egress lighting shall be provided per local and Ohio Building Code requirements. The following areas shall have emergency illumination whether having natural illumination or not:

1. Exits and exist access corridors.
2. Small and large assembly areas.
3. Locker rooms.
4. Student restrooms.
5. Main and other dedicated electrical rooms.
6. Main mechanical room and other mechanical decks.
7. Emergency power equipment location.
8. Administration and other building control areas.
9. Kitchen/student dining.
10. Interior instructional space without natural illumination.
11. Rooms with occupant load over 50 people.
12. Exterior side of exterior exit doors.

I. Light fixtures shall be controlled by switches on a per room basis where fixtures are located. Circuit breakers will not be acceptable for turning lighting "on" and "off".

J. Exterior parking areas shall be illuminated with high-intensity discharge lamp and light-emitting diode (LED) type light fixtures.

K. Auditeria/student dining space shall be equipped with theatrical type lighting controlled by dimmer banks and control consoles.

L. Computer labs shall be illuminated with fluorescent light fixtures equipped with recessed direct/indirect fluorescent fixtures with perforated lens or linear pendant fluorescent direct/indirect fixtures suitable for computer screens, to a visual comfort probability level of 80.

M. In instructional spaces when lighting is provided over the primary instructional wall markerboard, this lighting shall be oriented so the long dimension of the fixture is parallel with markerboard. The remaining lighting in the space may be run parallel or perpendicular to main instructional wall.

N. Provide site lighting per Chapter 3, Section 3211.

O. Light fixtures located in gymnasiums and auxiliary gymnasiums shall be equipped with protective wire guards,

P. Exit signs shall be wall mounted, where possible, in lieu of ceiling mounted.

Q. The use of incandescent type lighting shall be restricted to where recommended by the function of the space. The incandescent lamps shall be rated for 130-volt rugged service.

R. Art rooms shall be provided with supplemental track lighting in middle schools and high schools.

S. Options shall be investigated for control of exterior and interior corridor lighting by direct digital control by the energy management system.

T. Interior lighting shall be controlled by occupancy sensors, automatic timed lighting controlled system or a combination of both to comply with ASHRAE 90.1 ***(most recent as adopted by OBC or USGBC.)***. Exterior lighting shall be controlled by photo-sensor, astronomical time clock, or temperature control system to comply with ASHRAE 90.1 ***(most recent as adopted by OBC or USGBC.)*** to automatically turn lighting off when sufficient daylight is available.

U. Darken fixture above projection surface from multi-level switching in classrooms & labs.

V. Interior and Exterior lighting allowable power densities shall be in compliance with ASHRAE 90.1 ***(most recent as adopted by OBC or USGBC).***

W. Interior lighting allowable power densities shall be 90 percent of allowable under ASHRAE 90.1 ***(most recent as adopted by OBC or USGBC)*** in compliance with ANSI/ASHRAE/USGBC/IEC Standard 189.1-2009 - “Standard for Design of High Performance Green Buildings” article 7.4.6.1. The Design Professional shall include as part of the construction document phase submission the Department of Energy COMcheck interior lighting report documenting compliance.

X. Design Professional’s estimate of performance for light loss factors shall include the following:

1. Decrease in lamp lumens output due to aging (lamp lumen depreciation-LLD)
2. Accumulation of dirt and dust on lamp and luminaire surfaces (luminaire dirt depreciation-LDD)
3. Ballast factor and losses of specific type of lamp ballast.

Y. In stairways of a multi-level building, locate light fixtures for general illumination and emergency at or above landings for ease of lamp replacement.

SCHOOL LIGHTING LEVELS	
ROOM TYPE CLASSIFICATION	RECOMMENDED DESIGN FOOTCANDLES **DIRECT LIGHTING(1)**
ADMINISTRATIVE	
Offices/Receptionist	40
Storage Rooms	15
Restrooms	15
Conference/Resource Rooms	40
Health Clinic	40
Teacher Prep/Workroom	40
CLASSROOMS-GENERAL	40
Art Rooms/Kiln	50
Modular Technology Labs	40
CADD Labs	30
Industrial Tech/Production Labs	50
Computer Labs	30
Graphics Labs	40
Life Skills Labs	50
Science Labs	50
Laundry Rooms	30
Music Rooms	30
Large Group Instruction Rooms	40
MEDIA CENTER	30
Active Areas	30
Inactive Areas	20
ATHLETIC AREAS	
Gymnasium - Elementary School	30
Gymnasium - Middle School	50
Gymnasium - High School	50
Multi-use P.E. Rooms	50
Locker Rooms	15

SCHOOL LIGHTING LEVELS	
ROOM TYPE CLASSIFICATION	RECOMMENDED DESIGN FOOTCANDLES **DIRECT LIGHTING(1)**
STUDENT DINING/AUDITERIAS	
Assembly	20
Stage/Work Lights	30
Make-up/Dressing Rooms	30
Theatrical Control Room	30
Equip room with dimmable ***LED*** lighting offering 10-foot candles of illumination.	
STUDENT DINING(Used for testing)	40
Cooking	50
Food Preparation	50
Serving Line	50
Ware Washing	50
ELECTRICAL ROOMS	20-30
MECHANICAL ROOMS	30
PARKING AREA	1 (3)
DRIVEWAYS	.5 (3)
CIRCULATION AREAS	
Building Entries	5-10 (3)
Corridors	15
Corridors with Lockers	15
Stairways	10
(1) See article 1.02 Lighting, page 8600-5, for lighting maintenance.	
(2) Foot candles shall comply with local health department regulations	
(3) Foot candles shall conform to section 3211.	

CONSIDERATIONS

1. Providing minimum or no building night lights allows background security if undesired entry occurs with visible lights.
2. Parking lot lighting shall be circulated to allow building management system to darken unnecessary lighting during unoccupied periods.

1.03 WIRING DEVICES

A. General purpose use,120-volt duplex receptacles shall be of standard grounded type.

B. Separate receptacles located within instructional spaces shall be provided for general purpose uses and for computer/video technologies.

C. Instructional spaces shall be provided with a minimum of four (4) general use receptacles, as well as double duplex receptacles next to computer/video technologies ports. It is not mandatory to have the double duplex receptacles for any computer/video technology ports that receive power via Power Over Ethernet (POE). Coordinate locations of POE ports with Technology Designer.

D. Each space or room shall be provided with a minimum of one, 120-volt receptacle.

E. General purpose receptacles in corridors shall be spaced a maximum of 50 feet apart.

F. Office areas, conference rooms, and teacher workrooms shall be provided with a minimum of four (4) receptacles.

G. Duplex receptacles within 6 feet of plumbing fixture units shall be ground fault protected. These receptacles shall be protected by a ground fault circuit breaker or an integral ground fault device.

H. A maximum of four (4) computers shall be on a single20-amp, 120-volt electrical circuit.

I. Instructional space lighting shall be controlled by two (2) switches. One switch shall control the inboard lamps and the other switch shall control the outboard lamps in each fixture located in the space. ***For audio/visual presentation mode, place fixture(s) over markerboards/smartboards on the outboard lamp switch.***

J. Key-type switches protected with wire guards shall be used to control lighting in gymnasiums, auxiliary gymnasiums, and locker rooms. Non-protected key switches shall be used to control lighting in corridors, large group restrooms, and other public spaces. Instructional type spaces shall be controlled by toggle-type switches.

K. Provide an exterior, weatherproof ground fault protected duplex receptacle outside each main exterior door.

L. Electrical receptacles serving food service equipment not located against walls shall be mounted above the floor line on pedestal-type mountings.

M. Pre-kindergarten/kindergarten classrooms and their auxiliary spaces shall have duplex tamper-resistant receptacles installed.

N. Interior lighting shall be controlled by occupancy sensors, automatic timed lighting controlled system or a combination of both to comply with ASHRAE 90.1. Exterior lighting shall be controlled by photo-sensor or astronomical time clock to comply with ASHRAE 90.1. to automatically turn lighting off when sufficient daylight is available.

1.04 OUTLET LOCATIONS

ELECTRICAL OUTLET DEVICE TYPE *(1)*	Masonry Wall, Base (Starter) Course Height 4 inch | 8 inch Mounting Height Above Floor to Bottom of Outlet (Device) Box	
Receptacle outlets, microphone outlets (jacks), equipment outlets (jacks), television outlets (jacks), portable telephone outlets, computer outlets, etc.		
* General throughout	20"	20"
* Mechanical equipment rooms	52"	48"
* Above counter tops 30"H	36"	40"
36"H	44"	48"
48"H	52"	56"
* Above backsplash top	2" minimum	2" minimum
* Above radiators	6" minimum	6" minimum
* Above or adjacent to lavatories	44"	48"
* Behind domestic refrigerators	52"	56"
* Behind domestic washers and dryers	36"	32"
* Serving domestic dishwashers	2"	2"
* Wall-mounted telephone outlets	44"	48"
* Telephone/video control	44"	48"
Toggle switches	44"	44"
Recessed motor controllers	60"	56"
Electric panels, terminal cabinets, etc., to center of tub or box	50"	48"
Clocks	Near ceiling	Near ceiling
Pull stations (fire alarm)	44"	44"
Volume controls, call-in switches, doorbell buttons	44"	44"
Horn/strobes (fire alarm)	80"	80"
(1) Locate device to align with projects' established coursing.		

1.05 FIRE ALARM SYSTEM

A. Fire alarm systems shall be of addressable type, incorporating activation devices such as pull stations, smoke detectors, flow switches, duct detectors**,** etc., and audio visual devices such as horns and strobes.

B. System shall comply with the local building code, Ohio Building Code, National Fire Protection Association, and the Americans with Disabilities Act.

C. Main control panel shall be located in the administrative area with remote annunciator station as main entries, conforming to local jurisdiction requirements.

D. Strobe devices shall have their candela light intensity discharge conforming to the Americans with Disabilities Act and local codes.

E. Visual devices shall be located in spaces occupied by students, instructors, and the public. Audible devices shall be located so device delivers sounds levels that are 15 dB over ambient noise levels in areas occupied by students, instructors, or public to conform to Ohio Building Code.

F. System shall be connected electronically by a digital communicator to an independent monitoring agency or company that is not located on building site premises.

G. A manual pull station shall be provided in food service areas, at each exterior door used as means of egress, and at other locations conforming to Ohio Building Code, National Fire Protection Association, and other local codes.

H. Provide a two-way communication system in spaces designated by the Design Professional as “area for a rescue”. Communication system shall conform to the Americans with Disabilities Act.

I. Provide audible alarm devices in high ambient noise areas such as technology production labs, vocal rooms, and instrumental rooms.

J. Protect fire alarm devices located in gymnasiums, auxiliary gymnasiums, and locker rooms with wire guards.

K. Provide Voice-alarm type fire alarm systems per authority having jurisdiction.

1.06 LIGHTNING PROTECTION

A. Within the base building electrical system cost, the Electrical Design Professional has the option of including an Underwriter’s Laboratory (UL) listed and certified lightning protection.

1.07 ENERGY USE

A. All systems shall be designed in compliance with the current ASHRAE Standard 90.1 “Energy Standard for Building Except Low-Rise Residential Buildings”, and the energy usage requirements prescribed by the Ohio Building Code and the Department of Energy.

1.08 SECURITY SYSTEMS

A. Within the base building electrical system cost, provide the following basic security system conduits.

B. Provide conduit rough-in system only for keypad locations, motion sensors, door contacts, and control panel. Route all door contact conduits to an accessible ceiling area. Coordinate conduit routing and quantities with the Security Technology Designer.

1. Access control provisions for at least three (3) doors (main entrance, staff entrance, maintenance entrance) to include conduit at latch or hinge side, exterior wall box for card reader, interior wall box for keypad.

C. A minimum conduit rough-in system design shall include door contact switches**, *door hardware, access control locations at exterior doors, and interior keypad l*ocations.**

1. Conduits at head of selected interior doors for door position switch.

2. Conduits at the head of all exterior doors for door positions switch.

3. Conduits t latch/hinge side or door for electronic door hardware.

4. 120V power at door for electronic door hardware.

5. Wall boxes with conduit for key pad entry stations.

6. Interior and exterior wall boxes with conduit for proximity device readers.

7. Wall boxes with conduit for intercoms and ADA control stations.

D. Provide external junction box for Security camera mounting on Building. Coordinate Locations with Security Technology Designer. Stub ¾ in. conduit from junction box to the associated Telecommunications Cable Tray.

1. Interior and exterior wall boxes with conduit for wall mounted cameras.

E. Motion Detection system is Optional.

1. Coordinate the need for a motion detector conduit system with the Security Technology Designer.

1.09 TECHNOLOGY

A. Within the base building electrical system cost, provide the following basic Technology rough-ins. Coordinate the placement of all Technology Conduits, boxes and outlets with the Technology Design Professional.

B. Provide telecommunications cable tray above corridor ceiling of academic wings.

1. Provide wire basket style cable tray as the primary cable management system above accessible ceilings throughout main and secondary corridors. Cable tray shall be minimum 12"x4" deep, sized at no less than 50% fill. Coordinate all sizes and placement with the Technology Design Professional.

2. Cable trays shall be installed such that there are the following minimum clearances: 12" above, 6" below, 12" on each side.

3. Cable tray shall connect between all intermediate closets Telecommunication Rooms (TRs) and the Main Equipment Room (ER).

4. Provide a continuous path from all Telecommunications Rooms (TRs) back to Main Equipment Room (ER) using 4-inch Conduits, cable trays or a combination of both, as required by conditions.

5. Provide continuous bonding conductor (minimum #6 AWG), in accordance with NEC-250 and TIA/EIA-607, in all cable trays and bond to associated Telecommunications Grounding Busbar (TGB).

6. J-Hooks and similar support mechanisms are not to be used for main and secondary corridors.

C. Junction boxes used for data/voice/video outlets shall be 2-gang, 3 1/2" deep boxes and equipped with a minimum of a 1" conduit, home run to the associated Telecommunications Cable Tray, except where noted by the ***Technology*** Design Professional.

D. Telecommunications Rooms (TRs) shall be provided with a minimum of two (2) 120-volt, 30 Amp circuits for powering rack mounted UPS Units. Quantity and location of circuits will depend upon requirements of Technology Design Professional. If the building has a standby Generator, these circuits shall be attached to the standby power. General use receptacles, as well as double duplex receptacles shall be provided next to computer/video technologies ports.

E. Provide a minimum of two four (4) in. Riser conduits between floors for Telecommunications cables. Coordinate location and quantities with Technology ***Design Professional.***

F. Provide a continuous cable-tray route into the main Equipment Rooms (ER) and associated Telecommunications Rooms (TRs). Transition the Cable Tray to the Overhead rack cable support system in each of these rooms. As an option, provide 4-inch conduits, in lieu of cable tray thru ER and TR walls. In either case, ensure a continuous cable support system to Equipment racks and cabinets.

G. Fire-stop all penetrations.

H. Classroom ***Instructor/Projector Stations***.

1. Coordinate all classroom ultra-short throw interactive projector and AV Systems conduit and power requirements with the Technology Design Professional.

2. The following indicates general classroom requirements, however, verification is required due to variations in specific classroom AV system layouts.

a. Provide one (1), 2-gang, 3-1/2" deep box for the Classroom Instructor station and one (1) quad power outlet at 18" AFF. In addition, provide one (1), 1-gang, 3- ½" deep box at 18" AFF for the Instructor's technology outlet. Place the Instructor's station and technology outlet boxes side by side.

b. Provide one (1), home run, 1-1/4" conduit from ***Instructor*** station 2-gang box to associated Projector Station box. Provide one (1), home run, 1" conduit from ***Instructor*** station 1-gang box to associated Projector Station box. ***Coordinate box requirements of short-throw projector for stowage of A/V cables.***

c. Provide ***a 1 in. pathway from projector box*** for routing of classroom speakers and IR sensor cable to Instructor Station.

d. Provide two (2) 3/4" in. flexible conduits from Projector box to A/V outlet boxes.

3. Provide one duplex electrical outlet located in electrical box ***for the projector***. Provide circuit from the local computer panel that is equipped with TVSS.

4. Provide one (1), home run, 1 in. conduit from Projector box to the associated Telecommunications Cable Tray.

5. For Overhead Mounted Projector, ***in areas other than typical classroom***, provide one (1) Ceiling Tile Projector Mounting Plate with associated electrical outlet knockout and two (2), 1-gang, 3-1/2" deep boxes for Technology use (projector station) and a 1-gang, dual power outlet mounted in the Ceiling Tile Projector Mounting Plate for Projector and associated Set Top Box power. Connect Technology Outlet boxes to Project pull-box with flexible ¾ in. conduits as noted above.

I. Presentation/HDTV Monitor Stations

1. For small viewing rooms, conference rooms, small non-classroom areas, commons areas, etc., requiring ***an HDTV monitor***, provide one (1), 2-gang, 3-1/2" deep box one (1) quad power outlet at 96" in AFF***(verify height with Technology Design Professional.)*** Provide circuit from the local computer panel that is equipped with TVSS.

2. Provide one (1), 2-gang, 3-1/2" deep box for the ***presentation*** station and one (1) quad power outlet at 18" AFF. Place the ***presentation*** station and technology outlet boxes side by side.

3. Provide one (1), 2-gang, 3-1/2" deep box for the ***HDTV Monitor*** station at 96" in AFF.

4. Provide one (1), home run, 1-1/4" conduit from ***presentation*** station to associated ***HDTV Monitor*** station. Provide one (1), home run, 1" conduit from ***HDTV Monitor*** station to the associated Telecommunications Cable Tray.

J. Computer Labs

1. Provide a minimum 4-3/4 inch high center divided surface applied metal raceway in computer labs where equipment is located on perimeter of room.

2. Provide fire-rated poke-thrus for feeding computer furniture/desks in computer labs. Provide separate poke-thrus for electrical outlets and technology outlets.

3. Extend Technology poke-thru to the associated Telecommunications Cable Tray.

4. Coordinate the need, if any, of separate technology cable pathways with the Technology Design Professional.

K. Computer Stations

1. Provide one (1) 1" conduit for each computer workstation/work area outlet location and extend the conduit to the associated Telecommunications cable tray.

L. Classroom Phones

1. ***Where required,*** provide one (1) 1-gang, 3-½" deep box at 48" AFF on wall by Instructor Location or by Classroom Door (Designer to standardize on location District Wide) for Classroom Phone Instrument.

2. Provide one (1), home run, ¾". conduit from the Classroom Phone box to the associated Telecommunications Cable Tray.

M. Wall-Mounted Phones

1. Provide one (1) 1-gang, 3-½" deep box at 48" AFF on wall for wall-mounted Phone Instrument.

2. Provide one (1), home run, ¾". conduit from the Phone box to the associated Telecommunications Cable Tray.

N. Mechanical Room – Building Automation

1. Provide one (1) 1-gang, 3-½" deep box at 48" AFF on wall for HVAC and Building Automation Equipment in Mechanical rooms. Coordinate Box location with Building Automation System Designer.

2. Provide one (1), home run, ¾". conduit from the Building Automation System box to the associated Telecommunications Cable Tray.

O. Elevator Room – Elevator Phone

1. Provide one (1) 1-gang, 3-½" deep box at 48" AFF on wall in Elevator Equipment Room for Servicing Elevator Phone Equipment. Coordinate Box location with Elevator System Designer.
2. Provide one (1), home run, ¾". conduit from the Elevator Equipment Room box to the associated Telecommunications Cable Tray.

P. Electrical and Mechanical Room Phones

1. Provide one (1) 1-gang, 3-½" deep box at 48" AFF on wall in all Electrical and Mechanical Rooms for a Wall-Mounted Telephone. Coordinate final location with Designer.
2. Provide one (1), home run, ¾ in. conduit from the Electrical and Mechanical Room Telephone boxes to the associated Telecommunications Cable Tray.

Q. External Paging Horns

1. Provide external junction box for Paging Horn mounting on Building. Coordinate Locations with Paging Technology Designer. Stub ¾ in. conduit from junction box to the associated Telecommunications Cable Tray.

R. External Wireless Antennas

1. Provide external junction box on Building for External Wireless Antenna Cable Routing. Coordinate Locations with Wireless Technology Designer. Stub 1 in. conduit from junction box to an accessible ceiling area. The associated Wireless Access point must be mounted inside of the building, in an accessible space and within 20-25 feet of the external antenna.

S. A/V Cabinets

1. Provide all wall-mounted, A/V cabinets AND Specialized Audio Cabinets with a quad electrical outlet located inside of associated cabinet. ***Provide circuit from the local computer panel that is equipped with TVSS.***

2. Provide one (1), home run, ¾" conduit from the AV cabinet to the associated Telecommunications Cable Tray.

3. Provide a minimum of one (1), 2" Conduit stubbed from the wall-mounted A/V cabinet to above the ceiling for routing of A/V and Speaker cables. Install bushings on both ends of stub conduit. Coordinate requirements with Technology Designer.

T. Service Providers

1. Provide a minimum of one (1), 4" conduit for Wide Area Network (WAN) from the Main Telecommunications Equipment Room (ER) to the property line.

2. Provide one (1), 4" conduit for cable television (CATV) from the Main Telecommunications Equipment Room (ER) to the property line.

3. Provide one (1), 4" conduit for the telephone from the Main Telecommunications Equipment Room (ER) to the property line.

4. Concrete encase and reinforced all underground entrance conduits.

5. Stub all Entrance conduits up at associated Utility Poles.
6. Note that all Entrance conduits may NOT terminate at same Service Provider Pole. Coordinate location with Service Providers.

7. Provide nylon pull-ropes in all Entrance Conduits.

8. When the Entrance Facility is not located in the Main Technology Equipment Room (ER), (Remodels, for example), provide a minimum of two (2), 4" conduits from the Service Provider Entrance (DEMARC) to the Main Telecommunications Equipment Room (ER).

9. Provide outside system plant (OSP) infrastructure to comply with current BICSI COOSP Standards and Practices. Coordinate specific requirements with each Service Provider.

U. Low Voltage Sleeves

1. Provide one (1), 2 in. sleeve, with bushings, in all block walls, for telecommunications cables, as required.

2. Note, not all of the Telecommunications cables are run in conduits, for example, paging speaker cables are installed using J –Hooks, etc. and require sleeves to enter all rooms.

1.10 TELECOMUNICATIONS GROUNDING

A. Within the base building electrical system cost, provide Telecommunications Grounding/Bonding System in accordance with NEC-250 and TIA/EIA-607 using approved Grounding Hardware. CAD Weld Bonding Conductors to Building Steel.

B. Provide Telecommunications Main Grounding Busbar (TMGB) in Main Equipment Room (ER).

1. All TMGB Connections to be made with double-bolted, Compression style, Grounding Lugs.

2. As a minimum, Bond TMGB to following:

a. Building Steel (minimum #2 AWG insulated copper bonding conductor).

b. Main Electrical Service Ground (minimum #2 AWG insulated copper bonding conductor.)

c. Local Service Panel Ground (minimum #6 AWG insulated copper bonding conductor.)

d. Telecommunications Bonding Backbone (TBB) that connects to TMGB to other TGB's ***(size per BICSI TDMM) – Optional.***

e. Associated Telecommunications Cable Tray(s) ***(continuous #6 AWG bar copper bonding conductor connecting all Cable Tray sections.)***

f. Telecommunications Conduit(s) Entering ER (minimum #6 AWG insulated copper bonding conductor).

C. Provide Telecommunications Grounding Busbar (TGB) in all Telecommunications Rooms (TRs) and AV Equipment Cabinets.
   1. All TGB Connections to be made with double-bolted, compression style grounding lugs.
   2. As a minimum, Bond TBG to following:
      a. Building Steel (minimum #2 AWG insulated copper bonding conductor).
      b. Local Service Panel Ground (minimum #6 AWG insulated copper bonding conductor.)
      c. Telecommunications Boding Backbone (TBB) that connects TGB to other TGB's and TMGB ***(size per BICSI TDMM) – Optional***.
      d. Associated Telecommunications Cable Tray(s) ***(continuous #6 AWG bare copper bonding conductor connecting all Cable Tray sections.)***
      e. Telecommunications Conduit(s) Entering TR (minimum #6 AWG insulated copper bonding conductor).

D. As a minimum, the Technology Contractor shall bond the following devices to the associated TMGB and TGBs using a minimum #6 AWG insulated copper bonding conductor using compression style lugs:
   1. PABX Equipment
   2. Equipment Racks and Cabinet
   3. TR Cable Ladder and Tray
   4. CATV Equipment
   5. Lighting and Surge Protectors
   6. Telecommunications Devices
   7. Coupled Bonding Conductors (CBC's)
   8. Backbone Cable Shields
   9. Telecommunication and Fiber Cable Shields
   10. Antenna Cable Shields
   11. Raised Floors
   12. Antenna Masts

END OF SECTION

PURPOSE

The purpose of this chapter is to provide a design standard and a level of quality for the systems and materials to be incorporated into new buildings for the Career-Technical Facilities Assistance Program which are not addressed within the Design Manual.

SYSTEMS

Only those major building systems which differ from or are in addition to those stated within the original Design Manual will be listed in this chapter.

In this Career-Technical Section to the Design Manual, no attempt has been made to recommend or describe the means and methods of assembling the various systems.

MATERIALS

With purpose, the materials mentioned in this chapter are generic. No brand or manufacturer's names are stated. Materials other than those mentioned in this chapter, which meet or exceed the characteristics or performance of the stated materials, will be considered, provided adequate information is submitted for approval by the Design Professional and the Ohio Facilities Construction Commission. Alternate materials which exceed the cost of materials indicated in the Career- Technical Section of Opinion of Probable Cost in Chapter 1 will be at the school district's cost.

DESIGN CODES AND STANDARDS

It is recommended that all school spaces used primarily by children shall be designed in accordance with the proposed new ADA regulations for children ages 3 through 12. Areas used primarily by students 13 and over and by adults are to be designed in accordance with current ADA regulations. All buildings should adhere to all current codes and standards. Efforts in design should be made to reduce energy consumption to at least 30% below international energy conservation code 2000.

DESIGN FOR SAFETY / SECURITY

Design Professionals and educators are encouraged to embrace the concept known as Crime Prevention Through Environmental Design (CPTED). CPTED encourages planners to include safety elements into a building design at the earliest stages. Examples are administration control at main entrances, avoiding corridors with too many hidden spots, and fewer entrances.

ENERGY USAGE

All systems shall be designed in compliance with ASHRAE STANDARD 90.1 “Energy Standard for Building Except Low-Rise Residential Buildings”, and the energy usage requirements prescribed by the Ohio Building Code and the Department of Energy.

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A. APPLICATION

1. Used at high bay labs only (Programs 5-7).

2. Locate 8'-0" above finished floor and higher.
   Provide masonry below metal panels.

B. COMPONENTS

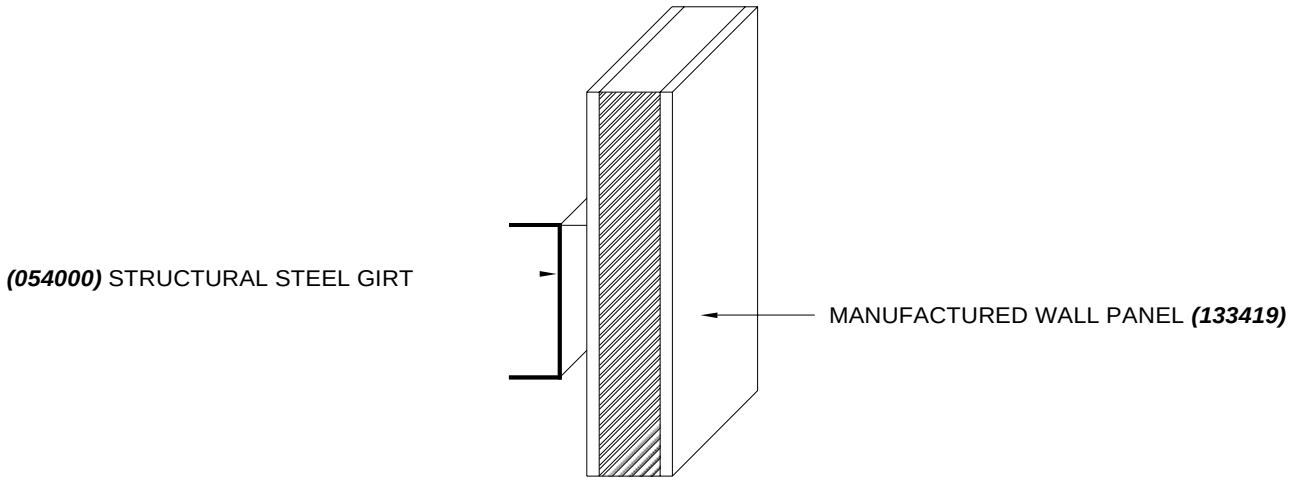
1. Exterior Finish
   a. 24 gauge stucco embossed G-90 galvanized steel with high performance finish

2. Core
   a. Foamed in-place urethane insulation.

3. Interior Finish
   a. 24 gauge white stucco embossed G-90 galvanized steel.

C. PERFORMANCE

1. Features
   a. Impact resistant
   b. Moisture resistant
   c. Thermal resistant



Manufactured Wall Panel
Figure A-1

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METAL ROOF WITH BATT INSULATION

A. APPLICATION

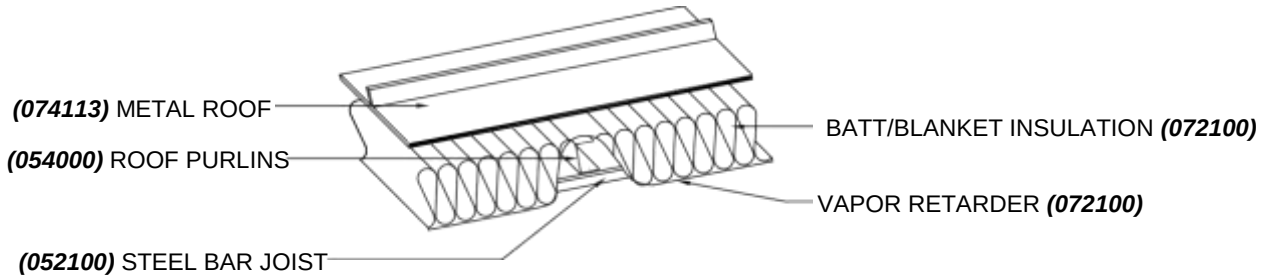
1. Steep Roofing

B. COMPONENTS

1. Roof Membrane
   a. Metal roof
2. Roof Insulation
   a. Batt/blanket insulation
3. Vapor Retarder
   a. Where required. Refer to Chapter 9.
4. Structural Support
   a. Roof purlins
5. Slope
   a. Minimum .25:12

C. PERFORMANCE

1. Features
   a. Impact resistant
   b. Moisture resistant
   c. Thermal resistant



Metal Roof with Batt Insulation
Figure A-1

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1.07 PLUMBING FIXTURES/PLUMBING SPECIALTIES (Add the following)

L. Floor drains shall be installed in each large group restroom, locker room, mechanical room, kitchen area, and high - bay labs. Provide a sediment bucket in the floor drain if conditions exist where solids may enter the drain. Provide ***an exterior*** oil interceptor at drains if conditions exist where oil, gasoline, etc. may enter the drain.

P. Install a cold water hose bibb in each large group restroom, locker room and mechanical room. The hose bibb shall be ***recessed*** behind a lockable door in restrooms and locker rooms, with access by a removable key handle. All high - bay labs shall receive keyed hose bibbs.

W. Provide trench drains on interior side of all overhead doors located within high - bay labs. Provide a sediment bucket in the drain if conditions exist where solids may enter the drain. Provide ***an exterior*** oil interceptor at drains if conditions exist where oil, gasoline, etc. may enter the drain.

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SECTION 1.05: AIR FLOW RATES FOR BUILDING SPACES (Add the following)

	SPACE	SUPPLY AIR	EXHAUST AIR
14.	Professional Labs (Program Types 1-4)	6 air changes/hour	N/A
15.	High Bay Labs (Program Types 5-7)	6 air changes/hour	0.5 cfm/SF

* See program summaries in Chapter 6 for additional HVAC requirements.

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1.02 LIGHTING (Add the following)

B. High volume space such as student dining, high - bay labs, etc. shall be illuminated with high-efficiency, high-intensity discharge lamp type light fixtures. Quartz restrike options shall be incorporated into some fixtures to provide an average of 2 footcandles of illumination during the cool-down/warm-up (restrike) period caused by momentary electrical outages.

SCHOOL LIGHTING LEVELS (add the following)

Room Type Classification	1993 IES	Recommended Minimum Footcandles
Professional Labs (program types 1-4)	-	***50***
High Bay Labs (program types 5-7)	-	60

INTRODUCTION

Specifications define the qualitive requirements for products, materials, and workmanship upon which the content is based. They are organized into ***50*** Divisions and ***6*** digit numbering system. Section titles have been closely coordinated with the numbering system established in CSI's ***new*** Masterformat ***2004*** Edition. In certain instances, section titles vary slightly from those recommended, but only where necessary to make them correspond more closely to text subject matter.

The specifications are no more than outlines complied to establish minimum quality requirements. They do not cover all materials required for a complete Project and do not attempt to include every possible variable, particularly where doing so would require an almost unlimited number of choices. These specifications are not to be used as bid documents.

Specifying methods include both performance (a statement of required results with criteria for verifying compliance, but without unnecessary limitations on the methods for achieving the required results) and reference standard (requirements set by authority, custom, or general consensus and are established as accepted criteria). There was no attempt to establish these specifications based on proprietary specifications which identify the desired products by manufacturer's name, brand name, model numbers, type designation, or other unique characteristics.

Section format conforms to 3 part arrangement developed by CSI and accepted by the Design Professionals to achieve uniformity in locating and organizing specification content.

Streamlined language is used where possible to describe requirements for products, systems, and processes. In these instances a generic term is punctuated by a colon and then followed by a list of requirements without a linking verb such as "shall be" or "provide" which is implied by colon.

Spelling and punctuation conform as closely as possible to current standards of usage. If conflicts occur between spelling of words in the dictionary versus industry practices, the latter takes precedence.

Minimums and maximums are defined in text only where possibility of confusion exists. Otherwise, because of the nature of this document, it shall be assumed items indicated in documents are guidelines and shall be adhered to, unless discussed with state authority.

Abbreviations included in text are defined in Chapter 1.

Demolition: Although Chapter 9 does not include an outline specification on demolition, special emphasis should be placed on recycling. With a demolition project, a recommendation should stress the need to recycle ceiling tile, carpet, and other materials where recycling programs are available.

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DIVISION 01

GENERAL REQUIREMENTS

TABLE OF CONTENTS

DIVISION 01: GENERAL REQUIREMENTS

013100	Project Management and Coordination
014000	Quality Requirements
015000	Temporary Facilities and Controls
015800	Project Identification
017419	Construction Waste Management and Disposal
017700	Closeout Procedures
018113	Sustainable Design Requirements
019100	Commissioning

SECTION 013100

PROJECT MANAGEMENT AND COORDINATION

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Administrative guidelines for project management and coordination.

1.2 BUREAU OF BUILDING CODE COMPLIANCE MEETING

A. Bureau of Building Code Compliance Meeting: CM will schedule a Building Code Compliance with Authorities with Jurisdiction, [Division of Industrial Compliance, 6606 Tussing Road, Reynoldsburg, Ohio 43068, (614)644-3334, www.com.ohio.gov.,] at a time convenient to Owner, CM, and A/E, after execution of the Agreement and before beginning any on-site construction activities. Hold conference at Project Site or another convenient location. Conduct the meeting to review inspection responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, CM, A/E, and their consultants; Contractor and its superintendent; major subcontractors; testing agency; and other concerned parties shall attend the conference. All participants at conference shall be familiar with project testing and inspection requirements.

1.3 PRE-INSTALLATION CONFERENCES

A. Pre-installation Conferences: A/E will schedule and conduct a pre-installation conference at Project Site before each construction activity that requires coordination with other construction and as indicated in the Contract Documents.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise A/E and CM of possible meeting date a minimum of 72 hours in advance. A/E will schedule meeting.

LESSONS LEARNED

3.1 Modern technology has contributed to the development of many new building products. These new products and the creative use of existing materials by some architects have lead to many innovative construction procedures. As architects take advantage of the increasing availability of new materials, complicated installation details have become standard. Consequently, many building projects now include complex assemblies of materials that require more-than-normal care to execute.

3.2 Difficult material installations and complex assemblies usually demand considerable skill on the part of the Installer. When two or more trades are involved in an installation, close coordination is necessary to achieve satisfactory results. However, when assembly or installation is difficult or intricate, close coordination between the trades is *essential* to avoid problems or material failures. This is true of the mason and roofer for coordination of the thru-wall flashing at roof-wall intersections. It is recommended that special coordination meetings be required to address issues necessary to assure quality construction.

A. When a building project requires an unusual assembly of materials, a pre-installation conference is usually advisable to review installation procedures and establish responsibilities. Pre-installation conferences are also desirable for many routine construction operations such as built-up roofing and waterproofing. To avoid problems and material failures, many architects require pre-installation conferences to coordinate the installation of specific products or systems.

3.3 Pre-installation Conferences as Quality Assurance: Many architects have found that the pre-installation conference is their first opportunity to assess the Installer's understanding of the quality requirements in the specifications, and bring to their attention any special requirements or experience from past projects that may help avoid quality issues and rejected work. Through participation in pre-installation conferences and in reviewing of mockups, the Architect is able to assist the Owner in obtaining a better quality installation; consideration should be given those work results that would most benefit from a requirement for a pre-installation conference, as the conferences require a time and cost commitment from the Contractor and from the Architect.

3.4 Advantages: During a pre-installation conference, participants review conditions under which they will perform their work, resolve minor problems that may otherwise hinder or delay progress, and discuss procedures that require cooperation.

A. A pre-installation conference should not be held just to make the parties aware of each other's problems; these issues should be discussed at a regular progress meeting before installation begins.

3.5 Timing: A pre-installation conference should not be scheduled before preliminary work is complete. However, it should be held early enough to resolve potential problems; one week before installation begins is sufficient for many installations. For complex installation involving many trades and critical substrates, several sessions may be needed to clarify all issues.

3.6 Attendees: The Contractor's superintendent, the Architect's field representative or project manager, the Construction Manager, the subcontractors, and materials suppliers should attend pre-installation conferences. Often, representatives of various manufacturers, officials of testing agencies, and local building inspection officials also attend.

3.7 Location: A pre-installation conference is typically held at the jobsite to enable participants to review field conditions and evaluate critical substrates and other preparatory work, if necessary.

3.8 Agenda: The following issues are usually discussed at pre-installation conferences:

A. Procedures Review: Participants in a pre-installation conference review essential procedures the parties must follow, from initial preparation to protecting the completed installation. The conference gives participants an opportunity to review the sequence of operations. Some projects require special procedures for an installation, and this meeting gives the parties an opportunity to ensure that everyone understands these special procedures as well as their responsibilities regarding following them.

B. Conditions Review: Participants in a pre-installation conference should review pertinent conditions about installation, including timely access to the Work and environmental concerns. This conferences gives participants an opportunity to review the status of previously completed work before installation begins. If unsatisfactory conditions are

discovered, the party responsible for the problem must take corrective action to remedy the situation without delaying progress.

C. Schedules Check: A final review of all schedules for installation is a major agenda issue for pre-installation conferences. For large installations, staggered material delivery may help maintain progress without creating storage problems on-site. However, staggered material delivery must be carefully coordinated with work progress at all stages to avoid material storage at critical points in the installation process.

D. Mockup Evaluation: On many projects, architects require the construction of mockups to establish the standard of performance of some critical construction operations. Pre-installation conferences give the participants an opportunity for a final review and evaluation of the mockups.

END OF SECTION

SECTION 014000

QUALITY REQUIREMENTS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Administrative guidelines for quality assurance and quality control.

1.2 PRIME CONTRACTORS QUALITY CONTROL PLAN

A. Quality Control Plan, General: Each Prime Contractor shall submit quality-control plan not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

B. Quality Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
   1. Project quality control manager may also serve as Contractor superintendent or foreman.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: Include in quality control plan a comprehensive schedule of Work requiring testing or inspection, including the following:
   1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
   2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
   3. Owner-performed tests and inspections indicated in the Contract Documents including test and inspections indicated to be performed by the Commissioning Authority.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.3 QUALITY ASSURANCE

A. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using material indicated for the completed Work:
   1. Build mockups in locations and of size indicated or, if not indicated, as directed by Architect.
   2. Notify Architect and Construction Manager seven days in advance of dates and times when mockups will be constructed.
   3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at the Project.
   4. Demonstrate the proposed range of aesthetic effects and workmanship.
   5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
      a. Allow seven days for initial review and each re-review of each mockup.
   6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

LESSONS LEARNED

3.1 Mockups are full-size representations of the construction, materials, and finishes required by the Contract Documents. They can be used to verify selections made under Sample submittals, to demonstrate aesthetic effects, to provide coordination between elements, and to demonstrate the qualities of products and workmanship. Mockups are especially useful when quality of workmanship is a particular concern and is difficult to specify and enforce through reference to industry standards. For all but the simplest of mockups described in the specifications, Drawings delineating the extent and location of mockups are typically provided. The Architect may wish to observe the construction of mockups. The Contractor's construction schedule should indicate adequate time for construction and approval of mockups. Extensive mockups should also be included as a line item in the schedule of values.

A. Mockups may simply be a portion of the Work completed for review prior to proceeding, or they may be extensive freestanding construction intended for demolition upon completion and acceptance of the Work. The individual specification sections indicate which type of mockup applies to which element of the Work.

B. Freestanding masonry mockups can be excellent opportunities for "Quality Assurance" measures to verify flashing.

C. Integrated exterior mockups incorporate mockup elements specified in several Specification Sections into a single, usually free-standing, assembly that also demonstrates successful interface between different materials and systems. Integrated mockups may be a valuable tool in enhanced building commissioning.

D. Room mockups are full-size representative construction of one or several typical room types that may incorporate all specified materials, including fixtures and equipment. Room mockups are often used in projects to provide final verification of specified materials as well as to demonstrate an acceptable level of workmanship.

END OF SECTION

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Administrative guidelines for temporary utilities, support facilities, and security and protection facilities.

1.2 TEMPORARY UTILITY INSTALLATION

A. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

B. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with approved coordination drawings.
   a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
   b. Maintain negative air pressure within work area using HEPA-equipped air filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

C. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilations requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification system when required to reduce substrate moisture levels to levels required to allow installation, application of finishes, and minimize the potential for mold growth.

1.3 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
   1. Protect porous materials from water damage.
   2. Protect stored and installed material from flowing or standing water.
   3. Keep porous and organic materials from coming into prolonged contact with concrete.
   4. Remove standing water from decks.
   5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers, but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
   1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
   2. Keep interior spaces reasonably clean and protected from water damage.
   3. Periodically collect and remove waste containing cellulose or other organic matter.
   4. Discard or replace water-damaged material.
   5. Do not install material that is wet.
   6. Discard, replace, or clean stored or installed material that begins to grow mold.
   7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
   1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
   2. Use permanent HVAC system to control humidity.
   3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
      a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
      b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record daily readings over a forty-eight hour period. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
      c. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

LESSONS LEARNED

3.1 Temporary Utilities

A. Temporary Heating and Cooling: Construction procedures require minimum temperatures for proper curing or drying. Architects should specify minimum temperatures for construction operations in the Sections for specific activities. Includes requirements for minimum temperatures in enclosed portions of the building to forestall the possibility of damage to the completed construction.

3.2 Security and Protection

A. Work in facilities may require special considerations for dust control and isolation of the building HVAC system. In addition to dust-tight temporary partitions, dust controls at openings to the work area, walk-off mats, negative pressurization, and independent temporary ventilation may be required.

B. Temporary fire-protection provisions in the Section Text are essential but basic. Contractors must keep temporary fire protection operational until permanent fire protection is available. If permitted by the Owner, once permanent facilities are completed and placed in service, the Contractor may remove temporary facilities. Review provisions with the Owner's insurance carrier to see if additional provisions will result in lower premiums; also review NFPA 241, *Safeguarding Construction, Alteration, and Demolition Operations*, before editing these provisions.

3.3 Environmental Considerations

A. Mold and Moisture Protection: In order to deliver a finished facility that is free of moisture damage and mold growth, the Contractor is responsible for taking appropriate steps during the construction to control the ingress of moisture, protect hygroscopic materials, and maintain a clean jobsite. Recommended procedures for controlling moisture during construction are well presented in the Associated General Contractors of America publication, *Managing Risk of Mold in the Construction of Buildings*.

B. Dust, Fume, and Odor Control: Construction sites inherently product dust- and fume-producing environments. Work in occupied facilities poses special challenges with respect to protection of the occupants and maintenance of acceptable indoor air quality. Include general provisions for dust control, maintaining negative air pressure, and separating HVAC systems that are intended to protect occupants from pollutants generated by construction operations.

END OF SECTION

SECTION 015800

PROJECT IDENTIFICATION

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Signage identifying the construction and project team.

1.2 MATERIALS

A. Lumber and Plywood
   1. For signs and directory boards, provide exterior marine plywood of sizes and thicknesses indicated.
   2. Treated lumber posts.
      a. Preservative chemicals: Shall contain no arsenic or chromium.

B. Paint
   1. For sign panels and applying graphics, provide exterior grade alkyd gloss enamel over exterior primer.

1.3 PROJECT IDENTIFICATION

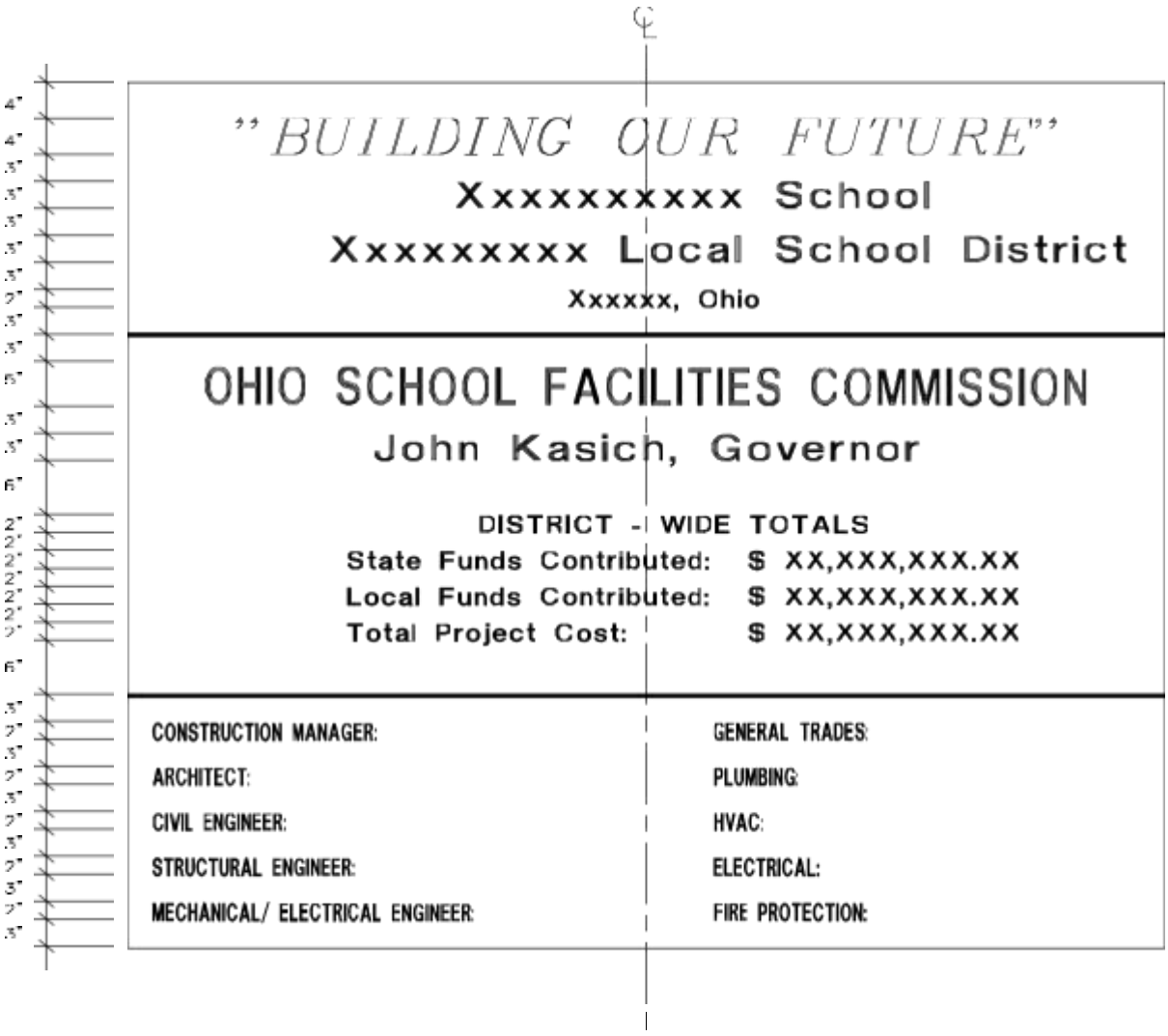
A. Project Identification and Temporary Signs: Prepare project identification and other signs of size indicated. Support on posts of framing of preservative treated wood or steel. Do not permit installation of unauthorized signs.
   1. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated.
   2. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.

LEED SUGGESTIONS

2.1 A. Credit EQ 4.4: For composite-wood products, consider using products containing no urea formaldehyde.

B. Credit MR7: For wood products consider using materials obtained from forests certified by an ***FSC***-accredited certification body to comply with FSC STD-01-001, “FSC Principles and Criteria for Forest Stewardship.”

END OF SECTION



PROJECT SIGN NOTES:

1. (1) SIGNBOARD – 8'–0" X 8'–0" X 3/4" MARINE PLYWOOD
2. LETTERS – GREEN ON WHITE BACKGROUND/STRIP AND BORDER RED/ SIZES AS NOTED
3. (2) POSTS 10'–0" (4" X 4")/FIR TREATED AND PAINTED BROWN
4. CROSS BRACE 2" X 4" X 5'–0"/LET INTO POSTS
5. (4) CARRIAGE BOLTS 5/8" X 5" WITH WASHERS
6. LOCATION DETERMINED BY ARCHITECT IN FIELD
7. LETTER STYLE TO BE "HELVETICA MEDIUM"

SECTION 017419

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Salvaging nonhazardous demolition and construction waste.

B. Recycling nonhazardous demolition and construction waste.

C. Disposing of nonhazardous demolition and construction waste.

1.2 PERFORMANCE GOALS

A. Salvage/Recycle Goals: As much demolition and construction waste as possible.

1.3 WASTE MANAGEMENT PLAN

A. Types and quantities of demolition, site-clearing, and construction waste.
   1. Plan shall be approved by Construction Manager.
   2. Train workers, subcontractors, and suppliers on waste management plan.
   3. Distribute waste management plan to entities when they first begin work on-site.

B. Type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator.

1.4 RECYCLING WASTE

A. Recycling Incentives: Revenues and other incentives for recycling will accrue to Contractor.

LEED SUGGESTIONS

2.1 LEED for Schools includes credits for diverting materials from landfills. The project team is encouraged to work together to establish project goals for these credits.

LESSONS LEARNED

3.1 Everyone on the project team, including vendors, should be made aware of the project goals so materials are not disposed of that could have been salvaged. Signs should be posted at the waste collection areas indicating what should be done to accomplish project goals.

END OF SECTION

SECTION 017700

CLOSEOUT PROCEDURES

GENERAL GUIDELINES

1.1 TORNADO SHELTER AREAS

A. The 1999 “National Performance Criteria for Tornado Shelters” provided by FEMA recommends providing 5 SF per person standing (10 SF for wheelchair) for shelter area. The 1998 National Fire Code also has recommendations. The Design Professional for new school facilities should assist the school district in selecting the most obvious shelter areas. Shelter areas should be ADA accessible and could include toilet rooms, locker rooms, spaces below structural decks, smaller interior rooms, in spaces with short ceiling spans, and in the center of the building.

B. It is not the intent of this section to require construction or improvement of a facility or area for use as a tornado shelter. Identified spaces should avoid walls of glass, windows, skylights, exterior walls, long open corridors, and modular classroom buildings.

C. Prior to completion of required closeout items, the Design Professional shall submit, through the Construction Manager, to the school district, a floor plan indicating recommended tornado shelter areas for the building(s) involved. The floor plan shall be small scale and indicate spaces to provide 5 SF per occupant plus reasonable space for wheelchair occupants.

D. OFCC and others involved in the development of this project closeout section do not make any representation, warranty, or covenant, expressed or implied, with respect to performance or results from recommendations herein.

1.2 PROJECT RECORD DOCUMENTS

A. The Design Professional shall provide record documents to the School District prior to final completion. The record documents shall be in conformance with the requirements of A/E Contract Article 2.7.16, CM Contract Article 2.7.16 and 2.7.14, General Conditions Article GC 11.2.1, and other provisions of the closeout process as determined by the OFCC in accordance with the Policy and Procedure Memorandums.

END OF SECTION

SECTION 018113

SUSTAINABLE DESIGN REQUIREMENTS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. USGBC Leed for Schools: Silver certification based on LEED for Schools.

B. A copy of the LEED project checklist is to be submitted by the Design Team to the OFCC at each phase submission and shall be attached to the this section for contractor's information only.

1.2 SUBMITTALS

A. LEED Action Plans: The Design Team is encouraged to work with the Construction Team to develop an "Action Plan" within 30 days of date established for the Notice to Proceed:
   1. The "Action Plan" shall indicate contractor strategies for obtaining construction phase credits.

B. LEED Progress Reports: Contractor shall, with each Application for Payment, compare construction and purchasing with LEED action plans.

C. LEED Documentation Submittals: Contractor shall provide product data, receipts, certification letters, chain-of-custody certificates, and other documentation needed to show compliance with requirements.

LESSONS LEARNED

3.1 A LEED Action Plan can provide reassurance that the contractors understand the LEED requirements and can help to clear up misunderstandings before they become a larger problem.

3.2 It Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period, verify installation of filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for air-handling system used during construction. Verify all filters are replaced prior to occupancy with MERV ***rating indicated in the project specifications.***

END OF SECTION

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SECTION 019100

COMMISSIONING

Spec Writer Note: Development of this specification section requires coordination with the project CxA. The CxA will assist with developing this section to properly reflect the scope of work for the project.

GENERAL GUIDELINES

1.1 Referenced Standards
- A. LEED for Schools Credit EAp.1 and EAc3
- B. ASHRAE Guideline 0 - 2005
- C. ASHRAE Guideline 1.1 - 2007

1.2 Related Documents

A. Owner Project Requirements (OPR), Basis of Design (BOD), Construction Drawings and Specifications, LEED documentation, Provisions of the Commissioning Services Contract, including General Conditions and Requirements, Supplementary Conditions, Revisions and other Specification sections, apply to work in this section.

1.3 Definitions

School District (SD or Owner)
Ohio Facilities Construction Commission (OFCC or Co-Owner) Ohio School Design Manual (OSDM)
Architect/Engineering Firm (A/E)
Construction Manager (CM)
Commissioning (Cx)
Commissioning Authority (CxA)
Test and Balance (TAB)
Owner's Project Requirements (OPR)
Basis of Design (BoD)
United States Green Building Council (USGBC)
Design Team (A/E, CM)
Project Team (A/E, CM, Contractor, Owners)
LEED Accredited Professional (LEED-AP)
Commissioning Team (SD, OFCC, CxA, CM, HVAC contractor, ATC contractor, TAB contractor, electrical contractor, plumbing contractor, general contractor.)

1.4 General Work Included

A. This section describes the process for commissioning of the various building systems, defines the responsibilities for the Project Team, and outlines the duties of parties involved.

B. The commissioning process may be applied to all equipment, components, and systems to be commissioned as listed in Part 3 of this section, including specified interfaces to and from equipment and systems provided under the other Divisions of this Specification.

C. LEED for Schools EAp1 - Fundamental Cx- INTENT: Verify that the building's energy-related systems are installed, calibrated, and perform according to the Owner's Project Requirements, Basis of Design, and Construction Documents.

D. LEED for Schools EAcr3 - Enhanced Cx - INTENT: Begin the Cx process early during the design process and execute additional activities after systems performance verification is completed.

1.5 Commissioning Authority

A. The CxA shall confirm that major building systems in newly completed school facilities are good operational systems that are low on maintenance and operating costs and perform interactively according to the contract documents.

B. Basic Services provided by the CxA are defined as services starting in the design phase through the warranty phase and include seasonal Cx. The CxA shall review design documents per LEED for Schools, develop a project specific Cx specification, develop and coordinate the execution of a testing plan, which includes observing and documenting system's performance to ensure that systems are functioning in accordance with the design intent of the contract documents and School District objectives.

C. The CxA will conduct and document commissioning meetings.

D. The CxA is not responsible for design or general construction scheduling, cost estimating, construction management, or performing corrective work, but shall assist with problem solving or addressing non conformance issues or deficiencies as identified by the CxA.

E. (Spec Writer Note: Identify the CxA hired by the School District to act as the CxA for the project and insert into this paragraph.) The CxA is responsible to the owner and shall have the authority to recommend final acceptance of each system commissioned.

1.6 Design Team (A/E and CM)

A. A/E will prepare the BoD and the construction documents per the OPR and the OSDM. This information must be submitted to the CxA for review.

B. A/E is responsible for the LEED process for the project.

C. A/E shall respond to the commissioning issues log.

D. The CM shall attend the commissioning meeting.

E. The CM shall prepare the Indoor Air Quality (IAQ) plan to be reviewed by the CxA per LEED for Schools EQc3.

1.7 Contractors

A. The appropriate contractors shall be responsible for cooperating and coordinating their work during the commissioning process. They shall be responsible for performing all work required for the installation of the components and systems, and for operation during the commissioning process. They shall furnish all necessary resources to accomplish the installation and the commissioning.

B. Within 30 days of the award of Contract, the Contractor shall submit the names of all the trades people who will be part of the commissioning process. The Contractor, and all his sub-trades and suppliers, shall cooperate with the CxA in the commissioning process.

C. At the initial commissioning scope meeting, to be held within 90 days of contract award, the contractor shall review the project schedule and identify the milestone commissioning activities. Milestone commissioning activities shall include, but are not limited to; equipment start-ups, system start-ups, testing activities performed by the contractor, readiness of each major system, and system functional testing as part of the commissioning process.

D. Contractor shall attend commissioning meetings, and complete action items arising from them, as required to allow the commissioning process to proceed on schedule.

E. Contractor shall complete and provide all system readiness documentation required by the commissioning process.

F. Contractor shall provide a Start-up Plan for each piece of equipment and system that is identified to be commissioned. Notify the CxA a minimum of seven (7) calendar days before start-up of major equipment and systems.

G. Contractors shall perform functional performance testing as specified in the CxA functional performance testing procedures.

H. Contractor shall provide personnel and testing instrumentation required to operate and test equipment and systems as part of functional performance testing. Testing may include calibration verification of system devices. Testing shall take place under the direct supervision of the CxA. Contractor shall be responsible for reimbursing the Owner and CxA for costs associated with retesting of systems that fail initial testing.

1.8 Commissioning Documentation

A. Commissioning Plan - Created by the CxA during the design phase of the project to identify scope of commissioning for the project and a preliminary schedule of activities for use during the project by members of the Commissioning Team.

B. Commissioning Specification – Created by the CxA during the design phase of the project to be inserted into the construction documents. Specification shall include a sample test form for all major equipment.

C. Meeting Minutes – Issued to members of the Commissioning Team after each commissioning progress meeting. Generated by the CxA.

D. Commissioning Schedule – Produced by the CxA with the input from the CM and the Commissioning Team contractors.

E. Design Phase documents – A/E will define the design intent for the Owner and for establishment of a basis for the Cx process. CxA will perform a design peer review report of the Owner's project requirements (OPR), Basis of Design (BoD), MEP Design Documents and the energy model. All documentation must be in compliance with LEED for Schools Credit EAc3 at each phased submission.

F. Start-up Plan – Submitted by the Contractor to identify methods to be used for equipment pre-checks, start-up procedures, start-up schedule, and sample reports to document completion. The Contractor shall document all equipment deficiencies and corrections made in the field as part of start-up report. Gather all appropriate utility information.

G. Envelope Testing Plan – CxA shall develop a envelope testing plan, schedule and reports. Schedule shall be coordinated with the CM and contractors.

H. Construction Phase documents – CxA shall provide a peer review and any comments on shop drawings to the designer of record. The CxA shall perform a peer review of the As-built documents at the end of the project.

I. Test Reports – Reports generated by the Contactor to document system/equipment testing included in the contact that is not dictated by the CxA. (i.e. hydrostatic pipe test report, pipe flushing & disinfection report, air & water balance report, etc.) CxA shall provide a review of these test reports.

J. Commissioning Issues Log – Identifies system deficiencies found through the commissioning process, updated and issued by the CxA.

K. Functional Tests – Created by the CxA, reviewed by the Project Team and the Commissioning Team contractors, for use during functional testing of each system. Test shall incorporate the Engineers sequence of control.

L. Training Plan – Submitted by the Contractor identifying personnel providing training and their qualifications, training supplemental materials and training session agendas for review by the CxA. Operation and maintenance manuals and as-builts shall be submitted to the CxA and the A/E to ensure completeness.

M. Systems Manual – CxA shall compile the System Manual for the owner. System manual shall consist of the OPR, design narrative and BOD (by A/E), CxA narrative, performance metrics for pre design (by A/E), control drawings (ATC), table of setpoints (by A/E and ATC), energy saving strategies (by A/E), As-Built drawings (CM, A/E and contractor), re-commissioning plan and energy tracking recommendations.

N. Final Commissioning Report – Provided by the CxA summarizing results, status of remaining operating deficiencies, and future actions and nonactions.

O. Re-commissioning manual – Provide by the CxA to identify a re-commissioning plan in compliance with LEED Eac3.

P. Commissioning Complete document– Formal Cx Project Complete document with sign-off to add finality to project.

Q. Post-Acceptance Phase documents – CxA will provide a near-warranty-end review of commissioned equipment. CxA will participate in a project close-out meeting / walk-thru with the construction team near the end of the warranty period to review and provide updates of any remaining construction issues. CxA will provide a letter report, summarizing the status of any remaining construction issues after conducting this “End of Warranty Period” walk-thru.

1.9 Testing Equipment & Instrumentation

A. The Contractor shall provide all industry standard test equipment required for performing the specified tests. Any proprietary vendor specific test equipment shall be provided by that vendor or manufacturer.

B. Any portable or hand-held setup / calibration devices required to initialize the control system shall be made available by the control subcontractor at no cost to the CxA or Owner for use during functional testing or pre-check inspections.

C. The Contractor's instrumentation shall be of sufficient quality and accuracy to test and/or measure system performance within the tolerances required. Instrumentation shall be calibrated at the manufacturer's recommendation intervals with calibration tags permanently affixed to the instrument. Instrumentation shall be maintained in good repair and operating condition throughout the duration of use on this project and shall be immediately re-calibrated or repaired if dropped and/or damaged in any way during use on the project.

1.10 Direct Digital Control System Software & Hardware

A. The Automatic Temperature Control Contractor shall provide the CxA full access to the Direct Digital Control system at the start of the acceptance phase.

B. System Software – The ATC Contractor shall provide the CxA with a copy of the system software and programming manual, including all diagnostic and trouble shooting features with license good for use during the project warrantee period. The ATC Sub-contractor shall provide the CxA training to allow navigation of the program. The security access should limit the CxAs ability to modify programming and only provide setpoint adjustment access, although does allow viewing of all system parameters and programming.

1.11 Commissioning Process

A. General: The commissioning process depends upon proper coordination between all Commissioning Team members, strict adherence to schedule and completion of all required documentation. Responsibilities of each team member are described in this and other sections of the contract.

B. Pre-Construction Phase

1. Initial Input: CxA shall attend POR meeting with Design Team to review project scope. A/E shall have an eco-charrette meeting where the CxA, CM, and Owner provide input. No later than the Design Development Phase, the Design Engineer shall submit the BOD Design Intent, Energy Model, Sequence of Operation, and Design Drawings to the CxA for review and comment. The CxA design review will follow LEED for Schools.

2. Preplanning: CxA will assist the A/E and CM in having the necessary commissioning language added to the bid documents and contractor requirements. CxA will work with the CM in adding the commissioning process into the project planning timeline and establish commissioning milestones.

C. Construction Phase

1. Commissioning Meetings: An initial Commissioning Scope Review/kick-off meeting will be held with all members of the Commissioning Team at the beginning of the project (generally within 90 days of award of contract). Periodic Commissioning Team progress meetings will be scheduled by the CxA to review progress of commissioning work and coordinate activities. (Commissioning progress meetings will be scheduled to coincide immediately before or after the regular weekly construction progress meeting.) Contractor shall anticipate at least one (1) commissioning meeting for every month of the construction phase (additional meetings as required will not be considered additional work to this contract).
2. Commissioning Schedule: Contractor shall assist the CxA in the development of a written schedule that integrates the commissioning activities into the construction schedule specified in Division 1. Update of the commissioning schedule to reflect changes in the work will be done as necessary. The commissioning schedule shall include at least the following dates:
    a. Submission of Operation & Maintenance information for systems to be commissioned.
    b. Schedule for systems, subsystems, and equipment start-up, including services of manufacturers' authorized service representatives, and performance of pretest checks.
    c. Schedule for functional performance testing, including seasonal testing.
    d. Schedule for Building Envelope testing.
    e. Schedule for Owner's operating personnel training.
3. Equipment & System Start-Up: Before any equipment or system is started, the Start-up Plan, including all pre-start check documentation provided by the equipment manufacturer, must be submitted. A minimum of seven (7) days prior to the start-up, the contractor shall notify the CxA of the scheduled start-up and give the CA the opportunity to witness part or all of the start-up work, and conduct their own pre-check inspection. After start-up is completed, then contractor shall submit completed start up report for each piece of equipment.
4. Prerequisite to Commissioning: Test and Balance report must be signed off by the Designer of record prior to final Cx of the respective systems. The CxA will observe, witness, and verify the TAB work in progress as necessary and correct. It is expected that all relevant and known punch-list items are addressed prior to that agenda Cx activity.
5. Initial Operation: Once the Contractor completes the start-up, testing, balancing, and calibration of all components and systems, the Contractor shall operate all systems through the specified modes of operation, and test the system responses to specified abnormal or emergency conditions. It is the responsibility of the contractor to complete the system and perform this functional and performance pre-check before the commissioning team performs functional acceptance testing.
    a. Functional acceptance testing included in the commissioning process is verification that the contractor has provided a complete and functioning system per the contract requirements. It is <u>not</u>, an opportunity for the contractor to determine deficiencies and work remaining.

b. The contractor shall ensure that a qualified technician(s) is available and present during the agreed upon schedules and of sufficient duration to complete the necessary tasks, tests, adjustments, and/or problem resolution.

c. Functional testing of the system shall be terminated and re-scheduled if it is deemed by the CxA that the system is not ready for functional testing and that the contractor has not fully completed the required initial operation pre-check. Costs borne by the Owner, CxA, Construction Manager and Associates associated with the additional time and resources required to re-schedule and repeat testing due to a lack of system readiness by the contractor, shall be borne by the contractor.

D. Acceptance Phase

1. Functional Acceptance Testing: Systems identified for commissioning shall be operated through the entire specified sequence of operations, as directed by the CxA for verifying acceptable operation. The contractor shall provide all testing instrumentation required and operate the system during the tests, and by this, the contractor shall ensure that the systems are not operated beyond their limits as installed.

2. System Deficiencies: All system operational deficiencies identified during the functional acceptance testing will be recorded by the CxA for correction by the contractor. Work to correct the deficiencies will be under the direction of the Owner, the Owner's representative, or the Project CM. Final acceptance of the system shall not be granted until all deficiencies identified are corrected or accepted.

E. Post-Acceptance Phase

1. CxA will provide a near-warranty-end review of commissioned equipment. CxA will participate in a project close-out meeting / walk-thru with the construction team near the end of the warranty period to review and provide updates of any remaining construction issues. CxA will provide a letter report, summarizing the status of any remaining construction issues after conducting this "End of Warranty Period" walk-thru.

1.12 System(s)/Equipment to be Commissioned

Spec Writer Note: Coordinate with the CxA and Owner which systems are to be commissioned for the project. HVAC systems and components listed are to be included in the basic project scope of work, although commissioning of additional building systems may also be added as an Owner's option.

A. The following systems shall be commissioned:

1. HVAC Systems including:

a. Direct digital automatic temperature control system (building automation systems)

b. Air distribution systems (air handling units, VAV boxes, make-up air units, etc.)

c. Hot water heating system (including boiler(s), pumps)

d. Chilled water system (including chiller(s), pumps)

e. Exhaust systems

f. Unitary systems (heat pump units & unit heaters)

g. Variable frequency drives

h. Cooling towers

i. Hydronic systems

j. Electrical heating systems
k. Utility service to HVAC systems
l. Energy consumption
M. HVAC Equipment Noise

2. Electrical Contractor Systems including:
   a. Normal Power Distribution (Main to Sub-Panel)
   b. Emergency Power System
   c. Alternative Energy Systems
   d. Lighting and lighting control
3. Plumbing Contractor Systems including:
   a. Domestic Hot Water
4. General Contractor Systems including:
   a. Classroom Acoustics per OSDM
   b. Building Envelope
   c. Kitchen Refrigerant Systems

B. The following equipment shall be provided a formal start-up (refer to other sections of the project specification for additional start-up requirements):
   1. HVAC Equipment including:
      a. Air Handling Units
      b. Boilers
      c. Pumps
      d. Chillers
      e. Fans
      f. Unitary Equipment
      g. Generator and Transfer Switches

END OF SECTION

DIVISION 02

EXISTING CONDITIONS

TABLE OF CONTENTS

DIVISION 02: EXISTING CONDITIONS

024116 Structural Demolition
024119 Selective Structural Demolition
025000 Site Remediation

SECTION 024116

STRUCTURAL DEMOLITION

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for demolition and removal of buildings and site improvements.

1.2 QUALITY ASSURANCE

A. Quality Standard: ANSI A10.6 and NFPA 241.

1.3 EXAMINATION

A. Perform an engineering survey of condition of building.

1.4 DEMOLITION

A. Use of explosives is not permitted.

B. Below-Grade Construction: Demolish and completely remove materials within 5 feet of new building footprint.
   1. Remove to at least 12 inches below grade all material outside of building footprint.

C. Existing Utilities: Demolish within 5 feet of new/existing building footprint and abandon outside footprint.

1.5 SITE RESTORATION

A. Below-Grade Areas: Fill and rough grade.
   1. Fill with satisfactory soil materials, recycled pulverized concrete, or recycled pulverized masonry per Geotechnical Engineer's recommendation.

1.6 DISPOSAL OF DEMOLISHED MATERIAL

A. Remove demolished material from site that cannot be salvaged or recycled and dispose of in an EPA-approved landfill.
B. Burning: Not Permitted.

LEED SUGGESTIONS

2.1 Coordinate with goals for "Construction Waste Management" to divert demolition debris from landfills. Identify and document materials that can be recycled. Identify and document materials to be salvaged for reuse either on site or off site.

LESSONS LEARNED

3.1 If over one acre of site is disturbed outside of building footprint, the School District must apply for a Notice of Intent (NOI) for Coverage under Ohio Environmental Protection Agency General Permit. Comply with local authorities who have jurisdiction requirements.

END OF SECTION

SECTION 024119

SELECTIVE STRUCTURE DEMOLITION

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for demolition and removal of portions of a building or structure and selected site elements.

1. Salvage existing items that can be reused or recycled.

1.2 EXECUTION

A. Professional engineer engaged to survey condition of building.

1.3 DISPOSAL OF DEMOLISHED MATERIAL

A. Remove demolished material from site that cannot be salvaged or recycled and dispose of in an EPA-approved landfill.

LEED SUGGESTIONS

2.1 Large portions of existing structures that can be reused on a major renovation project may qualify for a LEED for Schools Materials and Resources, Building Reuse Credit. Design Professionals are encouraged to pursue these credits where possible.

2.2 Coordinate with Construction Waste Management Plan. Identify materials to be recycled. Identify materials to be salvaged for reuse either on site or off site.

LESSONS LEARNED

3.1 What is to be demolished and what is to remain should be clearly indicated on the Drawings. Distinguish between what is to be demolished and discarded, and what is to be reinstalled, salvaged, or protected.

3.2 If selective demolition involves the exterior walls or roof of a building, temporary enclosures need to be weather-tight and strong enough to withstand winds. Airborne particles and dust generated by selective demolition activities may also be of concern to occupants of other spaces in the building. The following requirements can also be added to the Section Text for selective demolition locations near occupied areas where dust and other possible pollutants may be an issue:

A. Provide a vestibule enclosure at the entrance to the selective demolition area to create an airlock and suiting-up area.

B. Specify access routes for equipment and personnel and removal routes for selection demolition debris to areas outside the building; use sealed transport containers in corridors.

C. Provide exhaust systems to filter out and expel dust and airborne contaminants from the selective demolition enclosure directly to the outside. Design the system to provide negative air pressure in the selective demolition area relative to the adjacent spaces. The system can be designed and shown on the Drawings or the Contractor can be required to design the system to meet specific criteria.

D. Provide replacement-air (makeup air) systems to condition and filter air to replace exhausted air.

E. Clean and treat duct interiors with antifungal and antiviral agents after selective demolition is complete.

END OF SECTION

SECTION 025000

SITE REMEDIATION

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements concerning remediation of typical environmental contaminants at school renovation/demolition sites.

1.2 ASBESTOS

A. Under Environmental Protection Agency (EPA), National Emission Standards for Hazardous Air Pollutants (NESHAP), and inspection for asbestos-containing materials (ACM) must be completed prior to renovation or demolition of a facility. While some of the information in this report can be used, the Enhanced Environmental Assessment prepared for the Ohio Facilities Construction Commission does not satisfy this inspection requirement.

1. The inspection for asbestos-containing materials must be conducted by an Asbestos Hazard Evaluation Specialist (AHES) licensed by the Ohio Department of Health.

2. To conduct this inspection, the AHES should be provided with the results of any previous sampling conducted for the District and will need to know whether or not the buildings or portions thereof will be demolished or renovated.

3. If the building will be demolished, the AHES will need to know if the design for demolition will include requirements to recycle building materials or portion thereof.

B. ACM is defined as those materials containing greater than 1% asbestos. Since OSHA still regulates the removal of materials containing less than or equal to 1% asbestos, OFCC policy is to treat all materials (even those containing less than 1% asbestos) as ACM.

C. Prior to collecting bids for the removal of ACM found during the inspection, an asbestos hazard abatement design must be prepared by an individual licensed by the Ohio Department of Health as an Asbestos Hazard Abatement Project Designer.

D. Generally, OFCC's policy is that all asbestos-containing materials be removed prior to renovation work. Materials allowed to remain in a facility during demolition under NESHAP regulations not be removed. Regulatory requirements regarding removal of asbestos-containing materials include, but are not limited to, the following:

1. Under NESHAP, EPA mandates the following:

a. Demolition Work: regulated Asbestos-Containing Materials (RACM) must be removed. RACM includes the following: friable ACM (e.g., fireproofing and mechanical insulation); Category I nonfriable ACMs that become friable or will be subjected to

sanding, grinding, cutting or abrading (e.g., non-intact/nonpliable resilient floor coverings and glazing compound); and Category II nonfriable ACMs (e.g., hard plaster, gypsum board and cement board) which have a high probability of becoming crumbled, pulverized, or reduced to powder during the course of demolition work. Typically, Category I nonfriable ACM and pliable Category II nonfriable ACMs need not be removed prior to demolition work where standard demolition procedures and equipment are utilized (i.e., wrecking ball and cranes, bulldozer wrecking, explosions/ implosions, heavy equipment loading and materials handling, etc.).

1) Any Category I or Category II asbestos-containing material that becomes damaged from either deterioration or attempts at removal or abatement resulting in small fragments the size of four square inches or less shall also be considered friable or RACM.

b. Renovation Work: if a variance to OFCC's policy regarding removal of all ACM is granted, NESHAP requires that ACM be removed prior to renovation if such work will disturb them.

2. In schools being renovated, abatement work shall also be conducted per EPA's Asbestos Hazard Emergency Response Act which includes, but is not limited to, procurement of air samples following asbestos hazard abatement work prior to dismantlement of work areas.

3. Occupational Safety and Health Administration (OSHA) Standards require implementation of appropriate engineering controls and work practices for renovation and demolition work where ACM is present. These controls and practices include specific methods for removal of each type of ACM, air monitoring, appropriate personal protective equipment, hygiene facilities, and proper containerization and disposal of asbestos waste.

OSHA also regulates disturbance of materials which contain trace amounts (one percent or less) of asbestos. For removal of materials containing trace amounts of asbestos, OSHA requires air monitoring of employee exposures, use of wet methods, and proper containerization of waste. Therefore, for purposes of this report, material containing trace amounts of asbestos have been treated as if they are ACM.

4. Ohio Department of Health (ODH) regulations require that credentialed and licensed personnel be used for asbestos-related work (survey, design, abatement work, etc.).

1.3 LEAD- AND CADMIUM-CONTAINING COATINGS

A. OSHA regulations apply to work that will disturb paint or any other coating that contains a detectable amount of lead utilizing a valid detection method. EPA regulations apply to work that will disturb coatings that contain lead in an amount equal to or greater than 1.0 mg/cm^2 or 0.5% by weight). Generally, since OSHA regulations will virtually always apply to renovation work, OFCC's policy is to assume that all coated surfaces contain lead and cadmium. However, in child-occupied facilities (any school built prior to 1978 where children under 6 years of age are present on a regular basis), one should consider having a full building or partial paint inspection completed in these types of facilities built between 1960 and 1978 to determine whether or not EPA's RRP regulations would apply (refer to paragraph 1.3.C below). Note that if a facility is inspected prior to renovation work, this inspection must be completed per Ohio Department of Health regulations using licensed lead inspectors or lead risk assessors.

B. In schools not defined as a child-occupied facility, the following language should be added to Bidding Documents: Contractors shall assume that painted and coated surfaces that may be disturbed during work contain lead and cadmium. Contractors shall follow applicable OSHA and EPA regulations.

1. OSHA requirements include, but are not limited to: air monitoring; engineering controls and respirator usage (based on results of air monitoring); designation of a competent person; certain housekeeping activities; handwashing facilities; hazard communication and safety training; and clean lunchroom facilities.

2. EPA requirements include, but are not limited to sampling and/or disposal of lead waste.

C. In schools which are child-occupied facility (e.g., kindergarten classrooms, daycare facilities, etc.), the following language should be added to Bidding Documents: Contractors shall assume that painted and coated surfaces that may be disturbed during work contain lead and cadmium. Contractors shall follow applicable OSHA and EPA regulations, including EPA's Renovation, Repair and Painting Program Final Rule (RRP).

1. RRP requirements include, but are not limited to: use of certified firms, certified renovators, and trained workers; installation of job postings and demarcation signage; isolation of work areas; installation of polyethylene film over all flooring and objects; use of personal protective equipment; and prohibition of certain work activities.

2. RRP also requires that, at a minimum, prior to opening a renovated area within a building to the public, that the work area pass a visual inspection and project cleaning verification process; this process includes the wiping of floors, countertops and sills with a cleaning cloth at least 3 times or until the cloth passes a visual cleaning standard.

1.1 MERCURY

A. Elemental mercury may be found in schools as follows:

1. Fluorescent and HID lamps contain mercury; EPA regulations require proper recycling and disposal of these lamps.

2. HVAC and other mechanical components may utilize mercury switches and thermostats; EPA regulations require proper recycling and disposal of such devices.

3. Elemental mercury is often found in school laboratories, occasionally in large quantities. Chemistry and physics labs may study its unusual properties, and labs may utilize mercury-containing devices such as thermometers and pressure gauges. EPA regulations require proper recycling and disposal of mercury from laboratories.

4. Improper handling of elemental mercury from the above sources could result in mercury spills.

5. Elemental mercury may contaminate building drainage systems, especially those drains serving laboratories. Often, plumbing traps and acid/neutralization tanks collect mercury that has been flushed down drains.

B. Polyurethane sport or recreational floor finishes may be present in schools, sometimes under newer floor finishes. Some polyurethane flooring was manufactured using mercury (and other heavy metals) salts as catalysts; as these floors age, they emit mercury vapor. Suspect polyurethane floors should be sampled to determine whether or not levels of mercury or other heavy metals used in their manufacture were in sufficient concentrations to trigger EPA Hazard Waste requirements. If mercury-containing floors will be left in place, mercury vapor sampling should be performed to determine that levels are safe for occupancy.

C. Suspected mercury spills and mercury removal projects need to be evaluated by experienced consultants or health professionals. Remediation of mercury hazards should be performed by experienced and trained environmental contractors in accordance with EPA and OSHA regulations.

1.5 UNDERGROUND STORAGE TANKS (USTs)

A. USTs may be found on school sites. Active USTs should be evaluated to determine whether or not they meet current building and fire codes. Inactive USTs should be removed from the site during demolition or renovation work and proper site closure procedures and reports should be prepared.

B. In Ohio, BUSTR (Bureau of Underground Storage Tank Regulations, part of the State Fire Marshall's Office) regulates most gasoline and diesel USTs. BUSTR's mission is to effectively regulate the safe operation of underground storage tanks and to ensure appropriate investigation and cleanup of releases from USTs.

C. Heating oil USTs are not regulated by BUSTR, but BUSTR regulations are often followed for their design, maintenance and removal.

D. UST renovation/demolition work must be performed by BUSTR accredited firms and individuals.

1.6 POLYCHLORINATED BIPHEHYLS (PCBs)

A. Many schools in the U.S. have light ballasts containing PCBs. PCBs are contained within the ballast capacitors and potting materials.

B. In recent years, EPA has learned that caulk containing PCBs was used in some buildings, including schools, in the 1950s through the 1970s.

C. PCBs were widely used as an insulator and fire retardant in electrical transformers.

D. PCBs are regulated by the EPA under their Toxic Substances Control Act (TSCA). Materials containing PCBs must be disposed of properly.

END OF SECTION

DIVISION 03 CONCRETE

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DIVISION 3: CONCRETE

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033000	***Cast-in-Place Concrete***
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034500	Precast Architectural Concrete
035113	Cementitious Wood Fiber Decks
035216	Lightweight Insulating Concrete

SECTION 031119

INSULATING CONCRETE FORMING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for an insulated concrete wall forming system. It is an expanded polystyrene concrete forming unit which is used to construct a monolithic reinforced concrete wall. The forms remain in place providing an energy efficient concrete wall and it is finished with conventional interior and exterior wall coverings.

1.2 MATERIALS

A. Expanded Polystyrene: ASTM C 578.

B. Cross Ties: Polypropylene.

C. Concrete and Steel Reinforcement: Refer to Section 033000 – Cast-in-Place Concrete.
   1. Compressive Strength: 3000 psi minimum.
   2. Slump: 4 to 6 inches.

1.3 ACCESSORIES

A. Bracing, wall alignment, and scaffolding.

B. Window and door bucks.

C. Bearing plates and rim joist brackets or anchors.

D. Anchor bolts and plate anchors.

E. Waterproofing for below grade applications. ***Refer to 071000 – Dampproofing and Waterproofing.***

F. Exterior Finishes: Refer to Section 042000 – Unit Masonry.

G. Interior Finishes: Must meet 15 minute thermal barrier requirements. Refer to Section 092116 – Gypsum Board Assemblies.

LESSONS LEARNED

21 Wall can achieve an R-value of greater than 20. Thermal comfort combined with thermal mass advantages yields potential energy savings.

22 Sound Attenuation can achieve an STC of 50 when a 6 inch core is used.

23 Fire Resistive Construction: Up to 4 hours can be obtained.

24 Storm Safe Occupancy: System can be reinforced to sustain wind loads in excess of 150 miles per hour.

END OF SECTION

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SECTION 033000

CAST-IN-PLACE CONCRETE

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for curing, standard finishing, cements, aggregates, plasticizers and other chemical admixtures, additives, hardeners, and concrete reinforcement.

1.2 QUALITY ASSURANCE

A. Quality Standard: ACI 301.

1.3 REINFORCEMENT MATERIALS

A. Reinforcing Bars: Deformed.

B. Welded Wire Fabric (WWF): Plain.

C. Fibrous Reinforcement: (Optional) Fibrous reinforcement may be used in addition to welded wire fabric for concrete toppings and interior and exterior slabs on grade, whether exposed or covered with a floor covering. Use only fibrous reinforcement in precast concrete plank topping.
   1. Not to be used as a substitute for primary reinforcement for composite and non-composite elevated slabs or for interior or exterior slabs on grade.

D. Carbon Steel Fibers:
   1. Carbon steel fibers may be used in concrete for slabs on grade in lieu of welded wire fabric and fibrous reinforcement, at a rate of 30 lbs/cu.yd. of concrete.
   2. Carbon steel fibers may not be used in concrete for elevated slabs on non-composite deck or steel centering in lieu of welded wire fabric and fibrous reinforcement.
   3. Carbon steel fibers may be used in concrete for elevated slabs on composite metal deck at a rate of 35 lbs. per cubic yard of concrete.

E. Structural Macro Fibers:
   1. Structural macro fibers may be used in concrete for slabs on grade in lieu of welded wire fabric and fibrous reinforcement at a rate of 4 lbs. per cubic yard of concrete.
   2. Structural macro fibers may be used in concrete for elevated slabs on composite metal deck at a rate of 4.5 lbs. per cubic yard of concrete.
   3. Structural macro fibers may not be used in concrete for elevated slabs on non-composite metal deck.

1.4 CONCRETE MATERIALS

A. Portland Cement: ASTM C150, Type I, II, or III.

B. Supplementary Cementitous Materials:
1. Fly Ash: May be used up to a maximum of 25% of the total cementitous materials content in all concrete mixes.
2. Ground Granulated Blast-Furnace Slag: May be used up to a maximum of 35% of the total cementitous material content in all concrete mixes.

C. Aggregates
1. ASTM C33, Class 3S, normal weight aggregates.
2. ASTM C330, light weight aggregates.

D. Water: Potable, ASTM C94.

E. Concrete Admixtures: Containing less than 0.1 percent chloride ions.
1. Water-Reducing Admixture: Type A.
2. Retarding Admixture, Type B.
3. High-Range Water-Reducing Admixture, Type F.
4. Water-Reducing, Accelerating Admixture: Type E.
5. Water-Reducing, Retarding Admixture, Type D.
6. Accelerating Admixtures: Type C.

F. Vapor Retarder:
1. ASTM E-1745; meets or exceeds Class B, Water Vapor Permeance (ASTM E-96): 0.025 gr./ft^2/hr. or lower.

G. Concrete Curing Methods
1. Keep concrete continuously wet.
2. Covering concrete with mats***.***
3. Covering concrete with impervious sheet***.***
4. Clear, waterborne dissipating liquid curing compound: to be used at all concrete floors scheduled to receive applied finish materials.
5. Clear, waterborne membrane forming curing and sealing compound: to be used only at concrete floors not scheduled to receive applied finish materials.

H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound:
1. Can be applied to floor not scheduled to receive a finish.

1.5 PROPORTIONING AND DESIGN OF MIXES

A. Proportion mixes by either laboratory trial batch or field experience methods as specified in ACI 301, using materials to be employed on the project for each class of concrete required.

B. Water/Cementitious Ratios: Concrete mixes shall be limited to the water/cementitious ratios specified in the Concrete Schedule.

1.6 FLOOR AND SLAB FINISHES

A. Float Finish (Flt-Fn) - Noncritical Floors:
   1. Specified Overall Value: FF 20/FL 15.
   2. Minimum Local Value: FF 14/FL 10.
   3. Apply float finish to monolithic slab surfaces that are to receive trowel finish and subfloors under concrete toppings, thickset tile, sand bed terrazzo, and raised computer floors.

B. Trowel Finish 1 (Tr-Fn1) – Carpeted Floors, unless otherwise noted.
   1. Specified Overall Value: FF 25/FL 20.
   2. Minimum Local Value: FF 17/FL 14.
   3. Apply trowel finish to monolithic slab surfaces that are to receive carpet and noncritical floors where slabs remain exposed, such as mechanical rooms, unless otherwise noted.

C. Trowel Finish 2 (Tr-Fn2) – Floors with improved flatness/levelness requirements.
   1. Specified Overall Value: FF 35/FL 25.
   2. Minimum Local Value: FF 24/FL 17.
   3. Apply trowel finish to monolithic slab surfaces that are to receive thin-set flooring, resilient flooring, linoleum flooring, fluid-applied flooring, resinous flooring and other flooring types, unless otherwise indicated.
      a. At thin-set tile floors, maximum permissible variation shall be ¼ inch to 10 feet from required plane. After surface is steel troweled, apply a fine broom finish.

D. Trowel Finish 3 (Tr-Fn3) – Floors requiring better than average flatness/levelness.
   1. Specified Overall Value: FF 45/FL 35.
   2. Minimum Local Value: FF 30/FL 24.
   3. Apply trowel finish to monolithic slab surfaces that are scheduled to receive a polished concrete finish, unless otherwise noted.

E. Trowel Finish 4 (Tr-Fn4) – Wood covered floors, and with other floor finishes as indicated in their technical sections and required by their manufacturers:
   1. The slab shall be steel troweled to a true level and finished smooth and straight to a tolerance of 1/8inch in any 10 foot radius.

F. Nonslip Broom Finish (NsBrm-Fn): Apply nonslip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.
   1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom, perpendicular to main traffic route. Coordinate required final finish with the A/E before application.

LEED SUGGESTIONS

2.1 LEED for Schools includes credits for materials extracted/harvested and manufactured within a 500 mile radius from the project site. Concrete ready mix plants are so numerous that they are generally within 50 miles of most job sites. Supplementary cementitious materials, Portland cement, and the raw materials for cement are also generally extracted and manufactured within 500 miles of a job site as well.

2.2 Most reinforcing steel in the U.S. is manufactured from recycled steel. Steel from the Electric Arc Furnace (EAF) process contains a total of 100 percent recovered steel, of which 67 percent is post-consumer.

2.3 Supplementary cementitious material such as fly ash and slag cement are typically considered pre-consumer recycled material.

LESSONS LEARNED

3.1 Fly ash may improve workability, cohesiveness, and pumpability of fresh concrete and reduce concrete permeability with corresponding improvement in durability.

3.2 Fiber reinforcement may be used when plastic shrinkage reduction is sought.

3.3 Vapor Retarder is to be used directly below slab-on-grade.

(please see chart on next page)

C O N C R E T E S C H E D U L E
(The following are minimum design values)

ITEM OR STRUCTURE	FINISH	COMPRESSIVE STRENGTH AND OTHER REQUIREMENTS
Suspended slabs and concrete not otherwise indicated	RfFm-Fn SmFm-Fn, if exposed	3500 P.S.I. at 28 days Normal Weight Concrete: Minimum Cementitious Material Content: ACI minimum requirements Lightweight Concrete: Calculated Equilibrium Unit Weight: 110 lb/cu.ft, plus or minus 5 lb/cu.ft. per ASTM C567
Trench footings, footings, and interior foundations and retaining walls	RfFm-Fn SmFm-Fn, if exposed	3000 P.S.I. at 28 days
Foundation and retaining walls exposed to exterior	RfFm-Fn SmFm-Fn, if exposed, ***UON A6-Fn, where noted.***	4000 P.S.I. at 28 days 4.5% - 7.5% air entrainment Max W/C Ratio = 0.45 Mid-Range Water Reducer Required
Interior formed concrete exposed to view	SmFm-Fn	4000 P.S.I. at 28 days ***Max W/C Ratio = .055***
Interior floor slabs scheduled to receive mud-set mosaic and quarry tile	Flt-Fn	3500 P.S.I. at 28 days Max W/C Ratio = 0.45 Mid-Range Water Reducer Required
Exposed interior floor slabs and interior slabs scheduled to receive carpet	Tr-Fn1	3500 P.S.I. at 28 days Max W/C Ratio = 0.45 Mid-Range Water Reducer Required
Interior floor slabs scheduled to receive thin-set flooring, resilient flooring and other flooring types, unless otherwise noted	Tr-Fn2	3500 P.S.I. at 28 days Max W/C Ratio = 0.45 Mid-range water reducer
Interior floor slabs scheduled to receive a polished surface, and where indicated	Tr-Fn3	3500 P.S.I. at 28 days Max W/C Ratio = 0.45 Mid-range water reducer
Interior floor slabs scheduled to receive wood flooring, and where indicated	Tr-Fn4	3500 P.S.I. at 28 days Max W/C Ratio = 0.45 Mid-range water reducer
Exterior walks, stoops, steps, aprons, and curbs; exterior formed concrete exposed to view; exterior concrete not otherwise indicated	NsBrm-Fn Grt-Cl-Fn	***4500 P.S.I.*** at 28 days 4.5% - 7.5% entrainment Max W/C Ratio = ***0.45***
Metal stair pan fill, toppings over precast deck	--	2500 P.S.I. at 28 days #8 Aggregate (maximum)
Flowable fill – Type I Utility Trench Backfill	--	50-100 PSI at 28 days Unconfined compression strength per ASTM D4832
Flowable fill – Type II (option) Under Foundations	--	85 PSI at 28 days Unconfined compression strength per ASTM D4832
Lean concrete fill at soft soils or over excavations (option)	--	1500 P.S.I. at 28 days

END OF SECTION

SECTION ***033510***
POLISHED CONCRETE FINISHING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. This Section covers the performance characteristics and application procedures for polishing of concrete. The process involves grinding and buffing concrete surface to provide a sheen. Application of a liquid densifier provides a non-dusting surface resistant to surface absorption of liquids.

1.2 POLISHING MATERIALS

A. Liquid Densifier: Chemically reactive, waterborne solution of inorganic silicate or siliconate materials; odorless; colorless which hardens and densifies concrete surfaces to protect against abrasion, dusting, and absorption of liquids.

B. Joint Fillers: Two (2) component, 100 percent solids compound, with a minimum Shore D hardness of 50.

C. Color (Optional): Ready to use, penetrating, dye or reactive stain that chemically combines with cured concrete to produce permanent, variegated or translucent color effects or a hydrolyzed, lithium quartz or silicate compound, that works by penetrating and reacting with mineral compounds and/or siliceous materials to create a translucent or marbled color effects.

D. Polishing Equipment

1.3 POLISHED CONCRETE APPLICATION

A. Grind the concrete floor to within 2 to 3 inches of walls or obstructions with 16, 25, 40, 60, 80, and/or 150 grit, removing construction debris.

B. Apply material for color effects (optional).

C. Apply liquid densifier.

D. Polish the floor to desired sheen level.

E. Edges may be painted, honed, or polished.

LESSONS LEARNED

3.1 Polished concrete is gaining popularity as a moderate-duty concrete floor that is low maintenance and environmentally-friendly. Diamond polishing technology adapted from the dimension stone industry is used to produce a concrete floor with moderate to high-gloss shine.

A. Polished concrete is considered an environmentally-friendly choice for hard-surfaced flooring, eliminating resilient floor coverings, adhesives, sealers, and waxes that contain VOCs. The low-maintenance finish requires only regular damp mopping and occasional light polishing to restore gloss, without the need for periodic waxing, stripping, or chemical cleaning. Furthermore, the high reflectivity of the surface can reduce the amount of artificial lighting required to achieve a given level of illumination.

B. Existing concrete flat work also can be polished following patching and crack repair as required to produce a sound surface.

END OF SECTION

SECTION 033519

COLORED CONCRETE FINISHING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for chemically staining and sealing ***(or just sealing)*** concrete flatwork.

1.2 POLISHING MATERIALS

A. Liquid Densifier (optional): Chemically reactive, waterborne solution of inorganic silicate or siliconate materials; odorless; colorless which hardens and densifies concrete surfaces to protect against abrasion, dusting, and absorption of liquids.

B. Joint Fillers: Two (2) component, 100 percent solids compound, with a minimum Shore D hardness of 50.

C. Color ***(optional)***: Ready to use, penetrating, dye or reactive stain that chemically combines with cured concrete to produce permanent, variegated or translucent color effects or a hydrolyzed, lithium quartz or silicate compound, that works by penetrating and reacting with mineral compounds and/or siliceous materials to create a translucent or marbled color effects.

D. Sealer: Water based acrylic for sealing concrete where regular maintenance is planned. ***Designed to repel water, reduce scuffing and marring, allows substrate to breath, and produces a shine.***

1. Sealer shall be compatible with stain where stain is used.

END OF SECTION

SECTION 034100

PRECAST STRUCTURAL CONCRETE

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for precast reinforced concrete units.
   1. Plant-cast, load bearing, double-wythe, insulated, structural precast concrete units with an architectural finish for use as exterior building envelope and structural elements.
   2. Hollow-core slab and long-span plant-cast structural concrete units.

1.2 QUALITY ASSURANCE

A. Design Standard: PCI MNL 120

B. Quality-Control Standard: PCI MNL 116

1.3 MATERIALS

A. Form Liners (option)

B. Reinforcing Materials
   1. Reinforcing Bars: Deformed, deformed low-alloy, or galvanized steel.
   2. Steel Bar Mats***: Steel or low-alloy steel.***
   3. Welded Wire ***Reinforcement***: Plain or deformed steel.

C. Prestressing ***Tendons***

D. Concrete Materials
   1. Portland Cement: ASTM C ***150***, Type I or III.
   2. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33, with coarse aggregates complying with Class 4S.
   3. Admixtures: As recommended by ***Design Professional***, unless otherwise noted.
   4. Supplementary Cementitious Materials:
      a. Fly Ash may be substituted for up to 20 percent of the total cementitious materials.
      b. Ground granulated blast-furnace slag may be substituted for up to 50% of the total cementitious materials.

E. Steel Connections
   1. Finish: Painted, interior and galvanized for item in exterior wall or exposed to humidity above 50 percent.

F. Bearing Pads: As selected by Design Professional.

G. Rigid Insulation for Concrete Sandwich Panels: Extruded polystyrene rigid board.

H. Wythe Connectors for concrete sandwich panels: non-conductive, corrosion and alkali resistant, fiber composite wythe connectors, notched for retention.

I. Thin and half brick units and accessories.

J. Latex-portland cement pointing grout for thin-brick-unit joints.

1.4 CONCRETE MIX

A. Compressive Strength (28 days): Normal-Weight Concrete: 5,000 psi

END OF SECTION

SECTION 034500

PRECAST ARCHITECTURAL CONCRETE

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for architectural precast units.

1.2 QUALITY ASSURANCE

A. Design Standard: PCI MNL 120.

B. Quality-Control Standard: PCI MNL 117.

1.3 MATERIALS

A. Reinforcing Materials
1. Reinforcing Bars: Steel.
2. Steel Bar Mats: Steel.
3. Welded Wire Reinforcement: Plain steel.

B. Prestressing Strands

C. Concrete Materials
1. Portland Cement: ASTM C 150, Type I or III.
2. Supplementary Cementitious Materials: Fly ash and/or ground granulated blast-furnace slag.
3. Aggregates: Normal weight or lightweight.
a) Face-Mixture Coarse Aggregates: Uniformly graded.
4. Coloring Admixture, if required by Design Professional.
5. Admixtures: As recommended by Design Professional.

D. Steel Connections: Carbon-steel shapes and plates.
1. Finish: Galvanized.

E. Bearing Pads: As selected by Design Professional.

F. Grout: Sand cement.

1.4 CONCRETE MIXTURES

A. Compressive Strength (28 days):
1. Normal-Weight Concrete Face and Backup Mixtures: 5000 psi

END OF SECTION

SECTION 035113

CEMENTITIOUS WOOD FIBER DECKS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for monolitic cementitious wood-fiber units for roof deck installation and subpurlin tees for tile decks.

1.2 MATERIALS

A. Cementitious Wood-Fiber Units

1. Composition: Chemically processed long wood fibers mixed with Inorganic Hydraulic Cement, pressure bonded to produce units of thicknesses and sizes indicated.

1.3 PRODUCTS

A. ***Monlithic*** Cementitious Wood-Fiber Units

1. Tile: 2 inch minimum thickness.
2. Plank: 2 inch minimum thickness.
3. Channel-Reinforced Panels: 2 inch minimum thickness.
4. Concealed Tee Plank: 3 inch minimum thickness

B. Composite Cementitious Wood-Fiber Units

1. Composite Tile: 2 inch minimum thickness.
2. Composite Plank: 2 inch minimum thickness.
3. Composite Channel-Reinforcement Plank: 2 inch minimum thickness.

C. Insulated Composite Cementitious Wood-Fiber Units

1. Insulated Composite Tile:
a) Tile Base Thickness: 2 inch minimum.
b) Insulation Thickness: Total thickness shall be as required to meet value established by Energy Modeling.
c) Insulation: Extruded polystyrene.

2. Insulated Composite Plank:
a) Base Thickness: 2 inch minimum thickness.
b) Insulation: Extruded polystyrene.
c) Insulation Thickness: Total thickness shall be as required to meet value established by Energy Modeling.

3. Insulated Composite Channel-Reinforced Plank:
a) Base Thickness: 2 inch minimum thickness.
b) Insulation: Extruded polystyrene.
c) Insulation Thickness: Total thickness shall be as required to meet value established by Energy Modeling.

D. Subpurlins: Hot-rolled steel bulb tees

1. Gypsum based grout should fill entire space between tile and bulb tee.

LEED SUGGESTIONS

2.1 Construction Waste Management: Products are typically cut to 1'-0" length increments at factory reducing or eliminating field cuts and waste at site. Products can be shipped without packaging for minimum site waste.

2.2 Certified Wood: Products can be FSC and SFI certified.

2.3 Regional Materials: Products are manufactured in Ohio.

END OF SECTION

SECTION 035216

LIGHTWEIGHT INSULATING CONCRETE

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for cast-in-place lightweight concrete roof insulation for roof decks.

1.2 MATERIALS

A. General: Low density concrete, with an oven-dry unit weight not exceeding 50 lb./cu.ft., placed with or without embedded rigid insulation (EPS). Material shall be composed of a slurry of cement, water, and expansion material to produce an insulating concrete of a specific density range.

B. Cement: Portland Cement.
1. Fly ash may be used up to 25 percent of Portland cement by weight.

C. Galvanized Plain-Steel Welded Wire Reinforcement.

D. Molded-Polystyrene Insulation Board.

1.3 PHYSICAL PROPERTIES

	Range II	Range III
Cast Density	34-42 pcf	42-50 pcf
Compressive Strength	200 psi	250 psi
Roof Membrane Type	nailed base sheet	fully adhered system

END OF SECTION

DIVISION 04 MASONRY

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DIVISION 04: MASONRY

042000 ***Unit Masonry***
042250 Autoclaved Aerated Concrete (AAC) Masonry
042700 Glass Masonry Units
047200 Cast Stone

SECTION 042000

UNIT MASONRY

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for unit masonry assemblies.
   1. Masonry mortar and mixing masonry assemblies.
   2. Masonry grout and mixing masonry grout.
   3. Masonry anchorage and reinforcement devices.
   4. Masonry accessories.
   5. Manufactured concrete masonry units; both loadbearing and nonloadbearing and intended for use in unit masonry assemblies with mortar.
      a. Concrete masonry units
      b. Sound absorbing concrete masonry units
      c. Sound diffusing concrete masonry units
      d. Decorative concrete masonry units
   6. Manufactured clay masonry units; both loadbearing and non-loadbearing.
      a. Brick
      b. Structural-Clay Facing Tile

1.2 QUALITY ASSURANCE

A. Masonry Standard: Comply with ACI 530.1 / ASCE 6 / TMS 602**,** unless otherwise noted.
   a. Provide a 2-inch minimum clear air-space.

B. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
   2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

C. Mockups: Build mock-ups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials, execution, and aesthetic effect. Observation and evaluation of the mock-up shall be by the masonry installer, general trades contractor, A/E, CM, OFCC-PA, Commissioning Agent, window installer, ***testing agency, and air barrier certifier***.
   1. Build mock-up of typical wall area(s) as shown on Drawings including Movement Control Joints (Sealant Filled) 1'4" (minimum length), Air Barrier, Blocking for Window, Horizontal and Vertical Reinforcing Shelf Angles and Supports, Bond Beams and Lintels, Brick Ties and Anchors Flashing, End Dams, Weeps and Vents, Cavity Drainage Material (if required), Window Head, Sill and Jamb Details.
      a. Include a sealant-filled joint at least 16 inches long in each exterior wall mock-up.
      b. Include lower corner of window opening at upper corner of exterior wall mock-up. Make opening approximately 12 inches wide by 16 inches high.
      c. Include through-wall flashing installed for a 24-inch length in corner of exterior wall mock-up approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).

d. Mock-up shall include a complete through-wall penetration by each trade contractor including fire protection, plumbing, mechanical and electrical.

2. The window contractor shall provide and install in the mock-up wall a sample window of the type and profile used in the classrooms. (leaving portions of the perimeter exposed for inspection of the fasteners and air barrier transition to the masonry; some portions to receive final caulking inside and out)
3. Prior to starting general masonry cleaning, prepare mock-up for cleaning using the same cleaning materials and methods proposed for the Work.
4. Protect accepted mock-ups from the elements with weather-resistant membrane.
5. The construction of the mock-up shall be photographed or videotaped by the masonry contractor to be part of a presentation for groups of trades people as they join the project work force.

6. Refer to OSDM page 9101-5 for additional information.

1.3 CONCRETE MASONRY UNITS

A. Concrete Masonry Units (CMU): Light weight, medium weight, or normal weight.

B. Concrete Building Brick

C. Sound Absorbing Concrete Masonry Unit (SACMU)
1. Face sizes, unit weights, and finish textures shall match those of required regular concrete masonry units.
2. Provide flared slots, metal septa, and incombustible fibrous cavity fillers of the following:
a. 8 inch (53 STC) and 12 inch (56 STC) thick walls.

D. Sound Diffusing Concrete Masonry Units (SDCMU)
1. Aggregate shall meet ASTM C90 and ASTM C129.
2. Fiberglass inserts shall be installed at the block plant to ensure proper positioning.

E. Decorative Concrete Masonry Units: Light weight, medium weight, or normal weight.
1. Finish: Exposed faces of the following general description matching color, pattern, and texture of Architect's samples:
a. Normal-weight aggregate, ground finish (not acceptable if used as a comparison for LFI calculations)
b. Normal-weight aggregate, split-face finish
c. Normal-weight aggregate, split-ribbed finish
d. Normal-weight aggregate, standard finish, scored vertically so units laid in running bond appear as square units laid in stack bond
e. Normal-weight aggregate, standard finish, triple scored vertically so units laid in running bond appear as vertical units laid in stacked bond

F. Prefaced Concrete Masonry Units: Light weight hollow or solid units with smooth resinous facing.

G. Integral Water Repellent: Provide units made with liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength.

1.4 BRICK

A. Face Brick: ASTM C 216
1. Grade and Unit Compressive Strength: Provide units with grade indicated below:
a. Grade: SW., Type FBX or FBS

B. Building (Common) Brick: ASTM C 62 and as follows:
   1. Grade and Unit Compressive Strength: Provide units with grade indicated below:
      a. Grade: MW or SW.
   2. Application: Use where brick is indicated for concealed locations.

1.5 STRUCTURAL-CLAY FACING TILE
   A. Glazed Structural – Clay Facing Tile: ASTM C126, Grade S or SS.
   B. Unglazed Structural – Clay Facing Tile: ASTM C212, Type FTX or FTS, Standard class.

1.6 STONE
   A. Stone Trim Units: Limestone.

1.7 MORTAR MATERIALS
   A. Portland Cement: ASTM C150, Type I or III, nonstaining, without air entrainment and of natural color or white, to produce the required color of mortar or grout.

   B. Hydrated Lime: ASTM C207, Type S.

   C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C150, Type I or III, and hydrated lime complying with ASTM C207.

   D. Masonry Cement: ASTM C91. (optional)

   E. Mortar Cement: ASTM C1329. (optional)

   F. Aggregates: ASTM C144, except for joints less than 1/4 inch, use aggregate graded with 100 percent passing the No. 16 sieve.

   G. Water: Potable.

   H. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes.

   I. Epoxy Pointing Mortar:

   J. Integral Water Repellent Admixture (Exterior): An integral liquid polymeric admixture intended for use with concrete masonry units, containing integral water repellent.

1.8 MORTAR MIXES
   A. Do not use calcium chloride in mortar or grout.

TABLE A1 - Guide for the Selection of Masonry Mortars* (Modified)

Location	Building Segment	Mortar Type
Exterior, above grade	loadbearing wall nonloadbearing wall, parapet wall, chimney and veneer wall	S N
Exterior, at or below grade	foundation wall, retaining wall, manholes, sewers, pavements, walks and patios	S
Interior	loadbearing wall nonloadbearing partitions	N N

* This table does not provide for many specialized mortar uses, such as reinforced masonry, acid-resistant mortars and fire box mortar.

1.9 GROUT MATERIALS

A. Portland Cement: ASTM C150, Type I.

B. Fine Aggregates: ASTM C404, clean, sharp, natural sand.

C. Coarse Aggregates: ASTM C404. Maximum aggregate size 3/4 inch.

D. Water: Potable.

E. Flyash: May be substituted for up to 20 percent of the total cementitious materials in the grout mix.

1.10 GROUT MIXES

A. Grout mixes shall be plant mix or factory blended (dry mix with water added at the site).

B. Do not lower the freezing point of grout by use of admixtures or anti-freeze agents.
1. Do not use calcium chloride in grout.

C. Grout for Unit Masonry: Comply with ASTM C476.
1. Fine Grout: 2500 psi average compressive strength at 28 days for 6 inches and smaller hollow concrete masonry units and between 2 wythes of masonry where space is less than 2 inches in width.
2. Coarse Grout: 2500 psi average compressive strength at 28 days for 8 inches and larger hollow concrete masonry units and between 2 wythes of masonry where space is 2 inches in width or wider.

1.11 CONTINUOUS WIRE REINFORCING AND TIES FOR MASONRY

A. Masonry Joint Reinforcement.

B. For single wythe and composite masonry, provide ladder type joint reinforcing.

C. For multi-wythe masonry, provide as follows:
1. When both wythes are to be constructed simultaneously:
a. Provide ladder type joint reinforcing.
2. When each wythe is to be constructed separately:
a. Provide adjustable ladder type joint reinforcing fabricated with two steel side rods, cross rods, eyes and double legged pintles. Longitudinal rods shall be spaced for each face shell of CMU; eye sections shall extend into walls cavity, and pintles shall rest upon bed joints of face brick.

1.12 ANCHORING DEVICES FOR MASONRY

A. Rigid Anchors: Where masonry is to be rigidly anchored to structural steel beams, provide galvanized steel straps, bars or rods welded to the steel beam and extending into the mortar joint.

B. Flexible Anchors: Where masonry is to be laterally supported from structural steel, while permitting only vertical movement or both vertical and horizontal movement, provide adjustable anchors.

1.13 REINFORCING BARS

A. Uncoated Steel Reinforcing Bars

1.14 FLASHING

A. Embedded Flashing Materials
1. Provide one of the following types of flashing materials:
a. Copper-Fabric Laminate.
b. Rubber Asphalt Sheet Flashing.
c. Elastomeric Thermoplastic Flashing.
d. EPDM Flashing.

2. Sheet Metal Drip Edge: Fabricated from stainless steel or copper with hemmed edge.
a. Application: Where drip edge is required per recommendations of NCMA-TEK 19-4, ***and at all through wall flashings.***
b. Embedded flashing materials should not be used for drip edges.

1.15 INSULATION
A. Insulation: Provide insulation as required to meet or exceed thermal performance required or modeled by ASHRAE Standard 90.1.
1. Primary insulation shall be one of the following:
a. Extruded-Polystyrene Board Insulation: ASTM C578, Type IV.
b. Closed-cell polyurethane foam insulation.
c. Closed-cell polyisocyanurate foam core insulation: ASTM C1289, Type I or II, Class 1 or 2, Grade 2 (20 psi).
d. ***Foil faced closed cell rigid foam insulation***.
2. Secondary, if required for thermal resistance:
a. Loose-Granular Fill Insulation.
b. Molded-Polystyrene Insulation Units.
c. Polyurethane Spray Foam (Foamed-in-Place Insulation).

1.16 RELATED MATERIALS
A. Additional accessories, including compressible fillers, preformed control-joint gaskets, bond breaker strips, weep/vent products, cavity drainage material, reinforcing bar positioners and cleaners may be used at the discretion of the Project Designer to provide a complete weathertight masonry assembly.

1.17 CONTROL JOINTS – EMPIRICAL METHOD
A. Concrete Masonry Units

TABLE 1
CONTROL JOINT SPACING FOR RECOMMENDED ABOVE GRADE EXPOSED CONCRETE MASONRY WALLS (NCMA TEK-10-2B)

Distance between joints should not exceed the lesser of:	
Length to height ratio	or ft (m)
1-1/2	25 (7.62)

Notes:
1. Table values are based on the use of horizontal reinforcement having an equivalent area of not less than 0.025 $in.^2$/ft. (52.9 mm^2/m) of height to keep unplanned cracks closed.

2. Criteria apply to all concrete masonry units.
3. This criteria is based on experience over a wide geographical area. Control joint spacing should be adjusted up or down where local experience justifies but no farther than 25 ft. (7.62 m).
   a. Where concrete masonry is used as backup of other materials:
      1) Extend control joints through facing if it is rigidly bonded (masonry bond).
      2) Control joint need not extend through facing when bond is flexible (metal ties).
   b. Provide a horizontal slip plane where reinforced lintel beam terminates at a control joint. Provide horizontal slip plane at junction of roof and load-bearing masonry terminating at a control joint.

B. Expansion Joints in Brick: Provide in accordance with BIA Technical Note No. 18B.

1.18 FLASHING AND WEEP HOLES

A. General: Installed embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
   1. Install concealed through-wall flashing in accordance with SMACNA "Architectural Sheet Metal Manual" Chapter 4 Flashing and with NCMA TEK Bulletins 19-4 and 19-5 details to ensure water resistant masonry construction.
   2. Installed preformed corners and end dams, under flexible flashing membrane, bedded in sealant (as approved by manufacturer of preformed corner, end dams, and flexible flashing for compatibility) in appropriate locations along wall.

1.19 SOURCE QUALITY CONTROL

A. Masonry Contractor shall water test cavity to verify all water is draining to the exterior through the weeps before continuing with exterior wythe before capping wall.
   1. Contractor shall perform tests in the presence of CM, A/E, testing lab representative, and General Contractor.
      a. Do not proceed more than 3 veneer courses above flashing without testing, observation, and picture documentation by testing lab representative.
   2. Contractor shall hold water hose and with standard water pressure force water into the cavity at a cell vent so water can be observed coming out adjacent weeps for a period of at least 5 minutes. Contractor shall continue down the wall to the next cell vent where a weep did not indicate water wicking out and continue this process until the entire length of flashing is tested.
   3. Where water is observed inside the building or outside the building away from the weeps, masonry units shall be removed and flashing re-inspected and repaired.
   4. Water test shall be re-performed where flashing was repaired.

LEED SUGGESTIONS

2.1 Masonry normally generates large volumes of construction waste. However, masonry is clean waste and is, therefore, easily recycled as fill material.

LESSONS LEARNED

3.1 Flashing: Through-wall flashing and weep holes are detailed and installed in exterior masonry wall construction to collect and divert moisture to the outside of the wall that penetrates the exterior veneer. Through-wall flashing must be provided at the base of the wall, at roof and wall intersections, and at the top of parapets. Flashing is also needed over and under door and window openings, at shelf angles, and at other horizontal discontinuities in the cavity.

A. One non-ideal design issue that has surfaced is when the top of the roofing counter-flashing is not in the same joint as the bottom of the through-wall flashing. This causes some masonry to be unprotected. Since all masonry is permeable to water, water permeating this unprotected masonry can possibly enter the building. Ideally, the design would provide the through-wall flashing drip edge and the top of the roof counter-flashing in the same joint, thereby leaving no masonry wall area unprotected.

B. Flashing details that should be included to avoid construction deficiencies include:

1. Roof-wall flashing integration along sloped roofs.
2. Stepped counter-flashing along sloped roof-wall intersections.
3. Stepped roof-wall flashing and counter-flashing where the elevation of a flat roof changes.
4. Flashing integration where parapets intersect with walls.
5. End dams.

3.2 Weeps or Vents:

1. Weeps or vents installed at the top of walls, under window sills, etc. can aid in the venting of the cavity if properly installed and detailed and should be considered.

3.3 Penetrations of joists, beams, etc:

1. Joists, beams and other items that penetrate the masonry wall should be sealed completely with grout on both sides of the wall to prevent rotation and to ensure that the cavity remains completely separated from the interior of the wall and building.

Table 1 – Calculated STC Ratings for Concrete Masonry Walls (ref. 1)

Nominal Unit thickness, In.(mm)[b]	Density, pcf (kg/m³)	STC[a] Hollow unit	Grout-filled unit	Sand-filled unit	Solid unit
4 (100)	85 (1,362)	43	46[c]	45	45
	95 (1,522)	44	46[c]	45	45
	105 (1,682)	44	46[c]	46	46
	115 (1,842)	44	47[c]	46	46
	125 (2,002)	45	47[c]	46	47
	135 (2,162)	45	47[c]	47	47
6 (150)	85 (1,362)	44	49	47	47
	95 (1,522)	44	50	48	48
	105 (1,682)	45	50	48	49
	115 (1,842)	45	51	49	50
	125 (2,002)	46	51	49	51
	135 (2,162)	46	52	50	51
8 (200)	85 (1,362)	45	53	50	50
	95 (1,522)	46	53	51	51
	105 (1,682)	46	54	51	52
	115 (1,842)	47	55	52	53
	125 (2,002)	47	55	52	54
	135 (2,162)	48	56	53	55
10 (250)	85 (1,362)	46	56	53	53
	95 (1,522)	47	57	53	54
	105 (1,682)	48	58	54	55
	115 (1,842)	48	58	55	57
	125 (2,002)	49	59	56	58
	135 (2,162)	50	60	56	59
12 (300)	85 (1,362)	47	60	55	55
	95 (1,522)	48	61	56	57
	105 (1,682)	49	62	57	59
	115 (1,842)	49	62	58	60
	125 (2,002)	50	63	59	62
	135 (2,162)	51	64	59	63

[a] Based on: grout density of 140 lb/ft³ (2,243 kg/m³), sand density of 90 lb/ft³(1,442 kg/m³): unit percentage solid from mold manufacturer's literature for typical units (4-in.(100-mm) 73.8% solid, 6-in.(150-mm) 55.0% solid, 8-in.(200-mm) 53.0% solid, 10-in.(250-mm) 51.7% solid, 12-in. (300-mm) 48.7% solid). STC values for grout-filled and sand-filled units assume the fill materials completely occupy all voids in and around the units. STC values for solid units are based on all mortar joints solidly filled with mortar.

[b] Metric dimensions reflect equivalent metric unit sizes as opposed to direct SI conversions. Therefore, STC ratings of these hard metric units may be slightly different from the ratings listed here.

[c] Because of small core size and the resulting difficulty consolidating grout, these units are rarely grouted.

END OF SECTION

SECTION 042250

AUTOCLAVED AERATED CONCRETE (AAC) MASONRY

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for Autoclaved Aerated Concrete (ACC) Masonry Block

1.2 AUTOCLAVED AERATED CONCRETE (ACC) BLOCKS

A. AAC Masonry Block: ASTM C1386 for tolerances, density, and compressive strength.

1.3 ACCESSORIES

A. Mortar Materials: ASTM C 270.

B. Reinforcement: Continuous wire reinforcing, horizontal wall reinforcing.

C. Veneer Ties
1. Anchors
2. Fasteners

D. Concealed Flashing Materials
1. Copper-Fabric Laminate
2. Rubber Asphalt Sheet Flashing
3. EPDM Flashing

LESSONS LEARNED

2.1 Autoclaved aerated concrete (AAC) is a type of lightweight precast concrete, prevalent in Europe, Asia, and in the Middle East and recently available through manufacturing facilities in the United States. It is made with portland cement, silica sand or fly ash, lime, water, and aluminum powder or paste. The aluminum reacts with the products of hydration to release millions of tiny hydrogen gas bubbles that expand the mix to approximately five times the normal volume. When set, the AAC is cut into blocks or slabs and steam-cured in an autoclave.

2.2 AAC is significantly lighter (about 1/5th the weight of traditional concrete) than normal concrete and can be formed into blocks or panels. Lighter weight concretes generally have greater fire and thermal resistance, but less strength than traditional normal weight concrete.

END OF SECTION

SECTION 042700

GLASS MASONRY UNITS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for glass block set in mortar.

1.2 GLASS BLOCK

A. Hollow Glass Block: Hollow units made from transparent glass, with manufacturer's standard edge coating.

B. Solid Glass Block: Colorless, transparent, solid glass block with smooth or stippled faces and manufacturer's standard edge coating.

1.3 MORTAR MATERIALS

A. Portland Cement.

B. Hydrated Lime.

C. Portland Cement-Lime Mix.

D. Aggregrate.

E. Water-Repellent Admixture: Provide at all exterior joints.

1.4 ACCESSORIES

A. Panel Reinforcement: Ladder-type units, butt welded, not lapped and welded.
   1. Interior Walls: Hot-dip galvanized, carbon-steel wire.
   2. Exterior Walls: Hot-dip galvanized, carbon or stainless-steel wire.

B. Panel Anchors: Hot-dip galvanized after fabrication.

END OF SECTION

SECTION 047200

CAST STONE

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for cast Stone Trim

1.2 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer is a producing member of the Cast Stone Institute, or has on file and follows a written quality-control plan that includes all elements of the Cast Stone Institute's "Quality Control Procedures Required for Plant Inspection."

1.3 CAST STONE MATERIALS

A. General: Comply with ASTM C1364
1. Portland Cement.
2. Aggregates.

B. Reinforcement: Use galvanized or epoxy-coated reinforcement when covered with less than 1½ inches of cast stone material.

C. Embedded Anchors: Hot-dip galvanized steel.

D. Mortar: Portland cement and lime, masonry cement, or mortar cement.

1.4 FABRICATION

A. Provide units that are resistant to freezing and thawing.

LESSONS LEARNED

2.1 The term 'cast stone' is defined by the Cast Stone Institute and in ASTM C 1364, Specification for Architectural Cast Stone, as architectural precast concrete building units intended to simulate natural cut stone. Cast stone is typically distinguished from other architectural precast concrete by its size (masonry- or stone-sized units rather than panels) and its finish, which is intended to simulate stone rather than look like concrete. Cast stone is usually made with more carefully graded aggregate and less water than most architectural precast concrete, giving it a higher compressive strength, lower water absorption, and a more void-free surface than most architectural precast concrete.

2.2 Cast stone is used, like limestone or sandstone, as a masonry material for architectural features and trim or as a facing for buildings or other structures. By carefully selecting aggregates, cement, and pigments and through controlled manufacturing techniques, cast stone can be made to resemble various varieties of limestone, sandstone, quartzite, granite, and other unpolished, cut building stones. This ability to simulate natural cut stone can be used to replace damaged natural stone in historic renovation work where the original stone is no longer available.

2.3 Cast stone units must be designed within the manufacturing and handling limitations of the production process. Keep units generally rectangular in cross section; avoid L or U shaped units. Avoid long thin units; length should not exceed 15 times the least dimension and should generally be no more than 96 inches. Thickness should never be less than 2 inches, and 3 inches, as a minimum, is even better. Curved sections should be limited to no more than 48 inches in length. Generally, size units so that their volume is about 1 ½ to 2 cu.ft. Bear in mind the casting process when designing with cast stone; the profiles of units must include adequate "draft", which is the slope on surfaces that allows the cast stone unit to be removed from the mold. Also remember that repetition is the key to economy in any molded product; unless standard cast stone units are used, try to use as few types as feasible with as much repetition as possible.

END OF SECTION

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DIVISION 05 METALS

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SECTION 051200

STRUCTURAL STEEL FRAMING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for structural steel, shop painting, grout, and related items necessary to complete the Work indicated.

1.2 QUALITY ASSURANCE

A. Quality Standards: AISC 303 and 360.

B. All load-bearing structural steel shall be fabricated and produced using only steel made in the United States in accordance with Sections 153.011 and 153.99 of the Ohio Revised Code (ORC).

1.3 MATERIALS

A. Structural Steel Shapes: W-shapes, channels, angles, M-shapes, S-shapes, plate and bar, cold-formed hollow structural sections, and steel pipe.
   1. W-Shapes: ASTM A992.
   2. Channels, Angles, M- and S-Shapes: ASTM A36 or ASTM A572, Grade 50.
   3. Plate and Bar: ASTM A36 or ASTM A572, Grade 50.

B. Steel Casings

C. Steel Forgings

D. Bolts, Nuts, and Washers: High strength and tension control, high strength

E. Anchor Rods: Unheaded and headed rods, nuts, plate washers, and washers.

F. Connectors: Shear connectors, threaded rods, clevises, turnbuckles, eye bolts and nuts and sleeve nuts.

G. Structural Slide Bearings

H. Primer: Zinc oxide, oil.
   1. Coordinate primers with topcoats, requirements for slip critical joints, and limitations of sprayed fire resistive materials.

I. Grout: Metallic, shrinkage resistant and nonmetallic, shrinkage resistant.

J. Bituminous Coating: Cold applied asphalt mastic.

1.4 SHOP PRIMING

A. Shop prime steel surfaces except the following:
   1. Surface embedded in concrete or mortar.
      a. Apply a bituminous coating to steel embedded in concrete or mortar.

2. Surfaces to be field welded.
3. Surfaces to be high strength bolted with slip critical connections.
4. Surfaces to receive sprayed fire resistive materials (applied fireproofing).
5. Galvanized surfaces.

1.5 GALVANIZING

A. Galvanize lintels, shelf angles, and welded door frames attached to structural steel frame and located in exterior walls.

1.6 INSTALLATION

A. Erect structural steel in compliance with the AISC "Specifications and Code of Standard Practice."
   1. OSHA safety practices for steel erection per Federal Register 29 CFR 1926, Subpart R.

LEED SUGGESTIONS

2.1 LEED credits may be obtained under Materials and Resources for using materials with recycled content. The requirements are based on a cost-based formula for the total recycled content of all materials used on the project, excluding mechanical, electrical, and plumbing components and specialty items such as elevators, so that recycled content in high-cost items is significant. For steel-framed buildings, the recycled content of the steel goes a long way toward meeting the requirements for these credits.

2.2 The Steel Recycling Institute indicated that hollow structural shapes and steel plates are made by basic oxygen furnace method which typically has 23% post consumer recycled content and 1.5% preconsumer recycled content; rolled structural shapes are made by the electric arc furnace method, which typically has 57.5% postconsumer recycled content and 6.5% pre-consumer recycled content. The LEED Credit Interpretations allow the use of 25% for steel without any documentation, but for structural steel it is very worthwhile to obtain the required documentation because structural steel usually consists primarily of rolled structural shapes that have a much higher recycled content.

2.3 U.S.-EPA Comprehensive Procurement Guidelines (CPG) discusses steel manufactured in either a Basic Oxygen Furnace (BOF) or an Electric Arc Furnace (EAF). Steel from the BOF process contains 25-30% total recovered materials, of which 16% is post-consumer steel.

LESSONS LEARNED

3.1 A common coordination problem is the finishing of steel lintels and shelf (relieving) angles. Division 05, Section "Metal Fabrications" requires galvanizing of exterior loose-steel lintels or shelf angles; Division 05, Section "Structural Steel Framing" may require shop priming of structural steel members. If lintels or shelf angles are attached to the structural-steel frame, the steel fabricator may shop primer them unless the Contract states otherwise. If the Designer intends these lintels or shelf angles to be galvanized, retain this requirement in Division 5, Section "Structural Steel Framing".

END OF SECTION

SECTION 052100

STEEL JOISTS FRAMING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for steel joists, accessories, and related items necessary to complete to the Work indicated.

1.2 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing joists similar to those indicated for this Project and with a record of successful in–service performance.

1. Manufacturer must be certified by SJI to manufacturer joists to those indicated for this Project and with a record of successful in –service performance.
2. Assumes responsibility for engineering special joists to comply with performance requirements. This responsibility includes preparation of shop drawings and comprehensive engineering analysis by a qualified professional engineer.
3. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installation of joists that are similar to those indicated for this Project in material, storage, and extent.

1.3 MATERIALS

A. Steel: Comply with SJI and AISC “Standard Specifications.”

B. Bolts: Carbon or high-strength carbon steel.

1. Finish: Plain, uncoated.

C. Primer: SSPC – Paint 15.

1. Coordinate primer with topcoats and sprayed fire-resistive materials and primers.

LEED SUGGESTIONS

2.1 Refer to Division 5, Section “Structural Steel Framing”.

LESSONS LEARNED

3.1 Low-sloped roofing requires a roofing slope of at least ¼ inch per 12 inches. Besides using tapered insulation ($$$), measures to eliminate or reduce unwanted ponding of water on the roof include sloping joists to a low point or specifying joists with pitched top chords. Pitch may be one way where slope is in one direction or two ways where slope is in both directions.

A. Except for K-series joists that have top chords fabricated parallel or without pitch as standard, steel joists and joist girders may be fabricated with a top-chord pitch of 1/8 inch per 12 inches. This standard top-chord pitch will not be sufficient alone to meet the minimum ¼ inch per 12 inches (1:48) slop requirement.

3.2 Where shop priming is not permitted (were sprayed fire-resistive material is to be applied), distinguish locations of primed and unprimed joists on the drawings.

END OF SECTION

SECTION 053100

STEEL DECKING

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for metal floor and roof deck of fluted, ribbed, and cellular configurations; composite decks of metal and acoustical insulation; anchors, closures, and related accessories.

1.2 MATERIALS

A. Type: Steel for galvanized metal deck, ASTM A 653, structural quality Grade 33 or higher, G60 zinc coating, unless otherwise noted.
   1. Noncomposite steel form deck, when design of concrete slab meets all loading requirements without assistance from steel deck, engineer may reduce galvanized coating to G30.
   2. Note: Prime-painted decking is not acceptable.

B. Accessories: Flexible closure strips, pour stops, girder fillers, column closures, end closures, Z-closers, cover plates, and sump plate.

1.3 FABRICATION

A. Decking, General: Fabricate panels to comply with SDI Specifications and Commentary in SDI Publication No. 30.

B. Acoustical Roof Deck Units: ***NRC as determined by Designer.***

LEED SUGGESTIONS

2.1 Refer to Division 05, Section "Structural Steel Framing".

END OF SECTION

SECTION 054000

COLD-FORMED METAL FRAMING

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for bracing, fasteners, and related accessories for light gauge, loadbearing metal elements.

1.2 SYSTEM DESCRIPTION

A. Design Requirements: Calculate structural characteristics of cold-formed metal framing according to AISI's "Specification for The Design of Cold-Formed Steel Structural Members" ***and its "Standard for Cold-Formed Steel Framing – General Provisions".***

1. Design exterior nonaxial load bearing framing to accommodate lateral deflection without regard to contribution of sheathing materials.
2. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing – Header Design."
3. Roof Trusses: Design according to AISI's "Standard for Cold-Formed Steel Framing – Truss Design."
    a. Note: Prefabricated trusses that meet the qualitative requirements are acceptable.

B. Performance Requirements: Engineer, fabricate, and erect cold-formed metal framing to withstand design loads within limits and under conditions required.

1. Design framing systems to withstand design loads without deflections greater than the following:
    a. Cold-Formed Metal Framing: Lateral deflection of 1/240 of the wall height, unless otherwise noted.
        1) Limit deflection to 1/600 when supporting masonry.
    b. Floor Joists: Vertical deflection of 1/480 for live loads and 1/360 for total loads of span.
    c. Ceiling Joists: Vertical deflection of 1/240 of the span.
    d. Roof Trusses: Vertical deflection of 1/240 of the span.

1.3 COLD-FORMED METAL FRAMING MATERIALS

A. Galvanized Steel Sheet: ASTM A 1003, Structural Grade, Type H, metallic coated of grade and coating, and as follows:

1. Coating Designation: G 60 (Z 275), unless otherwise noted.
    a. Provide G90 where studs backup masonry, and where indicated.
2. Grade: As required for structural performance.

B. System Components: With each type of metal framing required, provide manufacturer's standard steel runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, and accessories as recommended by manufacturer for applications indicated, as needed to provide complete metal framing system.

1. Steel Sheet for Vertical Deflection and Drift Clips: ASTM A 653, structural steel, zinc coated, of grade and coating as follows:

a. Grade: As required by structural performance.
b. Coating: G60.

C. Framing Accessories: Supplementary framing, bracing, bridging, and solid blocking, web stiffeners, gusset plates, stud kickers, girts, joist hangers, and end closures.

D. Insulation for Inaccessible Voids.

END OF SECTION

SECTION 055000

METAL FABRICATIONS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for metal items fabricated from standard metal shapes and plates that are not classified in other locations.

1.2 PRODUCTS

A. Materials: Steel plates, shapes, and bars. Steel tubing, steel pipe, slotted channel framing, iron castings, and aluminum.

B. Miscellaneous Framing and Supports: Galvanized where indicated.
1. Steel framing and supports for ceiling-hung toilet compartments, operable partitions, overhead doors, overhead grilles, countertops, and mechanical and electrical equipment.
2. Elevator machine beams, hoist beams.
3. Steel shapes for supporting elevator door sills.

C. Shelf Angles: Galvanized at exterior walls.

D. Metal Ladders - Including Elevator Pit Ladders: Steel, unless otherwise noted.
1. Exterior ladders: Galvanized or aluminum.
2. Provide fixed, permanent ladders on wall9s) for access to all low-sloped roof areas.

E. Ladder Safety Cages: Match ladder.

F. Alternating Tread Devices: Steel.

G. Metals Ships' Ladders: Steel.

H. Metal Floor Plate: Steel.

I. Structural-Steel Door Frames:
1. Exterior frames galvanized.

J. Miscellaneous Steel Trim: Steel angle corner guards, steel edgings, and loading-dock edge angles.
1. Exterior trim galvanized.

K. Metal Bollards: Schedule 40 steel pipe.

L. Pipe and Downspout Guards.
1. Galvanized.

M. Abrasive Metal, Nosings, Treads, and Thresholds: Cast iron, cast aluminum, or extruded aluminum.

N. Metal Downspout Boots: Cast iron or aluminum.

O. Loose Bearing and Leveling Plates, Galvanized.

P. Loose Steel Lintels, Galvanized at Exterior Walls.

Q. Steel Weld Plates and Angles not specified in other sections, for casting into concrete.

LEED SUGGESTIONS

2.1 Refer to Division 05, Section “Structural Steel Framing”.

END OF SECTION

SECTION 055100

METAL STAIRS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for metal stairs.
   1. Railings attached to metal stairs or attached to walls adjacent to metal stairs may be added to this section.

1.2 MATERIALS

A. Abrasive Nosings: Extruded aluminum.

B. Stringers: Steel channels or tubes.
   1. Plate strings are not acceptable.

C. Metal-Pan Stairs: Uncoated cold-rolled or uncoated hot-rolled.

D. Metal Bar-Grating Stairs: ½ inch maximum opening.
   1. For service and exterior applications.

E. Metal Floor Plate Stairs: Rolled steel.
   1. For service applications.

1.3 FINISHES

A. Hot-dip galvanize items exposed to exterior or greater than 75% relative humidity.

END OF SECTION

SECTION 055213

PIPE AND TUBE RAILINGS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for pipe railings and guards.

1.2 METALS

A. Steel and Iron
1. Steel Pipe
   a. Black finish, unless otherwise indicated.
   b. Galvanized finish for exterior installations and where indicated.
2. Steel Tubing: Cold-formed steel tubing.
3. Steel Plates, Shapes, and Bars.
4. Iron Castings.
5. Expanded Metal.
6. Perforated Metal.
7. Woven-Wire Mesh.

B. Aluminum
1. Extruded Bars and Tubing.
2. Extruded Structural Pipe and Round Tubing.
3. Plate and Sheet.
4. Castings.
5. Perforated Metal.
6. Woven-Wire Mesh.

1.3 FABRICATION

A. Changes in Direction of Members: By bending or by inserting prefabricated fittings.

B. Connections: Either welded or non-welded.

C. Infill: Provide either vertical picket, expanded metal, perforated metal, or woven-wire mesh.

D. Toe Boards.

LEED SUGGESTIONS

2.1 Refer to Division 5, Section "Structural Steel Framing".

LESSONS LEARNED

3.1 Guard rail infill must be designed so a 4-inch sphere cannot pass through it, as to comply with code requirements. Horizontal rails as infill can be readily climbed by children and should be avoided. Economical options for infill include vertical pickets, expanded metal, perforated metal, or woven-wire mesh.

END OF SECTION

DIVISION 06

WOODS, PLASTICS, AND COMPOSITES

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DIVISION 06: WOODS, PLASTICS, AND COMPOSITES

061000 Rough Carpentry
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SECTION 061000

ROUGH CARPENTRY

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for miscellaneous wood framing, incidental rough carpentry required for support or attachment of other construction, pressure preservative treated and fire retardant treated wood.

1.2 PRODUCTS

A. Lumber
1. Maximum moisture content: 19 percent.
2. Factory mark each piece of lumber with grade stamp.

B. Boards
1. Maximum moisture content: 19 percent.

C. Fasteners: Hot-dip galvanized or stainless steel where exposed to weather, in ground contact, in contact with treated wood, or in area of high relative humidity.

1.3 WOOD PRESERVATIVE TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.

1.4 FIRE RETARDANT TREATED MATERIALS

A. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
1. Use treatment that does not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when testing according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.

LESSONS LEARNED

3.1 Increased corrosion of steel fasteners is a concern with preservative treatments, especially those containing ammonia and higher concentrations of copper (which will generally replace those containing arsenic). For this reason, hot-dip galvanized steel or stainless steel fasteners should be used with pressure-preservative-treated lumber.

3.2 WOOD PRESERVATIVE TREATMENT

A. Where carpentry may be subject to deterioration by moisture or insect attack, consider using pressure-preservative-treated material. Provide provisions for preservative-treated wood in locations required by building codes and in certain locations where wood should always be treated, such as wood used with roofing and flashing, on the damp side of vapor ***retarders*** and waterproofing, and items such as sills, sleepers, furring, blocking, and stripping if in contact with masonry or concrete located below grade. Provisions for treating wood in other locations should be added as required on a project-by-project basis. If the additional locations for the use of treated wood are too complex to describe in the specifications, identify them by notes on the Drawings.

B. Arsenic has been used in most of the treatment chemicals used for treating wood used in building construction since the 1970's, when the use of pentachlorophenol was largely eliminated. Some of the treatment chemicals that contain arsenic also contain chromium. The wood treatment industry has voluntarily phased out the use of the most common arsenic-based treatment (chromated copper arsenate, also called CCA) for treated wood intended for residential and similar uses, although the EPA has not declared pressure-treated wood that contains arsenic to be hazardous. The phase out required that wood treated after 2003 not contain CCA. Because the phase-out applied to residential use, CCA has generally been eliminated from use with all dimension lumber, its used being largely restricted to utility poles and piling. The phase-out does not apply to ACZA (ammoniacal copper zinc arsenate), which also contains arsenic, and which is often used to treat Douglas fir and other species that are difficult to treat, due to their high density and resultant poor absorption of treatment chemicals.

C. Boron is effective for controlling fungi, molds, and insects such as termites that use these wood-destroying organisms to break down and digest wood fibers. Boron is also relatively safe for human beings and animals and is inexpensive. The one problem with boron is that its compounds are very water soluble. It is easy and inexpensive to treat wood with boron, but the wood must be protected from getting wet. For most of the building framing, which will be enclosed in the finished building, boron treatment is ideal, for protection against termites, but care must be exercised to ensure that the treatment is not washed out by rain before the framing can be covered. If boron treatment is used, provisions should be included for spray treatment by an exterminator of wood that has become wet.

END OF SECTION

SECTION 061600

SHEATHING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for wall sheathing, roof sheathing, ***vented nailboard,*** building wrap, sheathing joint and penetration treatment and flexible flashing at openings in sheathing.

1.2 WOOD PANEL PRODUCTS, GENERAL

A. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.

1.3 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
   1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

1.4 FIRE-RETARDANT-TREATED PLYWOOD

A. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
   1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
   2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when testing according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.

1.5 WALL SHEATHING

A. Plywood Wall Sheathing
B. Glass-Mat Gypsum Wall Sheathing
C. Cellulose Fiber-Reinforced Gypsum Sheathing
D. Extruded-Polystyrene-Foam Wall Sheathing
E. Foil Faced Closed Cell Rigid Foam Wall Sheathing

1.6 ROOF SHEATHING

A. Plywood Roof Sheathing: Exterior, Structural I sheathing.
   1. Provide 5/8 inch nominal thickness for 24 inch rafter spacing.

B. Oriented-Strand-Board Roof Sheathing: Exposure 1, Structural 1 sheathing.
   1. Provide 5/8 inch nominal thickness for 24 inch rafter spacing.

C. Composite Nail Base Insulated Roof Sheathing

1. Type: Vented

2. Board Insulation: Either polyisocyanurate or extruded polystyrene

3. Oriented Strand Board: Board shall not exceed its APA span rating based on the spacing of the spacer blocks.

a. The spacer blocks within the ventilation space shall not exceed 10 percent of the panel area and will allow air to flow both up the slope and horizontally. The air space shall be 2 inches minimum.

1.7 FASTENERS

A. Fasteners: Hot-dip galvanized or stainless steel where exposed to weather, in ground contact, in contact with treated wood, or in area of high relative humidity.

1.8 WEATHER-RESISTANT SHEATHING PAPER

A. Building Wrap: ASTM E 1677, Type I air retarder; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized.

B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended for sealing joints and penetrations in building wrap.

1.9 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Glass-Mat Gypsum Sheathing Board: Silicone emulsion sealant, compatible with sheathing tape and sheathing, and recommended for use with glass-fiber sheathing tape and for covering exposed fasteners.

B. Sheathing Tape for Glass-Mat Gypsum Sheathing Board: Self-adhering glass-fiber tape, for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing board.

C. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape for sealing joints and penetrations in sheathing.

1.10 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.025 inch.

LEED SUGGESTIONS

2.1 Emissions: Products shall meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 Vented Roof Assemblies: Proper ventilation is critical to the longevity and effectiveness of the roof assembly. While 2 inches is the recommended air space, for runs over 60 feet and complex roof designs, including hips, the Design Team should consult vented nailboard manufacturer and verify design using a "Vented Roof System Calculator" available from most manufacturers.

END OF SECTION

SECTION 062000

FINISH CARPENTRY

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for wood construction that can be purchased ready made and installed by a finish carpenter, not requiring the specialized skills of architectural woodwork fabrication.

1.2 QUALITY ASSURANCE

A. Quality Standards: Architectural Woodwork Institute (AWI) "Quality Standards."
   1. Custom grade.

1.3 INTERIOR MATERIALS

A. General: Provide materials that comply with requirements of the AWI Woodworking Standard for each type of woodwork and quality grade indicated and, where the following products are part of woodwork, with requirements of the referenced product standards, that apply to product characteristics indicated:
   1. Hardboard: AHA A135.4
   2. High Pressure Laminate: NEMA LD3.
   3. Medium Density Fiberboard: ANSI A208.2, made with binder containing no urea-formaldehyde resin.
   4. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea-formaldehyde resin.
   5. Straw-based particleboard: ANSI A208.1, Grade M-2, except for density.
   6. Softwood Plywood: PS 1.
   7. Hardwood Plywood and Face Veneers: HPVA HP-1, made with binder containing no urea-formaldehyde resin.

1.4 EXTERIOR MATERIALS

A. Exterior Standing and Running Trim and Rails
   1. Dimensional lumber of rot resistance species.
      a. Redwood, South American ipe, bald cypress, cedar, black locust, and black walnut.

1.5 STANDING AND RUNNING, TRIM AND RAILS FOR TRANSPARENT FINISH

A. Standing and running trim shall be custom grade hardwood, conforming to AWI Section 300.

1.6 FACTORY FINISHING OF INTERIOR WOODWORK

A. Quality standard complies with AWI Section 1500.

B. General: The prefinishing of interior architectural woodwork is required to be preformed at factory as specified in this section.

C. Transparent Finish: Comply with requirements indicated below for grade, finish system, staining, effect, and sheen.
   5. Grade: Custom
   6. AWI Finish System TR-6 - Catalyzed Polyurethane
   7. Staining: As determined by Designer.
   8. Effect: Open grain
   9. Sheen: As determined by Designer.

END OF SECTION

SECTION 064023
INTERIOR ARCHITECTURAL WOODWORK

GENERAL GUIDELINES

1.1 SECTION INCLUDES
- A. Qualitative requirements for shop-fabricated wood and laminate-clad fabrications.
  1. Section includes custom-fabricated cabinets and countertops.

1.2 QUALITY ASSURANCE
- A. Quality Standards: Architectural Woodwork Institute (AWI) "Quality Standards."
  1. Custom grade.

1.3 MATERIALS
- A. Wood Products
  1. Hardboard: AHA A135.4
  2. Medium Density Fiberboard: ANSI A208.2, made with binder containing no urea-formaldehyde resin.
  3. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
  4. Straw-based Particleboard: ANSI A208.1, Grade M-2, except for density.
- B. Thermoset Decorative Panels
- C. High-Pressure Decorative Laminate: NEMA LD3, grades as required by woodwork quality standard.

1.4 HARDWARE
- A. Butt Hinges.
- B. Wire Pulls: Back-mounted, metal.
- C. Catches, Adjustable Shelf Standards and Supports, and Shelf Rests.
- D. Drawer Slides: Builders Hardware Manufacturers Association (BHMA): Minimum standards of BHMA A156.9.
  1. Heavy Duty (Grade 1 HD-100).
  2. Box Drawer Slides: Grade 1 HD-100.
  3. File Drawer Slides: Grade 1 HD-200.
  4. Pencil Drawer Slides: Grade 1.
  5. Keyboard Slides: Grade 1 HD-100.
- E. Locks: Door and drawer.
- F. Grommets, Casters, Leveling Guides, and Articulating Keyboard Assemblies.

1.5 FABRICATION
- A. Comply with requirements of AWI for Custom Grade, unless otherwise noted.

LEED SUGGESTIONS

2.1 Emissions: Products shall meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Enviornmental Chambers."

END OF SECTION

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DIVISION 07

THERMAL AND MOISTURE PROTECTION

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077200 Roof Accessories
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SECTION 071000

DAMPPROOFING AND WATERPROOFING

LESSONS LEARNED

3.1 While damp proofing and waterproofing qualitative requirements are not included in the Design Manual, ***their correct implementation is critical*** to a successful project.

3.2 Damp proofing is used on the exterior face of below grade walls to reduce migration of moisture into interior spaces. Waterproofing is resistive to migration of water into interior spaces through below grade walls where it is under hydrostatic pressure. Waterproofing is required on walls that retain earth and enclose interior spaces where groundwater is within 6 inches of the floor.

3.3 The Design Team should review the Geotechnical report for recommendations on damp proofing and waterproofing. ***Good rainwater and storm run-off management and foundation drainage, and proper grading of soil or paving away from building walls and foundations is also critical.***

END OF SECTION

SECTION 072100

THERMAL INSULATION

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for organic and inorganic insulation applied for thermal protection in walls, ceilings, attics, and crawl spaces; under concrete slabs on grade; and at perimeter of foundations.

1.2 PERFORMANCE REQUIREMENTS

A. Plenum Rating: Glass and slag-wool-fiber / rock-wool-fiber insulation rated for resistance against erosion and mold growth per UL 181.

B. NFPA: Foam plastics left exposed to the interior occupied space must be covered by a thermal barrier, show compliance to NFPA 286 for flame spread classifications for specific materials or assemblies, ***or qualify for an exemption under the Ohio Building Code.***

1.3 MATERIALS

A. Extruded Polystyrene Board Insulation
   1. Type IV, 25 p.s.i. minimum density.

B. Unfaced Mineral Fiber Blanket Insulation
   1. Mineral Fiber Type: Fibers manufactured from glass, slag wool, or rock wool.

C. Faced Mineral Fiber Blanket Insulation
   1. Mineral Fiber Type: Fibers manufactured from glass, slag wool, or rock wool.

D. Foil-Faced, Glass-Fiber Board Insulation: Nominal density of 6 lb/cu.ft.

E. Glass-Mat-Faced, Glass-Fiber Board Insulation: Nominal density of 6 lb/cu.ft.

F. Unfaced, Slag-Wool-Fiber / Rock-Wool- Fiber Board Insulation: Nominal density of 6 lb/cu.ft.

G. Foil Faced Closed Cell Rigid Foam Board Insulation.

H. Glass-Fiber Loose Fill.

I. Foamed-in-Place Insulation
   1. Silicate foam.
   2. Open-cell polyurethane: Water-based polyurethane, low-density, no VOC emissions after 30 days; foaming agent: carbon dioxide and water.

J. Closed-cell polyurethane Foam Insulation: ASTM C 1029, Type II, 1.5 lb.cu.ft.
   1. Foam insulation required between all windows and doors at head, jamb, and sill.
   2 Foam interior junction of the roof to wall intersection, the underside of the roof deck at the ridge and valley(s) and at all roof penetrations (roof drains, conduit, roof hatch, etc.) per detail on Chapter 8: Systems and Materials – Exterior Walls, Exterior Wall/Roof Closure. ***Provide thermal barrier per building code.***
      a. Class A Foam that meets the requirements of NFPA 286 Room Corner Fire Test does not require a thermal barrier.

K. Auxiliary Insulating Materials
   1. Vapor-retarder tape
   2. Adhesive for bonding insulation
   3. Insulation fasteners
   4. Tape or foam for sealing joints in insulation board.

L. Self-Supported, Spray-Applied Cellulosic Insulation.

M. Vapor Retarders.

N. Spray-Polyurethane Foam Sealant: 1 or 2 component, 1.5 to 2.0 lb/cu.ft. density; flame

spread index of 25 or less according to ASTM E 162 or E 84.

1. Single-component sealant low expansion design for sealing perimeter of openings.
2. Two-component foam sealant for gaps over 2 inches.

LEED SUGGESTIONS

2.1 Qualifying for a credit under the LEED Rating System requires a reduction in design energy cost compared to the energy cost budget for regulated energy components described in the requirements in ASHRAE 90.1. Insulation plays a major role in determining the extent of design energy-cost reductions. To obtain the maximum number of points under the "Energy and Atmosphere – Optimize Energy Performance", an 'integrated design' approach with the Mechanical Engineer is important.

2.2 Product Data for Credit EQ 4: Indicate products meet the testing and product requirements of the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

2.3 Sustainability Requirements: Provide glass-fiber insulation as follows:

A. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 27-ppb formaldehyde.

2.4 Sustainability Requirements: Provide spray-applied cellulosic insulation as follows:

A. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 27-ppb formaldehyde.

LESSONS LEARNED

3.1 Thermal Resistance and Thermal Resistivity

A. Thermal resistance (R-value) is a measure of resistance to heat flow of the "total thickness" of an insulating material or construction. Thermal resistivity (r-value) is a measure of resistance to heat flow of a "unit thickness" of a homogeneous insulating material. The performance of non-homogenous materials such as fibrous blanket insulation is always reported using total thermal resistance, not unit thermal resistivity. For insulation in board form, which is homogeneous, the performance is reported in unit thermal resistivity. Where thermal resistivity is used, the total thermal resistance can be calculated by multiplying the unit thermal resistivity by the actual thickness in inches, or in SI (metric) units, by fractions of a meter.

B. For thermal blanket insulation, the location and thermal resistance are properly shown on the Drawings rather than indicated in the Specifications. For thermal insulation in board form, the location and thickness are shown on the Drawings and the thermal resistivity is indicated in the Specifications.

C. Because the performance of acoustical blanket insulation is not related to heat flow, neither thermal resistance nor thermal resistivity is used, even though thermal and acoustical blanket insulation may be identical. The location and thickness of acoustical blanket is shown on the Drawings.

3.2 Placement and Anchorage

A. Difficult spaces to insulate include floor-to-window wall junctures and partition-to-exterior wall junctures. Gaps in insulation at such locations can be successfully insulated by using spray polyurethane foam insulation.

END OF SECTION

SECTION 072700

AIR BARRIERS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for air barrier system. The entire building envelope shall be designed and constructed with a continuous air barrier.

1. Provide transition taping and foam products for masonry mockup in early construction phase.

B. Building Airtightness Requirement: The basic airtightness requirements and processes for OFCC projects is the following:

1. Design and construct the building envelopes of ***all instructional facilities*** with a continuous air barrier to control air leakage into (or out of) the conditioned space. Clearly identify the boundary limits of the building air barriers and of the portion or portions of the building to be tested for building airtightness on the construction documents. Clearly identify all air barrier components of each envelope assembly on construction documents and detail the joints, interconnections and penetrations of the air barrier components.
2. Join and seal the air barrier materials of each assembly to the air barrier materials of adjacent assemblies, allowing for the relative movement of these assemblies and components. Clearly identify air barrier system continuity on the plan and section construction drawings.
3. There shall be a continuous thermal, moisture and air barrier system surrounding the interior of the building to the top of the footings. ***There shall be no direct contact or thermal bridge between the exterior and the interior of the building*** such that the thermal, moisture and air barrier becomes discontinuous. Provide details to seal all penetrations, including but not limited to electrical, plumbing and HVAC components; windows and doors; compatibility of materials with one another.
4. Support the air barrier so that it shall withstand the maximum positive and negative air pressures that will be placed on the building without displacement, or damage, and transfer the load to the structure. The air barrier assembly must be durable to last the anticipated service life of the envelope.
5. Provide a motorized damper in the closed position and connect it to the fire alarm system to open on call and fail in the open position for any fixed open louvers such as at elevator shafts. Dampers and controls shall close all ventilation or make-up air intakes and exhausts, atrium smoke exhausts and intakes, etc. where leakage can occur during inactive periods. Provide air-tight vestibules at building entrances with high traffic.
6. Compartmentalize spaces under negative pressures such as boiler rooms and provide make-up air for combustion.

C. Air Barrier Design: The air barrier shall be designed and noted in the following manner:
1. All air barrier components of each building envelope assembly shall be clearly identified or otherwise noted on construction documents.
2. The joints, interconnections, and penetrations of the air barrier components including lighting fixtures shall be detailed or otherwise noted.
3. The continuous air barrier shall extend over all surfaces of the building envelope (at the lowest floor, exterior wall, and ceiling or roof).
4. The continuous air barrier shall be designed to resist positive and negative pressures from wind, stack effect, and mechanical ventilation.

D. Air Barrier Installation: The following areas of the continuous air barrier in the building envelope shall be wrapped, sealed, caulked, gasketed, or taped in an approved manner to minimize air leakage:
1. Installer shall be certified by the Air Barrier Association of American (ABAA) Quality Assurance Program.
2. Joints around fenestration and door frames (both manufactured and site-built).
3. Junctions between walls and floors, between walls at building corners, between walls and roofs or ceilings.
4. Penetrations through the air barrier in building envelope roofs, walls, and floors.
5. Building assemblies used as ducts or plenums.
6. Joints, seams, connections between planes, and other changes in air barrier materials.
7. All steel support members at openings in exterior walls shall be isolated from direct thermal transfer.
8. Install an air barrier transition from window to air barrier.

E. Quality Control: Provide for site inspections by ABAA to verify conformance with manufacturer's instructions and ABAA's Quality Assurance Program. Inspections at 5, 50, and 95 percent completion with written report.

1.2 MATERIALS AND ASSEMBLIES

A. Continuous air barrier materials and assemblies for the opaque building envelope shall comply with one of the following requirements.
1. Materials that have an air permeance not exceeding 0.004 cfm/ft^2 under a pressure differential of 0.3 in w.g. (1.57 psf) when tested in accordance with ASTM E 2178. The following materials meet the requirements of 5.4.3.1.3.a:
a. Plywood – minimum 3/8 in.
b. Oriented strand board – minimum 3/8 in.
c. Extruded polystyrene insulation board – minimum 1/2 in.
d. Foil-faced rigid foam insulation board – minimum 1/2 in.
e. Exterior gypsum sheathing or interior gypsum board – min. 1/2 in.
f. Cement board – minimum 1/2 in.
g. Built up roofing membrane
h. Modified bituminous roof membrane
i. Fully adhered single-ply roof membrane
j. A Portland cement/sand parge, stucco, or gypsum plaster – minimum 1/2 in. thick.
k. Cast-in-place and precast concrete.
l. Sheet metal.
m. Closed cell 2lb/ft^3 nominal density spray polyurethane foam – minimum 1 in.

2. Assemblies of materials and components (sealants, tapes, etc.) that have an average air leakage not to exceed 0.04 cfm/ft^2 under a pressure differential of 0.3 in w.g. (1.57 psf) when tested in accordance with ASTM E 2357 ASTM E 1677, ASTM E 1680 or ASTM E283; the following assemblies meet the requirements of 5.4.3.1.3 b.
   a. Concrete masonry walls that are:
      1) Fully grouted, or
      2) Painted to fill the pores.

1.3 Pre-Installation conferences shall be used to establish standards of workmanship for installation and for coordination among contractors.

LESSONS LEARNED

2.1 Air barrier and vapor ***retarder*** are two distinct functions. Two functions may be provided by one material which has both characteristics or the functions may be satisfied by two separate materials occurring in different planes of the building envelope.

A. Air barriers serve a different role in a building envelope than vapor retarders. Air barriers restrict the movement of airborne moisture into building cavities. Vapor retarders control the diffusion of moisture vapor into and out of building envelopes. Many air barrier materials also function as vapor retarders; others are vapor permeable. The location within the wall of combined air barriers/vapor retarders and of separate vapor retarders and air barriers is governed by the difference between interior and exterior environmental conditions.

2.2 A vapor ***retarder, if used,*** should occur on the interior side of the thermal insulation.

2.3 An air barrier/ retarder can be provided and satisfactorily serve its purpose in a variety of locations in the plane of the wall and roof.

A. Improper location or coordination of air barriers and vapor retarders can prevent the escape of moisture from the wall; moisture-laden air condensing in walls and the roof can lead to mold growth, metal framing corrosion, building materials deterioration, and wet insulation losing its insulating characteristics.

2.4 Air movement can carry exponentially more moisture into and through the building envelope than vapor diffusion alone, which can lead to mold and fungal growth, the corrosion and premature deterioration of building components, and the staining of interior and exterior facades.

2.5 The Department of Energy has concluded that up to 40% of the energy consumed to heat and cool a building can be attributed to air leakage into and out of buildings. The effort to conserve energy and minimize losses from the interior environments of buildings has resulted in the need for tighter building envelopes. To control air leakage through building envelopes, air barriers as an air-impermeable component within the wall or roof have been incorporated into some building codes.

2.6 Air barriers are a component of the building envelope that control the movement of air into (infiltration) and out of (exfiltration) building walls and roofs due to differences in wind pressure, stack pressure, and HVAC fan pressure.

A. Wind: Produces positive air pressure on the windward façade of a building and negative air pressures on the leeward and side facades and on the roof. The magnitude of negative wind forces has been widely documented for roofing applications where substantial uplift loads must be resisted by roof assembly.

B. Stack Effect: The effect of air rising or falling within a building due to temperature differences between air in the building and air outside the building. Stack effect in heating seasons in cold climates can cause air infiltration at the lower levels of a building and air exfiltration in the upper levels. The reverse occurs in warm climates with air conditioning cooling the inside air causing it to fall. Air infiltrates the upper levels of a building and exfiltrates in the lower levels. Stack effect forces can be significant and sustained for several months. The air barrier must be capable of resisting these forces.

C. Fan Pressure: HVAC system pressurization that maintains a building interior with a positive pressure. Air under pressure attempts to infiltrate through the building envelope. Positive HVAC pressurization is usually intended to reduce infiltration and pollutants and to counter stack effect air pressure.

2.7 The resultant air pressures about the entire building envelope will influence the HVAC design pressures as well as indicate the magnitude of forces that the air barrier will be required to sustain.

2.8 Air exfiltration from a heated or air-conditioned interior space through the building envelope increases energy consumption as the building's HVAC system produces more conditioned air than would be required in a building with a properly functioning air barrier.

2.9 Air infiltration into a heated or air-conditioned building also increases energy consumption as the building's HVAC system corrects the interior temperature and humidity to the desired levels.

A. Air barriers restrict the movement of moisture into building cavities. Moisture-laden air condensing in walls and the roof can lead to mold growth, metal framing corrosion, building materials deterioration, and wet insulation losing its insulating characteristics.

B. Air barriers serve a different role in a building envelope than vapor retarders, which control the diffusion of moisture vapor into and out of building envelopes. Many air barrier materials also function as vapor retarders; others are vapor permeable. The location within the wall of combined air barriers/vapor retarders and of separate vapor retarders and air barriers is governed by the difference between interior and exterior environmental conditions.

END OF SECTION

SECTION 073113

ASPHALT SHINGLES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for roof shingles, underlayment, and fastening products and methods.

1.2 QUALITY ASSURANCE

A. All products used must be approved by shingle manufacturer prior to use.

B. Exterior Fire-Text Exposure: Class A; ASTM E108 or UL 790, for application and roof slopes indicated.

1.3 WARRANTY

A. Special Warranty

1. Material Warranty Period: 40 years from date of contract completion, prorated, with first 5 years nonprorated.
2. Wind-Speed Warranty Period: Resist blow-off or damage caused by wind speeds up to 80 m.p.h. for a minimum 5 years from date of contract completion.

1.4 SHINGLES

A. Laminated-Strip Asphalt Shingles: ASTM D3462, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.

B. Hip roofs require special consideration.

1.5 ROOFING ACCESSORIES

A. Felt Underlayment.

B. Self-Adhering Sheet Underlayment.

1.6 METAL TRIM AND FLASHING

A. Perimeter Edge Metal: Provide one of the following metal types and thickness:

1. 26 gauge (0.019 inch thick), prefinished galvanized steel
2. 0.032 inch thick, prefinished aluminum

B. Penetration Flashings: Provide one of the following metal types and thickness:

1. 26 gauge (0.019 inch thick), prefinished galvanized steel or stainless steel.
2. 0.032 inch thick, prefinished aluminum.
3. 16 ounce (0.022 inch thick), copper.

C. Valley Construction (Open Valleys): Provide one of the following metal types and thickness:

1. 26 gauge (0.019 inch thick), prefinished galvanized steel or stainless steel.
2. 0.032 inch thick, prefinished aluminum.
3. 16 ounce (0.022 inch thick), copper.

D. Apron, Step, Cricket, or Backer Flashings: Provide one of the following:

1. 26 gauge (0.019 inch thick), prefinished galvanized steel or stainless steel.
2. 0.032 inch thick, prefinished aluminum.
3. 16 ounce (0.022 inch thick), copper

1.7 INSTALLATION

A. General: Comply with manufacturer's instructions and recommendations but not less than those recommended by ARMA's "Residential Asphalt Roofing Manual" or "The NRCA Steep Roofing Manual."

1. Fasten asphalt shingles to roof sheathing with ***galvanized roofing*** nails.

LESSONS LEARNED

3.1 The emergence of structural insulated roofing panels and the use of rigid insulation laminated to wood-based sheathing panels as structural roof deck have highlighted ventilation needs. For maintaining warranties, asphalt shingle manufacturers require an unobstructed air space immediately below the roof-deck sheathing. To permit air movement under the roof-deck sheathing, a number of proprietary products have been developed that use battens as spacers and an added sheathing layer as the asphalt shingle substrate. This air space can be vented with continuous soffit or eave intake vents combined with continuous ridge exhaust vents.

A. Proper ventilation extends the life of shingled roofs by minimizing the temperature differential between the attic air and outside air. It keeps the roof system cool during the hot summer months, preventing premature deterioration and less shingle replacement.

B. Proper ventilation prevents ice damming caused when the heat from inside the building and the sun melts the snow at the ridge. This causes water to run to the eaves and refreeze and the repetition of this process causes ice dams.

C. Proper ventilation provides energy savings in the summertime by cooling the roof sheathing, preventing premature roof deterioration, premature roof replacement, and increased servicing of cooling units due to their excessive use. It prevents heat build-up in unvented systems which radiates downward and increased the demand on cooling systems.

D. Proper ventilation provides energy savings in the wintertime by preventing hot and cold air to interact and cause moisture from condensation that causes soaked insulation, corrosion, and water infiltration.

END OF SECTION

SECTION 074113

METAL ROOF PANELS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for vertical-rib, seamed-joint, standing-seam metal roof panels.

1.2 WARRANTY

A. Special Warranty on Panel Finishes: 20 years.

B. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: 20 years.

1.3 PRODUCTS

A. Standing-Seam Metal Roof Panels:
1. Profile: Vertical rib, seamed joint.
2. Material: Aluminum-zinc alloy-coated steel.
3. Exterior Finish: 2-coat fluoropolymer, 70 percent PDVF resin.

B. Accessories:
1. Vapor retarder, if required by Design Team.
2. Thermal insulation: Faced polyisocyanurate board or extruded-polystyrene board.
3. Self-adhering, high-temperature sheet underlayment (optional over entire roof).
4. Slip sheet.
5. Substrate boards.
6. Miscellaneous metal framing.
7. Flashing and trim.
8. Gutters.
9. Downspouts.
10. Roof curbs.
11. Snow guards: Seam-mounted, stop or bar types. Surface mounted is not acceptable.
12. Pipe flashing.
13. Soffit panels.

LEED SUGGESTIONS

2.1 Buildings seeking LEED accreditation can receive a point for Sustainable Sites – Heat Island Effect for steep-sloped roofs having a Solar Reflectance Index (SRI) of 29 or more.

END OF SECTION

SECTION 074213

METAL WALL PANELS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for factory-formed and field-assembled, exposed or concealed fastener, lap-seam metal wall panels.

1.2 MATERIALS

A. Thermal Insulation for Field-Assembled Metal Wall Panels: Extruded polystyrene board.

B. Substrate Board.

C. Miscellaneous Metal Framing.

D. Panel Material
   1. Metallic-Coated Steel Sheet Prepainted with Coil Coating.
      a. Zinc-Coated (galvanized) Steel Sheet.
      b. Aluminum-Zinc Alloy-Coated Steel Sheet.

1.3 PRODUCTS

A. Exposed/Concealed-Fastener, Lap-Seam Metal Wall Panels
   1. Profile: As selected by A/E.
   2. Material: Zinc-coated (galvanized) steel or aluminum-zinc alloy-coated steel sheet. No aluminum.
   3. Exterior Finish: 2-coat Fluoropolymer.

B. Accessories
   1. Flashing and trim.
   2. Metal soffit panels.

END OF SECTION

SECTION 074216

INSULATED-CORE METAL WALL PANELS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for foamed-insulation-core metal wall panels and laminated-insulation-core metal wall panels.

1.2 PANEL MATERIALS

A. Metallic-Coated Steel Sheet
   1. Zinc-Coated (Galvanized) Steel Sheet.
   2. Aluminum-Zinc Alloy-Coated Steel Sheet.

B. Aluminum Sheet.

1.3 PANEL CORES

A. Polyisocyanurate Insulation: Closed cell, modified polyisocyanurate foam using a non-CFC blowing agent, foamed-in-place or board type, with flame-spread index of 75 or less and smoke-developed index of 450.

1.4 FOAMED-INSULATION-CORE METAL WALL PANELS

A. Concealed-Fastener, Foamed-Insulation-Core Metal Wall Panels: Formed with tongue-and-groove panel edges; designed for sequential installation by interlocking panel edges and mechanically attaching panels to supports using concealed clips or fasteners.

1.5 LAMINATED-INSULATION-CORE METAL WALL PANELS

A. Shiplap-Edge, Laminated-Insulation-Core Metal Wall Panels: Formed with flush exterior panel facing and with shiplap edges; designed for sequential installation by mechanically attached panels to supports using concealed clips and fasteners; with factory-applied sealant or gaskets in side laps.

1.6 ACCESSORIES

A. Miscellaneous Metal Framing.

B. Flashing and Trim.

END OF SECTION

SECTION 074219

METAL PLATE WALL PANELS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for factory-formed and field-assembled metal plate wall panels.

1.2 PERFORMANCE REQUIREMENTS

A. Air Infiltration: ASTM E 283.

B. Water Penetration under Static Pressure: ASTM E 331.

C. Structural Performance: ASTM E 330.
1. Deflection Limits: 1/180.

1.3 WARRANTY

A. Materials and Workmanship: Two years.

B. Finishes: 20 years.

1.4 MATERIALS

A. Miscellaneous Metal Framing: Subgirts, base or sill angles or channels, hat-shaped rigid furring channels, and cold-rolled furring channels.

1.5 PRODUCTS

A. Metal Plate Wall Panels
1. Material: Aluminum or steel sheet.
2. Thickness: 0.120 inch minimum
3. Exterior Finish: 2-coat fluoropolymer (70% PVDF resin), clear anodized or color anodized.

1.6 INSTALLATION

A. Installation Method: Flange attachment, clip, subgirt and spline, track support, rail support, or rainscreen principle.

END OF SECTION

SECTION 074243

COMPOSITE WALL PANELS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for factory-formed, metal-faced composite wall panels with thin thermoplastic cores.

1.2 PERFORMANCE REQUIREMENTS

A. Air Infiltration: ASTM E 283.

B. Water Penetration under Static Pressure: ASTM E 331.

C. Structural Performance: ASTM E 330.

1.3 WARRANTY

A. Materials and Workmanship: Two years.

B. Finishes: 20 years.

1.3 MATERIALS

A. Miscellaneous Metal Framing: Subgirts, base or sill angles or channels, hat-shaped rigid furring channels, and cold-rolled furring channels.

1.4 PRODUCTS

A. Metal-Faced Composite Wall Panels:
   1. Material: Aluminum faced.
   2. Thickness: 0.157 inch (4mm) minimum.
   3. Exterior Finish: 2-coat fluoropolymer (70% PVDF resin), 3-coat fluoropolymer, 4-coat fluoropolymer, mica fluoropolymer, metallic fluoropolymer, FEVE fluoropolymer, clear anodized, color anodized, mill, acrylic finish for maintaining an “aged” finish, acrylic finish for maintaining a “penny-bright” finish, or pre-patinated.

1.5 INSTALLATION

A. Installation Method: Clip, track support, subgirt and spline, or rainscreen principle.

END OF SECTION

SECTION 075000

MEMBRANE ROOFING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. General qualitative requirements for roofing system applied to the structural substrate, over insulation, or protected with insulation (protected membrane) as appropriate to the particular assembly.

1. Built-up bituminous roofing
2. Elastomeric membrane roofing
3. Thermoplastic membrane roofing
4. Modified bituminous membrane roofing

1.2 SYSTEM DESCRIPTION

A. General: Provide installed roofing membrane and base flashings that remain watertight, do not permit the passage of water, and resist uplift pressure calculated according to ASCE 7, thermally induced movement, and exposure to weather without failure.

B. Design Requirements

1. All roofs shall be designed and built to ensure positive drainage.
   a. Positive Drainage: The drainage condition in which consideration has been made during design for all loading deflections of the deck, and additional roof slope has been provided to ensure drainage of the roof area within 48 hours of rainfall, during ambient drying conditions.
2. ***Roofs shall be "solar ready" in accordance with O.R.C. 3318.112.***

1.3 QUALITY ASSURANCE

A. Exterior Fire Test Exposure: Class A, comply with ASTM E108.

1.4 SEQUENCING

A. Work shall begin only after opening and penetrations are in place and adjacent work required for complete tie-in are in place. This includes flashing in masonry walls with special attention given to roof to wall transitions.

1. Work shall not begin before the "Preinstallation Conference" and conditions exist necessary for a successful completion of roofing have occurred.
2. Work shall not begin without the presence of manufacturer's representative, A/E and Testing Laboratory, if required.

B. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the Applicator shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas.

C. After work on roof is started, no traffic will be permitted on the roof other than necessary for the roofing application and inspection. Materials shall not be piled on the roof to the extent that design live loads are exceeded. Roofing materials shall not be transported over unfinished or finished roofing or existing roofs unless adequate protection is provided.

1.5 WARRANTY

A. Roofing Warranty: Minimum manufacturer's 20 year total system warranty.

1.6 BUILT-UP ASPHALT ROOFING
A. Refer to Section 075113.
1.7 MODIFIED BITUMINOUS MEMBRANE ROOFING
A. Refer to Section 075200.
1.8 EPDM ROOFING
A. Refer to Section 075323.
1.9 THERMOPLASTIC MEMBRANE ROOFING
A. Refer to Section 075400.
2.0 INSTALLATION
A. Install roofing membrane systems according to roofing system manufacturer's written instructions and applicable recommendations of NRCA's "Quality Control Guidelines".

LEED SUGGESTIONS

2.1 Buildings seeking LEED accreditation can receive a point for Sustainable Sites – Heat Island Effect for low-sloped roofs having a Solar Reflectance Index (SRI) of 78 or greater.

2.2 Qualifying for a credit under the LEED Rating System requires a reduction in design energy cost compared to the energy cost budget for regulated energy components described in the requirements in ASHRAE 90.1. Insulation plays a major role in determining the extent of design energy-cost reductions. To obtain the maximum number of points under the Energy and Atmosphere – Optimize Energy Performance, an "integrated design" approach with the Mechanical Engineer is important.

LESSONS LEARNED

3.1 Roof System: The term "roof system" is defined by these documents as "a system of interacting roof components, generally consisting of a membrane or primary roof covering, roof insulation and flashings designed to waterproof and improve the building's thermal resistance."

3.2 Warranties: Two types of comprehensive materials-and-workmanship warranties are commonly offered. Known as no-dollar-limit warranties and total-system warranties, these warranties usually bind the roofing installer to the manufacturer to make repairs during the first two years of the warranty period; thereafter, the system manufacturer agrees to provide labor and materials to repair leaks.
A. Total-system warranties are required by the Ohio School Design Manual to offer the Owner a single entity to resolve roofing leaks that are traceable to the roofing membrane and other roofing components. Therefore the specification prepared by the Design Team should provide provisions for a total-system approach.

3.3 Insulation: Joints between insulation boards need to avoid gaps. Insulation must be installed in a minimum of two layers with joints offset in each direction, which reduces thermal bridging and makes the roofing system more energy efficient.

3.4 Additional items to be considered for a successful roof (one without leaks) includes:
A. Possible inspections by a Registered Roof Observer or Registered Roof Consultant from the Roofing Consultants Institute.
B. Thermographic scans by Owner for finished systems at job completion. This maybe included as part of the Enhanced Building Commissioning work.
C. Hold trades other than the roofing contractor accountable for work on finished roof.

END OF SECTION

SECTION 075113

BUILT-UP ASPHALT ROOFING

GENERAL GUIDELINES

1.1 SECTION INCLUDES
- A. Qualitative requirements for roofing systems composed of alternating layers of bituminous sheets and viscous bituminous coatings over an insulated deck.

1.2 SYSTEM DESCRIPTION
- A. Provide one of the following built-up roofing membrane systems for insulated substrates:
  1. BU-I-A-G (4)-A (Built-Up Roof Membrane Over Insulated Deck Using Asphalt with Glass Fiber Ply Sheets and Aggregate Surfacing)
  2. BU-I-L-G2(coated base) (4)-A (Built-Up Roof Membrane Over Insulated Deck Using, Cold Liquid-Applied Asphalt with Ply Sheets and Aggregate Surfacing)

1.3 MATERIALS
- A. Base Sheet: As recommended by manufacturer.
- B. Ply Felt: Asphalt impregnated, glass fiber felt, complying with ASTM D 2178, Type VI or 28 lb. coated based sheets as required by manufacturer to meet warranty requirements.

1.4 FLASHING MATERIALS
- A. Flashing Sheet
  1. Provide one of the following:
     a. SBS modified asphalt sheet, mineral granule surfaced, ASTM 6162 (composite sheet) or ASTM 6164 (polyester).
     b. APP modified asphalt sheet, mineral granule surfaced, ASTM 6223 (composite).

1.5 ASPHALT MATERIALS
- A. Roofing Asphalt: As recommended by built-up roofing membrane manufacturer.
- B. Cold Applied Adhesive.

1.6 AUXILIARY MEMBRANE MATERIALS
- A. Aggregate Surfacing.
- B. Substrate Board: If required by the Design Team or roof system manufacturer by project conditions.
- C. Vapor Retarder: If required by the Design Team by project conditions.
- D. Roof Coating: If required by the Design Team by project conditions.
- E. Walkways: Provide at roof access points and recommended by system manufacturer.

1.7 POLYISOCYANURATE BOARD INSULATION
- A. Insulation shall have a minimum compressive strength of 20 psi and be faced on both top and bottom.

B. Provide tapered insulation, preformed saddles, crickets, tapered edge strips, and other insulation shapes as required for “positive drainage”.

1.8 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.

B. Fasteners.

C. Cold Fluid-Applied Adhesive.

D. Wood Nailer Strips.

E. Cover Board
1. Perlite insulation board.
2. Cellulosic-fiber insulation board.

1.9 GENERAL INSTALLATION REQUIREMENTS

A. Install built-up roofing membrane system according to roofing system manufacturer’s written instructions and applicable recommendations of ARMA/NRCA’s “Quality Control Guidelines for the Application of Built-Up Roofing”.
1. Install roofing system according to applicable specification plates of NRCA’s “The NRCA Roofing and Waterproofing Manual”.

LEED SUGGESTIONS

2.1 Credit EQ 4.1 relates to indoor air quality within the building and sets limits for the VOC content of adhesives and sealants that may emit this VOCs into the interior space of the building. Because many adhesives and sealants used in roofing are used beneath the roof membrane, the volatile materials in them cannot be vented to the exterior and end up in the occupied space. For this reason, the requirements of this credit apply to roofing sealants and adhesives unless they are used exclusively on the exterior side of the roof membrane.

LESSONS LEARNED

3.1 If permanent roofing membrane is installed before roof-top work by other contractors is completed, a common scenario, the roofing membrane can be damaged. Although obvious damage can be remedied, long-term problems may still develop that may not be covered by a warranty. Confining rooftop construction operations to specific areas and enforcing protection requirements will also offer a measure of protection to the permanent roofing membrane.

3.2 The cost of temporary roofing, installed for the Contractor’s convenience or to minimize the risk of incurring a penalty for delaying the overall Project completion, is the Contractor’s responsibility.

3.3 Temporary roofing SHALL NOT be permitted to be retained as part of a final roofing membrane. It is easily damaged during the construction period. Moisture may enter the temporary roofing membrane and the dangers associated with phased construction of a BUR system may also be introduced. Ply slippage may occur between the temporary roof surface and the succeeding plies of the BUR roofing system. Interrupted or phased construction of the BUR roofing system is not recommended by roofing system manufacturers or NRCA.

END OF SECTION

SECTION 075200

MODIFIED BITUMINOUS MEMBRANE ROOFING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for roofing systems formed with modified bituminous membranes over an insulated deck.
   1. Provide one of the following systems:
      a. MBA (1)-I-(T, M or L)-G(2)-M or A (Modified Bitumen APP Roofing Membrane Over Insulated Deck, Mopped or Set In Cold, Liquid-Applied Adhesive, with Glass Fiber Ply Sheet and Mineral or Aggregate Surfacing)
      b. MBS (1)-I-(T, M or L)-G(2)-M or A (Modified Bitumen SBS Roof Membrane Over Insulated Deck, Mopped or Set In Cold, Liquid-Applied Adhesive, with Glass Fiber Ply Sheet and Mineral or Aggregate Surfacing)

1.2 MATERIALS

A. Cap Sheet: Provide one of the following:
   1. SBS-Modified Bituminous Cap Sheet: SBS-modified asphalt sheet, smooth surfaced, dusted with fine parting agent on both sides or granular surfaced; suitable for application method specified; manufacturer's standard thickness and weight; for use and of reinforcing type as follows:
      a. Use: Roof membrane and base flashing.
      b. Reinforcing: Composite woven (ASTM 6162) and glass fiber mat.
   2. APP-Modified Bituminous Cap Sheet, Smooth Surfaced: Atactic polypropylene modified asphalt sheet, smooth surfaced; suitable for application method specified; manufacturer's standard thickness and weight; for use and of reinforcing type as follows:
      a. Use: Roof membrane and base flashing.
      b. Reinforcing: Composite woven (ASTM 6162) and glass fiber mat.

1.3 AUXILIARY MEMBRANE MATERIALS

A. Protective Surfacing
   1. Aggregate Surfacing.

   2. Roof Granules.

B. Roofing Asphalt: As recommended by modified bituminous membrane manufacturer.

C. Cold-Applied Adhesive.

D. Substrate Board: If required by Design Team or roof system manufacturer by project conditions.

E. Vapor Retarder: If required by Design Team or roof system manufacturer by project conditions.

F. Walkways: Provide at roof access points and recommended by system manufacturer.

1.4 BASE SHEET MATERIALS

A. Base Sheet: Unperforated, asphalt impregnated and coated, glass fiber sheet, dusted with fine mineral surfacing on both sides.

1.5 BASE-PLY FELTS

A. Base-Ply Felt: Asphalt coated, glass fiber felt, complying with ASTM D 2178, Type VI or 28 lb. coated base sheets as required by manufacturer to meet warranty requirements.

1.6 POLYISOCYANURATE BOARD INSULATION

A. Insulation shall have a minimum compressive strength of 20 psi and be faced on both top and bottom.

B. Provide tapered insulation, preformed saddles, crickets, tapered edge strips, and other insulation shapes as required for “positive drainage”.

1.7 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.

B. Fasteners.

C. Cold Fluid-Applied Adhesive.

D. Wood Nailer Strips.

E. Cover Board
1. Perlite insulation board.
2. Cellulosic-fiber insulation board.

1.8 INSTALLATION

A. Install modified bituminous membrane roofing system according to roofing system manufacturer’s written instructions and applicable recommendations of NRCA/ARMA’s “Quality Control Recommendations for Polymer Modified Bitumen Roofing”.
1. Install roofing system according to applicable specification plates of NRCA’s “The NRCA Roofing and Waterproofing Manual”.

END OF SECTION

SECTION 075323

EPDM ROOFING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for roofing systems formed with nonvulcanized and vulcanized elastomeric membranes over an insulated deck.
   1. Fully-Adhered Thermoset Membrane Roofing.

1.2 EPDM SHEET

A. Uniform, flexible sheet formed from a terpolymer of ethylene-propylene-diene (EPDM), complying with ASTM D 4637, of the following grade, class, thickness, backing, and exposed face color:
   1. Thickness: 60 mils, nominal.
      a. Type II, scrim or fabric internal reinforced.
      b. Backing: Unbacked.
      c. Black
   2. Thickness: 60 mils, nominal.
      a. Type I, non-reinforced
      b. Backing: Unbacked.
      c. White on black.

B. Sheet Flashing: 60 mil thick EPDM.

1.3 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended by roofing system manufacturer for intended use and compatible with EPDM membrane roofing.

B. Protection Sheet: Epichlorohydrin or neoprene non-reinforced flexible sheet.

C. Seaming Material: Manufacturer's standard splice tape.

D. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

E. Fasteners, lap sealant, bonding adhesive, and water cutoff mastic.

F. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, and other accessories.

1.4 SUBSTRATE BOARDS

A. Substrate Board
   1. Glass-mat, water-resistant gypsum substrate.
   2. Gypsum wood fiber composite/fiber-reinforced gypsum.
   3. Perlite board.

1.5 ROOF INSULATION

A. General: Provide one of the following preformed roof insulation boards that comply with roofing system requirements and referenced standards:

1. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, 1.6 lb./cu.ft. minimum density, square edged.
2. Polyisocyanurate Board Insulation: 20 psi compressive strength, minimum, and faced on both top and bottom.

B. Provide tapered insulation, preformed saddles, crickets, tapered edge strips, and other insulation shapes as required for “positive drainage”.

1.6 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
B. Fasteners.
C. Cold Fluid-Applied Adhesive.
D. Cover Board – must be included in the assembly.

1.7 MEMBRANE INSTALLATION

A. Membrane must be fully adhered.

LESSONS LEARNED

3.1 Substrate Boards may be used as thermal barriers, as support for vapor ***retarders***, and as part of a fire-resistance-rated roofing system. Substrate boards used as part of a fire-resistance rated roofing system can reduce the amount spray-on fireproofing needed. Value engineering a substrate board out of a rated roof assembly may in turn add cost to the project. ***Careful choice of roofing insulation can eliminate the need for a thermal barrier.***

3.2 Cover Boards

A. Elastomeric roofing systems using molded- or extruded-polystyrene insulation or polyisocyanurate insulation may also benefit from cover boards. NRCA has identified conditions where a cover board might be considered for ballasted, fully-adhered, and mechanically-fastened roofing systems.

B. Cover boards are beneficial if the compressive strength of the foam insulation is less than 23 lb/sq.ft. (158 kPa). Foam insulation in roofing systems that will be ballasted or subject to foot traffic may crush, reducing the thermal-insulation value. Extruded-polystyrene insulation in a fully-adhered membrane roofing may be attacked by solvent-based adhesives. Polyisocyanurate felt facers may separate from the foam if subject to long-term roof traffic. Creep under pressure from fastener plates or bars, causing a reduction in clamping pressure, has been reported with molded polystyrene in mechanically-fastened roofing systems. The damage from these situations can be minimized with the use of cover boards.

END OF SECTION

SECTION 075400

THERMOPLASTIC MEMBRANE ROOFING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for roofing systems formed with reinforced and unreinforced thermoplastic membranes over an insulated deck.
   1. Provide any of the following products:
      a. Thermoplastic Polyolefin Sheet (TPO)
      b. Polyvinyl-Chloride Sheet (PVC)
      c. Ketone Ethylene Ester Sheet (KEE)

1.2 THERMOPLASTIC POLYOLEFIN SHEET (TPO)

A. Reinforced Thermoplastic Polyolefin Sheet: ASTM D 6878***-11a***, reinforced, ***fabric backing is optional.***
   1. Thickness: 60 mils, minimum.

1.3 Polyvinyl-Chloride SHEET (PVC)

A. PVC Sheet: ASTM D4434, Type III, fabric reinforced, ***fabric backing is optional.***
   1. Thickness: 60 mils, minimum.

1.4 KETONE ETHYLENE ESTER SHEET (KEE)

A. Ketone Ethylene Based Sheet Roofing (KEE): ASTM D6754, reinforced internally with a fabric, ***fabric backing is optional.***
   1. Thickness: 45 mils, minimum.

1.5 AUXILIARY MATERIALS

A. General: Finish auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing material.

B. Sheet Flashing: As recommended by membrane manufacturer.

C. Slip Sheet.

D. Vapor Retarder: If required for assembly as determined by Design Team.

E. Fasteners.

F. Walkways.

G. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, and other accessories.

1.6 SUBSTRATE BOARDS

A. Substrate Board, provide one of the following:
   1. Glass-mat, water-resistant gypsum substrate.
   2. Gypsum wood fiber composite/fiber-reinforced gypsum.
   3. Perlite board.

1.7 ROOF INSULATION

A. General: Provide one of the following preformed roof insulation boards that comply with roofing system requirements and referenced standards.
   1. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, 1.6 lb./cu.ft. minimum density, square edged.
   2. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Grade 2, felt or glass-fiber met facer on both major surfaces.

B. Provide tapered insulation, preformed saddles, crickets, tapered edge strips, and other insulation shapes as required for “positive drainage”.

1.8 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.

B. Fasteners.

C. Cold Fluid-Applied Adhesive.

D. Cover Board **–** must be included in the assembly.

1.9 INSTALLATION

A. Membrane shall be adhered.

END OF SECTION

SECTION 075700

COATED FOAMED ROOFING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for low-slope roofing assemblies consisting of spray-applied materials which expand through chemical reaction and an elastomeric coating.

1.2 PERFORMANCE REQUIREMENTS

A. Uplift pressure calculated according to SEI / ASCE 7.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: SPFA accreditation for company.

B. Fire-Test-Response Characteristics
1. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indexes of 75 and 450, respectively.
2. Exterior Fire-Test Exposure: Class A.

1.4 WARRANTY

A. Coated Formed Roofing Manufacturer's Warranty: 20 years.

1.5 MATERIALS

A. Polyurethane Foam: ASTM C 1029, Type III; with in-place density of 2.8 to 3.0 lb/cu.ft. and flame-spread index of 75 or less.

B. Silicone Coatings: One- or two-component silicone.

C. Thermal Barrier: If required for roof assembly as determined by Design Team.

D. Vapor Retarder: As recommended by coated foamed roofing manufacturer and Design Team.

E. Mineral Granules: Ceramic-coated roofing granules.

F. Walkway Pads: Formed of nonwoven PVC strands.

1.6 INSTALLATION

A. Install thermal barrier to resist uplift pressures according to roofing system manufacturer's written instructions.

B. Apply base coat and topcoat at thickness recommended by coated foamed roofing manufacturer.

C. Apply mineral granules over coated polyurethane foam.

END OF SECTION

SECTION 076200

SHEET METAL FLASHING AND TRIM

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for shop- and field-formed accessories trim.

1.2 QUALITY ASSURANCE

A. Quality Standard: SMACNA's "Architectural Sheet Metal Manual".

1.3 WARRANTY

A. Fluoropolymer Finishes: 10 years.

1.4 MATERIALS

A. Sheet Metals, Exposed
   1. Copper sheet
   2. Aluminum sheet with smooth, flat or embossed surface.
      a. Class I clear anodic finish.
      b. Class I color anodic finish.
      c. Coil-Coated Finish: two-coat fluoropolymer.
   3. Stainless-Steel Sheet: Polished directional satin finish with smooth, flat surface.
   4. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel or Aluminum-zinc alloy-coated steel sheet with smooth, flat or embossed surface.
      a. Coil-Coated Finish: Two-coat fluoropolymer.

B. Underlayment

1.5 PRODUCTS

A. Formed Flashing and Trim
   1. Reglets and Counterflashing: Stainless steel or galvanized steel.
      a. Type: Stucco, concrete, or masonry.
         1) Surface-mounted type should be avoided.
      b. Materials
         1) Copper: 16 ounce.
         2) Stainless Steel: 0.0187 inch thick.
         3) Prepainted, Metallic-Coated Steel: 0.028 inch thick.

B. Formed Roof Drainage Fabrications: Including hanging gutters, downspouts, parapet scuppers, conductor heads, and splash pans.
   1. Gutters
      a. Girth up to 15 inches
         1) Aluminum: 0.032 inch thick.
         2) Prepainted, metallic-coated steel: 0.0217 inch thick.
      b. Girth 16 to 20 inches
         1) Aluminum: 0.040 inch thick.
         2) Prepainted, metallic-coated steel: 0.0276 inch thick.

c. Girth 21 to 25 inches
   1) Aluminum: 0.050 inch thick.
   2) Prepainted, metallic-coated steel: 0.0336 inch thick.
d. Girth 26 to 30 inches
   1) Aluminum: 0.063 inch thick.
   2) Prepainted, metallic-coated steel: 0.040 inch thick.
e. Girth 31 to 35 inches
   1) Prepainted, metallic-coated steel: 0.0516 inch thick.

2. Downspouts
   a. Aluminum: 0.024 inch thick.
   b. Prepainted, metallic-coated steel: 0.0217 inch thick.
3. Parapet Scupper
   a. Copper: 15 oz./sq.ft.
   b. Aluminum: 0.032 inch thick.
   c. Prepainted, metallic-coated steel: 0.0276 inch thick.
4. Conductor Heads
   a. Aluminum: 0.032 inch thick.
   b. Prepainted, metallic-coated steel: 0.0276 inch thick.
5. Splash Pans
   a. Aluminum: 0.040 inch thick.
   b. Stainless steel: 0.0187 inch thick.

C. Formed Low-Slope Roof Fabrications: Including roof-penetration flashing and roof-drain flashing.
1. Roof-Penetration Flashing
   a. Stainless steel: 0.0187 inch thick.
   b. Prepainted, metallic-coated steel: 0.0276 inch thick.
2. Roof Drain Flashing
   a. Stainless steel: 0.0187 inch thick.
3. Refer to Section “Roof Specialties” for roof edge flashing and copings.

D. Miscellaneous Formed Fabrications: Including equipment support flashing and overhead-piping safety pans.
1. Equipment Support Flashing
   a. Stainless steel: 0.0187 inch thick.
   b. Prepainted, metallic-coated steel: 0.0276 inch thick.
2. Overhead-Piping Safety Pans
   a. Stainless steel: 0.0250 inch thick.
   b. Prepainted, metallic-coated steel: 0.0276 inch thick.

LESSONS LEARNED

3.1 Metal Considerations

A. Compatibility of sheet metal flashing and trim with other materials on the building must be considered. Sustained wash from certain materials onto sheet metal flashing and trim may cause deterioration of metals or finishes. Contact manufacturers to verify whether metals and coatings under consideration are compatible with runoff from adjoining stonework, concrete, or masonry.

B. Metal-to-metal compatibility should also be considered. Avoid contact between metals that are farthest apart in the galvanic scale. See Appendix C in SMACNA's Architectural Sheet Metal Manual for more recommendations for reducing galvanic corrosion.

C. Galvanic corrosion results when two metals are in contact with each other in the presence of an electrolyte such as rainwater or sea water. The less noble, or more anodic, metal will corrode. A galvanic scale, or galvanic series, arranges metals according to their relative electrolytic behavior in a specific electrolyte, which is why the exact order of metals may differ in different galvanic scales. The greater the separation on the scale, the greater the corrosion potential.

3.2 Sheet Metal Thickness and Gages – The sheet metal flashing and trim industry continues to use the term gage to indicate sheet metal thickness for steel and stainless steel, although, according to ASTM standards, sheets metals are only produced in decimal or fractional thicknesses. ASTM A 480/A 480M, Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip, includes the following statement in Section 4, "Ordering Information": "Thickness shall be ordered to decimal or fractional thickness. The use of the gage number is discouraged as being an archaic term of limited usefulness not having a general agreement on meaning." It would be difficult to compare metal thicknesses among manufacturers if the use of gages were retained.

3.3 Wind-Uplift Resistance – Wind-uplift resistance and how sheet metal roof edge flashing and copings are attached at the roof perimeter are issues that have grown in prominence. Perimeter flashing failures are frequently cited as initiating roofing membrane failures during windstorms. FM Global (FMG) reports: "The majority of (low-slope) roof covering failures involve improperly designed or constructed perimeter flashings."

END OF SECTION

SECTION 077100

ROOF SPECIALTIES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for standard manufactured components, both formed and extruded, serving as roofing perimeter facing, drainage, and expansion control.

1.2 PERFORMANCE REQUIREMENTS

A. Low-slope membrane roof systems metal edge securement, except gutters, shall be designed in accordance with ANSI/SPRI ES-1, except wind speed shall be determined by ASCE 7.

1.3 WARRANTY

A. Painted Finishes: 10 years.

1.4 COPINGS

A. Copings: Manufactured coping system consisting of formed-metal coping cap, concealed anchorage, concealed splice plates with same finish as coping caps, mitered corner units, and end caps.
   1. Coping Caps: Fabricated from one of the following exposed metals.
      a. Aluminum: 0.063 inch thick, minimum
      b. Prepainted, Metallic-Coated Steel Sheet: 0.034 inch thick, minimum.
   2. Corners: Continuously welded or mechanically clinched and sealed watertight.

1.5 ROOF EDGE FLASHINGS

A. Provide one of the following types compatible with roofing system selected, performance and wind-load requirements.
   1. Canted Roof Edge Fascia: Manufactured, two-piece, roof edge fascia consisting of snap-on or compression-clamped metal fascia cover and a continuous formed galvanized steel sheet cant dam, 0.028 inch thick, minimum, with integral drip edge cleat.
      a. Fascia Cover: Fabricated from one of the following metals:
         1) Formed or extruded aluminum or painted, metallic-coated steel sheet in thickness as recommended by NRCA in “Guide for Sheet Metal Fascia Edges”.
   2. Roof Edge Fascia: Manufactured, two-piece, roof edge fascia consisting of snap-on metal fascia cover and a continuous formed- or extruded-aluminum anchor bar with integral drip edge cleat to engage fascia cover.
      a. Fascia Cover: Fabricated from one of the following metals:
         1) Formed or extruded aluminum or painted, metallic-coated steel sheet in thickness as recommended by NRCA in “Guide for Sheet Metal Fascia Edges”.

3. Gravel Stops: Manufactured, one-piece, formed-metal gravel stop with a horizontal flange and vertical leg fascia terminating in a drip edge, continuous hold-down cleat, and concealed splice plates of same material, finish, and shape as gravel stop.
    a. Fabricate from one of the following metals:
        1) Aluminum sheet or painted, metallic-coated steel sheet in thickness as recommended by NRCA in “Guide for Sheet Metal Fascia Edges”.

1.6 GUTTERS AND DOWNSPOUTS

A. Gutters and Downspouts: Manufacture or fabricate gutter complete with end pieces, outlet tubes, and other accessories as required. Furnish flat-stock gutter spacers and gutter brackets from same material as gutters, of size recommended by SMACNA, but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.
    1. Fabricate from one of the following metals:
        a. Aluminum sheet or painted, metallic-coated steel sheet in thickness as recommended in the Architectural Sheet Metal Manual, Table 1-5 “Recommended Minimum Gages for Gutter.”

1.7 REGLETS AND COUNTER FLASHINGS

A. General: Provide reglets of type, material, and profile indicated, compatible with flashing. Form to securely interlock with counterflashing.

B. Counterflashing Wind Resistant Clips: Provide clips to be installed before counterflashing to prevent wind uplift of the counterflashing’s lower edge.

C. Material: Fabricate reglets from the following metal in thickness indicated:
    1. Aluminum Sheet: 0.050 inch thick, minimum.
    2. Painted, metallic-coated steel sheet: 0.028 inch, minimum

D. Provide counterflashing fabricated from the same metal as reglets and compatible with reglet system installed.

E. Provide counterflashing fabricated from the following metal in thickness indicated:
    1. Aluminum Sheet: 0.024 inch thick.
    2. Painted, metallic-coated steel sheet:: 0.028 inch.

(continued on next page)

Guide for Sheet Metal Fascia Edges

(Reprinted from the NRCA Roofing and Waterproofing Manual – Fourth Edition)

Recommended Minimum Gauges for Fascia and Cleat[2]					
Exposed Face Without Brakes "A" Dimension	**Aluminum Alloy (30003-H14)**	**Cold Rolled Copper**	**Galvanized or Coated Steel (G60 & G90)**	**Stainless Steel (302 & 304)**	**Cleat[2]**
Up to 3" Face	.032"	16 oz.	24 ga.	24 ga.	Same gauge as fascia metal
3" to 6" Face	.040"	16 oz.	24 ga.	24 ga.	One gauge heavier than fascia metal
6" to 8" Face	.050"	20 oz.	24 ga.	24 ga.	One gauge heavier than fascia metal
8" to 15" Face	Add brakes to stiffen or use two-piece face	Add brakes to stiffen or use two-piece face	Add brakes to stiffen or use two-piece face	Add brakes to stiffen or use two-piece face	One gauge heavier than fascia metal

Reprinted from SMACNA "Architectural Sheet Metal Manual"

Girth		**Galvanized Steel**		**Copper**		**Aluminum**		**Stainless Steel**	
in.	**mm**	**gage**	**mm**	**oz.**	**mm**	**in.**	**mm**	**gage**	**mm**
Up to 15	Up to 380	26	0.5512	16	0.55	0.032	0.812	28	0.396
16-20	410-510	24	0.7010	16	0.55	0.040	1.016	26	0.477
21-25	530-640	22	0.8534	20	0.69	0.051	1.295	24	0.635
26-30	660-760	20	1.006	24	0.82	0.063	1.295	22	0.795
31-35	790-890	18	1.311	24	0.82			20	0.952
Over 35	Over 890	16	1.613					18	1.270

Table 1-5 Recommended Minimum Gages for Gutter

END OF SECTION

SECTION 077200

ROOF ACCESSORIES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for accessories installed on or in roofing other than mechanical or structural items.

1.2 QUALITY ASSURANCE

A. Sheet Metal Standard: SMACNA's "Architectural Sheet Metal Manual".

1.3 PRODUCTS

A. Roof Curbs: Galvanized steel, aluminum-zinc alloy-coated steel, prepainted metallic-coated steel, aluminum, or stainless steel.

B. Equipment Supports: Galvanized steel, aluminum-zinc alloy-coated steel, prepainted metallic-coated steel, aluminum, or stainless steel.

C. Roof Hatches: Galvanized steel, aluminum-zinc alloy-coated steel, prepainted metallic-coated steel, aluminum, or stainless steel.

D. Gravity Ventilators: Galvanized steel or aluminum.

E. Ridge Vents: Galvanized steel or aluminum.

LESSONS LEARNED

3.1 Special attention to insulating curbs and ensuring that seams and joints of roof accessories are sealed to prevent air or water infiltration can have a significant effect on the energy efficiency of roof accessories.

END OF SECTION

SECTION 078100

APPLIED FIREPROOFING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for specialized coatings, mineral fiber, and cementitious coverings to provide the resistance to building components.

1.2 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide SFRM with the fire-test-response characteristics as determined by testing identical products per test method indicated by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

B. Product shall contain no detectable asbestos.

1.3 MATERIALS

A. Concealed SFRM: Cementitious or sprayed-fiber.

B. Exposed SFRM
1. Cementitious Type: Dry density not less than 22 lb/cu.ft.
2. Sprayed-Fiber Type: Dry density not less than 22lb/cu.ft.
3. Water-based intumescent mastic.
4. Non-water-based intumescent mastic.

C. Auxiliary Fire-Resistive Materials:
1. Substrate primers.
2. Bonding adhesive.
3. Expanded metal lath.
4. Reinforcing fabric.
5. Reinforcing mesh.
6. Sealer.
7. Topcoat.

LESSONS LEARNED:

2.1 If primers and lockdown encapsulants are neither listed nor prohibited in the specified fire-resistance design, UL allows the application of SFRM over unknown, primed, and similarly painted wide-flange steel shapes under certain conditions but only after bond tests are performed to compare the bond strength of the SFRM that has been applied over coated steel to that applied over uncoated steel. UL's Fire Resistance Directory, "Coating Materials" Article, which is applicable to wide-flange steel shapes, specifies the bond tests and the conditions where mechanically attaching the SFRM is required. These conditions include wide-flange-beam flange widths exceeding 12 inches, column-flange widths exceeding 16 inches, beam and column web depths exceeding 16 inches, and bond strengths over primed steel falling below the minimum acceptable values. Typically, SFRMs for direct application are tested on galvanized steel deck with a phosphate coating. If other coatings are present, mechanical attachment may be required unless the deck and coating have been UL tested and listed as a painted deck for a specific UL design. Verify, with manufacturers, the chemical compatibility of primers or encapsulants with the SFRM.

2.2 Careful consideration of fire-protection requirements by the entire design team early in the design process can result in integrated designs that may avoid common complaints about and problems with costs, value engineering, substitutions, workmanship, durability, indoor air quality, and failures related to applications of SFRM.

2.3 Several methods, both active (sprinklers) and passive, are possible for protecting steel structures from fire. Designing for fire protection might include dividing a building into isolated modules with a limited number of penetrations for fire-rated doorways, electrical conduits, and ducts. Modules could be protected with SFRM, sprinklers, or both, depending on use, occupancy, potential exposure to abusive environments and individuals, and requirements of authorities having jurisdiction. Costs of sprinkling may be offset by savings from less-restrictive requirements for construction and finishes. Avoiding fire-rated doorways reduces costs for doors, hardware, and signs. Avoiding penetrations for electrical and mechanical work reduces the need for and expense of through-penetration firestop systems, fire-safing insulation, and fire dampers.

2.4 The design of other construction may be dictated by the selection of specific fire-resistance designs in ways that are sometimes unanticipated. For example, selecting assemblies for floor-ceiling designs that are allowed, with restrictions, for roof-ceiling designs, may limit the choice of roofing materials and thickness of the roof insulation.

2.5 Certain surfaces, such as the underside of metal floors and roof decks, may undergo continuous changes in loading or vibration from heavy traffic that could damage SFRM. Excessive deflection and impact forces on steel deck from construction activities and traffic have been identified by manufacturers of SFRM as the leading causes of lack of cohesion/adhesion and bond failure when SFRMs are applied to steel deck. Problems with roof decks surpass problems with floor decks because floor decks are often concrete filled, usually stiffer than roof decks, and less susceptible to impact loads. Manufacturers of SFRM recommend that roofing be completed, penthouse construction be completed, HVAC roof equipment be placed, and construction roof traffic be stopped before applying SFRM. ASTM E 1513 “Practice for Application of Sprayed Fire-Resistive Materials” (SFRMs) states that “SFRM shall be applied after all roof construction, installation of roof-top HVAC equipment, and other related work is completed” and “No SFRM shall be applied to steel deck prior to completion of concrete work on steel deck.” AWCI’s Recommended Sprayed Fireproofing Industry Standards suggests prohibiting traffic on completed roofing until SFRMs are completely dry and cured. ASTM E 1513 requires that “No roof traffic shall be allowed during application or during the curing period of the SFRM applied to the roof.” Excessive construction loads on roof decks can dent and distort the decks and cause damage to applied SFRM. Refer to manufacturers’ written recommendations for other guidelines that might influence the choice of above-deck roofing components.

END OF SECTION

SECTION 078400

FIRESTOPPING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for materials installed in cavities, around penetrations, and openings in floors, walls, partitions, and other building components to prevent spread of fire and smoke.

1.2 QUALITY ASSURANCE

A. Installer Qualifications: An FM Global-approved firestop contractor or a UL-qualified firestop contractor.

B. Fire-Test-Response Characteristics: UL, Intertek ETL SEMKO, or FM Global.

1.3 PENETRATION FIRESTOPPING

A. Penetrations in Fire-Resistance-Rated Walls: F-ratings per ASTM E 814 or UL 1479.

B. Penetrations in Horizontal Assemblies: F- and T-ratings per ASTM E 814 or UL 1479.

C. Penetrations in Smoke Barriers: L-ratings per UL 1479.

D. W-Ratings: Per UL 1479.

1.4 FIRE-RESISTIVE JOINT SYSTEMS

A. Joints in or between Fire-Resistance-Rated Construction: ASTM E 1966 or UL 2079.

B. Joints at Exterior Curtain-Wall / Floor Intersections: ASTM E 119 or ASTM E 2307.

END OF SECTION

SECTION 079200

JOINT SEALANTS

GENERAL GUIDELINES

1.1 Sealants are required for masonry mockup in early construction phase.

LEED SUGGESTIONS

2.1 LEED Rating: The U.S. Green Building Council's Green Building Rating System for Leed for Schools requires low-emitting materials within the weatherproofing system for Credit EQ 4.1. VOC limits are those listed for Bay Area Air Quality Management District Regulation 8, Rule 51. Although most elastomeric sealants fall easily within VOC limits, special attention should be paid to solvent-release sealants such as acrylic-based and butyl-rubber based products. Primers must also be considered because they typically have a higher VOC rating than the sealants themselves. Exterior sealants are not covered in LEED Credit EQ 4.1.

LESSONS LEARNED

3.1 While joint sealant qualitative requirements are beyond the scope of the Design Manual, they are none the less very important. Joint sealants provide continuity and weathertightness across small gaps in construction and at junctures between dissimilar materials.

A. Exterior Exposure: For exterior applications sealants must resist the effects of exposure to ultraviolet (UV) light, ozone, heat, water, temperature extremes, air pollution, and cleaning chemicals.
   1. Silicone joint sealants are generally regarded as having the highest performance and best durability of the elastomeric joint sealants for exterior use.

B. Interior Applications: For interior applications, sealants must resist the effects of exposure to mildew, paint, cleaning agents, and for special applications - certain chemicals.
   1. Silicone, urethane, or latex sealants may be used for interior applications based on application.
      a. Silicones are recommended for mildew resistance and where contact with food is possible.
      b. Urethanes are good general purpose sealants.
      c. Latex sealants are paintable and good for filling gaps where little movement is expected.

C. Traffic Applications: If exposed to foot and vehicular traffic, sealants must resist the abrasion, tearing, puncturing, and other forms of damage caused by sharp objects such as spike heels, pebbles, and debris.
   1. Urethanes are generally chosen for traffic joints because of their greater hardness and better tear resistance.

3.2 Evaluating joint-sealant performance requires understanding not only sealant properties but also their various modes of failure. These include the following:

A. Adhesive Failure: The sealant loses bond with joint substrates. Sealants must tenaciously grip both sides of a joint, but may require a bond breaker or backer rod to prevent the sealant from adhering to the backing substrate. Adhesion testing prior to construction is recommended. Nonporous, and even some porous substrates, may require priming to improve adhesion. Adhesive failure is caused by the following:

1. Selecting a sealant that is not designed to adhere to the types of joint substrates existing in a project.
2. Improperly formulating or mixing a sealant so that its bonding capacity is not developed.
3. Improper preparation of joint substrates so that the sealant is not allowed to contact and wet sound surfaces. Substrates must be free of moisture, frost, dirt, sealers, paints, form release agents, contamination, corrosion, and degradation. Primer saturation could also prevent the sealant from bonding to substrates.
4. Tensile strength of the sealant exceeds its adhesive strength in the extension cycle. This condition can result from joint widths that are too narrow relative to sealant movement capabilities.
5. Hardening of sealant and loss of elasticity due to age or other causes. This condition can be caused by improper mixing of sealant components. It may occur in joints where initial adhesion is good but deteriorates after one or two years to the point where adhesive failure occurs.
6. Compression set occurs, which refers to a sealant's resistance to return to its former shape during extension after deformation under compression. Because adhesive failures typically do not occur when sealants are compressed but generally occur during extension, the cause is often attributed to poor joint preparation or poor adhesion characteristics of the sealant rather than to the actual cause, compression set. Failure of preformed foamed sealants generally is caused by loss of compression pressure against joint substrates.

B. Cohesive Failure: The sealant fails by tearing within itself while the edges remain adhered to both sides of the joint. The primary reason for cohesive failure is joint movement greater than the joint can accommodate.

C. Spalling Failure: A portion of the joint substrate pulls away with the sealant attached. This may not be the result of a failure of the sealant, but may result if the substrate material is weak or friable. Such failures may occur if the sealant lacks adequate movement capability; the higher the modulus of a sealant, the greater the stress on the bond line.

D. Intrusion Failure: Solid foreign matter intrudes into the sealant after it has necked down during extension and then, during a subsequent compression cycle, abrades the sealant in a manner that causes cohesive failure in a later tension cycle.

E. Reversion: A sealant softens and loses its elasticity, thereby simulating a return to its uncured state. This form of failure is primarily associated with urethane sealants and is defined in ASTM C 717 as "a loss of elastomeric properties and a decrease in durometer hardness of a seal or cured sealant following environmental exposure." The sealant industry is not currently in agreement as to the cause of reversion or how prevalent the problem is.

F. Crazing: Also called "alligatoring". This form of failure may be induced by normal deterioration due to weather and can eventually lead to cohesive failure.

G. Bubbling: This condition is caused by gas escaping from the sealant, backer rods, or substrates, and can destroy the sealant's integrity when bubbles rupture. Moisture in the substrate is a primary cause of bubbling, but it is also often caused by air entrainment during mixing of liquid sealants.

H. Appearance-Related Failures: These failures include bloom, organic growth, color change, and chalking. Bloom is where fluids within the sealant migrate to the sealant's surface. Organic growth is where algae, mildew, or other microorganisms grow on the sealant's surface and produce roots, which not only penetrate the sealant but also consume it. Color change results from unstable pigments or an adverse chemical reaction with another chemical in contact with the sealant. Chalking is where powder forms on the sealant's surface and can indicate disintegration of the base polymer as a result of weathering.

END OF SECTION

08 OPENINGS

DIVISION

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SECTION 081113

HOLLOW METAL DOORS AND FRAMES

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for hinged doors, fixed panels, and frames manufactured from carbon steel.

1.2 QUALITY ASSURANCE

A. Steel Door and Frame Standard: Comply with ANSI A250.8.

1.3 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008, Commercial Steel, Type B; suitable for exposed applications.
   1. Application: Interior, unless otherwise noted.

B. Metallic-Coated Steel Sheets: ASTM A653, Commercial Steel, Type B, with an A60 zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.
   1. Application: Exterior openings.

1.4 DOORS

A. Interior Doors: Provide doors complying with requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical endurance level:
   1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless) or Model 3 (Stile and Rail).

B. Exterior Doors: Provide doors complying with requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical endurance level:
   1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless) or Model 3 (Stile and Rail).

1.5 FRAMES

A. Frames for Interior Openings: 0.053 inch thick steel (16 gauge).

B. Frames for Exterior Openings: 0.053 inch thick steel (16 gauge).

END OF SECTION

SECTION 081116

ALUMINUM DOORS AND FRAMES

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for hinged or pivoting doors and fixed panels manufactured from aluminum.

1.2 STANDARD FULL GLASS ALUMINUM DOORS

A. Major portions of the door stiles shall be .125 inch in thickness, and glazing molding shall be .050 inch thick.

B. Doors ***Design: Wide stile.***

1. Interior glazing stops shall be square snap-in type with neoprene bulb type glazing. Square stops on exterior side shall be lock-in tamperproof type. No exposed screws shall be required to secure stops.

C. Door shall be weatherstripped on 3 sides with metal backed pile cloth installed in the door and/or frame. An adjustable weatherstrip astragal with stainless steel backing shall be provided at the meeting stiles of a pair of doors.

1.3 FLUSH ALUMINUM DOORS

A. Standard Flush Aluminum Doors, for Manual Swing Operation

1. Provide minimum 1-3/4 inch thick doors constructed from the following:

a. Framing and Hardware Backup: Extruded aluminum tubing, 0.125 inch minimum thickness.

b. Facing; provide one of the following:

1) Seamless aluminum sheet 0.062 inch thick; smooth, ribbed, or pebbled texture; laminated to 0.125 inch tempered hardboard.

2) Seamless aluminum sheet 0.090 inch thick; smooth, ribbed, or pebbled texture.

3) Combined 0.100 inch thick tube shapes with smooth or ribbed texture.

2. Core: Rigid insulating material of not less than 2.0 lb/cu.ft. density.

3. Exterior stops shall be an integral part of the door construction with a minimum wall thickness of .132 inch and minimum height of 3/4 inch. Glazing tape shall be applied to stop prior to installation of glass or panel. Doors shall be interior glazed with 3/4 inch high extruded aluminum snap-in glass stops with a minimum wall thickness of .060 inch with a roll-in gasket.

1.4 HARDWARE

A. Door shall be modified in width for continuous gear hinge installation.

END OF SECTION

SECTION 081416

FLUSH WOOD DOORS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for hinged doors and fixed panels with flush panel construction; solid cores; wood veneers.
   1. Flush wood doors.

1.2 QUALITY ASSURANCE

A. Quality Standards: WDMA I.S. 1-A.

1.3 INTERIOR SOLID CORE DOORS

A. Grade: Custom grade with “A” faces.

B. Cut: Plain sliced or rotary cut.

C. Match between Veneer Leaves: Book or slip match.

D. Assembly of Veneer Leaves on Door Faces: Running match.

E. Construction: 5-ply construction with particleboard, stave core, or “SCL” structural composite lumber core with stiles and rails glued to core.

F. WDMA I.S. 1-A Performance Grade: Extra Heavy Duty

1.4 FITTING AND FINISH

A. Fitting: Factory prefit and premachine doors.

B. Factory Finish: Transparent factory finish, WDMA TR-4 conversion varnish or TR-6 catalyzed polyurethane.
   1. Grade: Custom

LEED SUGGESTIONS

2.1 Many domestic hardwood species are readily available, and as certified wood, including some that produce strikingly attractive veneers. Cherry, American black walnut, pecan, and butternut provide fine veneers. Brown ash, figured hard maple, red gum, or hickory can also provide fine veneers that are out of the ordinary. Red and white oak, white ash, and American elm also produce fine-quality veneers. Using less well-known tropical species that are not endangered may also be environmentally desirable because it may encourage sustainable forestry. The database “Woods of the World”, Version 2.5, listed in the “References” article in these evaluations, provides information for many lesser-known tropical hardwoods that are not endangered.

2.2 All door core materials use fast-growing, low-density wood species that are typically farmed or removed as weeds from hardwood stands. None require cutting old-growth stands, so environmental implications associated with decisions about core type are generally not critical. For particleboard cores, however, there is a possibility for positive environmental effects, because particleboard is available made from recycled wood as well as from straw, which is an agricultural waste. Recycled content of particleboard can consist of sawdust and scraps from lumber mills or urban wood waste from demolition activities or from tree trimming.

2.3 LEED Rating: The U.S. Green Building Council's (USGBC) LEED for Schools, requires that a minimum of 50% of wood-based materials be certified as having been obtained from forests that comply with FSC STD-01-001, FSC Principles and Criteria for Forest Stewardship, in order for a building to qualify for LEED Credit MR 7. The Section Text includes optional paragraphs to require flush wood doors produced from certified wood and to require documentation of chain of custody for the wood. Note that USGBC will allow credit for the full value of the door as certified wood if the door manufacturer is listed for chain-of-custody certification and at least 70% of the wood materials in the door are from certified forests; otherwise, it only allows credit for the value of the certified wood materials used in making the door.

END OF SECTION

SECTION 081613

FIBERGLASS DOORS ***AND FRAMES***

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for fiberglass reinforced plastic (FRP) doors and frames.

1.2 WARRANTY

A. Materials: 10 years

1.3 MATERIALS

A. Door
1. Door Face Sheets
a. Fiberglass reinforced plastic.
b. Total door thickness to be a nominal 1-3/4 inch.

2. Internal Construction
a. Core
1) ***Rigid Insulation or*** Polyurethane Foam Core (non-rated interior)
2) Mineral Core – fire-rated.
b. Stiles and Rails: Pultruded fiberglass ***or aluminum tubes. Wood is not acceptable.***

B. Door Frames ***(optional)***: High modulus pultruded structural RFP shape.
1. The frame section shall be standard double rabbeted. 5-3/4 inches deep by 2 inch face, 3/16 inch thick, with integral 5/8 inch doorstop, to match typical hollow metal configurations.
2. Design may use either aluminum or fiberglass frames.

END OF SECTION

SECTION 083113

ACCESS DOORS AND FRAMES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for access doors and panels in walls and ceilings.

1.2 QUALITY ASSURANCE

A. Fire-Rated Vertical Access Doors and Frames: NFPA 252 or ***UL 10 B.***

B. Fire-Rated Horizontal Access Doors and Frames: ASTM E119 or UL 263.

1.3 ACCESS DOORS

A. Frames: minimum 0.060 inch thick sheet steel (16 gauge) with flange suitable for adjacent material.

B. Doors: minimum 0.075 inch thick sheet steel (14 gauge).

C. Door Type
1. Flush panel, unless noted otherwise.
2. Recessed panel, at gypsum wallboard and acoustical ceiling.
3. Fire-rated where indicated.

D. Locking Devices: Cylinder locks where exposed to public.
1. Screw driver latching may be used where access to door is controlled, i.e. janitor's closet.

END OF SECTION

SECTION 083320

OVERHEAD COILING DOORS AND GRILLES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for doors and grilles that open by folding as an accordion or as a set of panels.
   1. Coiling counter doors.
   2. Overhead coiling doors.
   3. Overhead coiling grilles.
   4. Wood counter shutters.

1.2 QUALITY ASSURANCE

A. Fire Rated Assemblies: NFPA 80, and acceptable testing agency listing.

B. Energy Performance at Insulated Standard Service Door
   1. Thermal Requirements (Assembly): U-0.500 maximum (R-2, minimum).
   2. Air Leakage: Shall not exceed 0.2 cfm/ft² when tested at a pressure of at least 1.57 pounds per square foot (psf) in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 or NFRC 400.

1.3 COILING COUNTER DOORS

A. Type
   1. Standard counter door.
   2. Fire rated counter door.

B. Door curtain, provide one of the following:
   1. Zinc-coated (galvanized) cold-rolled structural steel (ss) sheet, complying with ASTM A653, G90 coating designation.
   2. Stainless steel, Type 304 Series, ASTM A666.

C. Slat Profile: Flat face slats.

1.4 OVERHEAD COILING DOORS

A. Type
   1. Standard service door.
   2. Insulated standard service door.
   3. Fire rated service door.
      a. Motor operated for testing.

B. Door Curtain, provide one of the following:
   1. Zinc-coated (galvanized) cold-rolled structural steel (ss) sheet, complying with ASTM A653, G90 coating designation.
   2. Stainless steel, Type 304 Series, ASTM A666.

C. Slat Profile: Flat face slats.

1.5 OVERHEAD COILING GRILLES

A. Grille curtain and finish, provide one of the following:
1. Stainless steel, AISI Type 302/304 with No. 4 satin finish.
2. Aluminum, ASTM B 221, with clear anodized finish.
3. Hot dip zinc (galvanized), complying with ASTM A123 or electrogalvanized complying with ASTM 653.

LESSONS LEARNED

2.1 Overhead coiling doors, sometimes called rolling doors, include non-insulated, insulated, and fire-rated service doors that have traditionally been used where security, smoke, containment, and fire containment are primary considerations. An advantage of coiling doors is their compact door storage assembly, which is at the head of the opening, frequently above the suspended ceiling height.

2.2 The installation and maintenance of doors and assemblies used to protect openings against the spread of fire and smoke are regulated by NFPA 80. This standard requires door testing and labeling with fire-resistance ratings that requires that fire-rated doors be installed in fire-rated construction. Overhead doors cannot be used to close off a means of egress unless special provisions are made for an emergency pass door within or adjacent to the rated door.

END OF SECTION

SECTION 083613

SECTIONAL DOORS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for doors that open by moving upward into a nonvertical position, guided on a track.

1.2 PERFORMANCE REQUIREMENTS

A. Operation-Cycle Requirements: Provide sectional overhead door components and operators capable of operating for not less than 5,000 cycles.

B. Energy Performance:

1. Thermal Requirements (Assembly): U- .22, maximum (R-4.5 minimum).

2. Air Leakage: Shall not exceed 0.2 cfm/ft^2 when tested at a pressure of at least 1.57 pounds per square foot (psf) in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 or NFRC 400.

1.3 SECTIONAL OVERHEAD DOORS

A. Steel Door Sections: Insulated panels.
   1. Frame and Panels: Galvanized (G60) steel frame and steel panels.
      a. Steel Thickness for Sectional Faces: 0.040 inch thick (20 gauge).
   2. Thermal Insulation

B. Track: Galvanized Steel.

C. Weather Seals.

D. Windows: Optional.

E. Operation: Manual or Electric Door Operator.

1.4 AUXILIARY MATERIALS

A. Automatic reversing control for bottom bar for electric sectional overhead doors.

END OF SECTION

SECTION 084413

GLAZED ALUMINUM CURTAIN WALLS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for glazed curtain walls with metal framing members.

1.2 QUALITY ASSURANCE

A. Energy Performance: Glazed aluminum curtain walls shall have energy performance ratings per NFRC.
   1. Thermal ***Requirements (Assembly)***): ***U-0.45, maximum (R-2.2 minimum) but s***hall not be less than value determined by Mechanical Engineer by "Building Modeling" in order to meet project's LEED objectives.
   2. Air Leakage: Shall not exceed 0.06 cfm/ft^2 when tested at pressure of at least 1.57 pounds per square foot (psf) or higher in accordance with NFRC 400 or ASTM E283.

1.3 GLAZED ALUMINUM CURTAIN WALLS

A. Primary Components: Extruded aluminum framing, internal reinforcement, trim, and filler units, sealants, and gaskets.

B. Glazing: Refer to Division 08, Section "Glazing".

C. Construction: Thermally improved.

END OF SECTION

SECTION 085113

ALUMINUM WINDOWS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for fixed and operable aluminum framed windows used singly and in multiples.

1.2 QUALITY ASSURANCE

A. Manufacturer shall certify that windows have been tested and conform to AAMA/WDMA 101/I.S.2.
   1. Performance Class: AW Architectural.
   2. Performance Grade: Not less than 60.

B. Energy Performance: Aluminum windows shall have energy performance ratings per NFRC.
   1. Thermal Requirements (Assembly): U-0.55, maximum, (R-1.8 minimum) but shall not be less than value determined by Mechanical Engineer by "Building Modeling" in order to meet project's LEED objectives.
   2. Air Leakage: Shall not exceed 0.2 cfm/ft^2 when tested at a pressure of at least 1.57 pounds per square foot (psf) in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 or NFRC 400.
   3. Provide early delivery sample window of the type and profile used in the classrooms for the mock-up required in the Unit Masonry section 042000.

1.3 ALUMINUM WINDOWS

A. Window Operation
   1. Projected.
   2. Casement.
   3. Fixed.
   4. Awning.
   5. Top hinged in-swinging windows.

B. Glazing: Sealed Insulated Units
   1. Refer to Division 08, Section "Glazing".

C. Construction: Thermally improved as required to meet energy requirements.

1.4 AUXILIARY MATERIALS

A. Insect Screening: Provide at operable vents.
   1. Aluminum frame.
   2. Screen: Glass-fiber-mesh, aluminum wire, or solar-screening mesh.
   3. Wickets: Sliding or hinged.

B. Blinds Between Glazing: Where required at vision glass, provide remotely operated horizontal louver blinds in the space between glazing panes. Construct blinds of aluminum shades, equipped for tilting, raising, and lowering by standard operating hardware located on inside face of sash.
   1. Access Panel: Shall be hinged, lift-off type not acceptable.

END OF SECTION

SECTION 085200

WOOD WINDOWS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for fixed and operable wood framed windows used singly and in multiples.

1. Aluminum or vinyl clad

1.2 QUALITY ASSURANCE

A. Provide wood windows of performance class and grade indicated that comply with ***AAMA / WDMA 101 / I.S.2 / NAFS***

1. Performance Class: C minimum.
2. Performance Grade: 30 minimum.

B. Energy Performance: Windows shall have energy performance ratings per ***NFRC-100.***

1. Thermal Transmittance (u-factor): Shall not be less than value determined by Mechanical Engineer by "Building Modeling" in order to meet project's LEED objectives.
2. Provide early delivery sample window of the type and profile used in the classrooms for the mock-up required in the Unit Masonry section 042000.

1.3 WOOD WINDOWS

A. Window Operation

1. Projected.
2. Casement.
3. Fixed.
4. Single-Hung.

1.4 MATERIALS

A. Aluminum Cladding

1. Trim Members: Provide aluminum-clad wood, hollow-aluminum extrusions, or roll-formed aluminum trim members.

B. Vinyl Cladding

1. Trim Members: Vinyl-Clad Wood.

C. Hardware

1. Operating Device: Combination lever handle or crank Cam latch lock.
2. Hinges: Heavy-duty, two-knuckle butt hinges (Minimum of two per ventilator).

D. Glazing: Sealed Insulated Units

1. Refer to Division 08, Section "Glazing".

1.5 AUXILIARY MATERIALS

A. Insect Screening

1. Provide at operable vents.
2. Screen: Glass-fiber-mesh or aluminum wire fabric.
3. Wickets: Sliding or hinged.

B. Blinds Between Glazing: Where required at vision glass, provide remotely operated horizontal louver blinds in the space between glazing panes. Construct blinds of aluminum slats equipped to tilting, raising, and lowering by standard operating hardware located on inside face of sash.

C. Insulating-Foam Sealant: Refer to Division 08, Section "Thermal Insulation."

D. Aluminum subsill and sill flashing.

LESSONS LEARNED

3.1 Water infiltration is a problem only if there is not a means for controlling its path and weeping the water out. Proper installation methods for installing wood windows need to include a means of controlling water even if it comes from within the wall cavity.

3.2 Most schools are a brick and block design and ***wood windows*** need to be installed with an installation clip. Proper exterior sealant and application of interior foam is critical to create a "dead air" space in the wall cavity. This dead air space will help prevent the negative interior pressure of the building trying to pull any water into the building. The second critical installation item is use of a subsill, especially when units are mulled together. Use of a subsill system will provide a path for any water that penetrates the ***window assembly*** to ***drain*** without causing damage to the windows ***or building***.

3.3 A mock-up and a pre-installation conference ***are necessary to verify*** coordination with ***the air barrier*** and ***to prevent*** water infiltration.

END OF SECTION

SECTION 085410

FIBERGLASS WINDOWS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for fiberglass windows.

1.2 QUALITY ASSURANCE

A. Provide fiberglass windows of performance class and grade indicated that comply with AAMA/NWWDA 101.1.5.2
   1. Performance Class: C minimum.
   2. Performance Grade: 30 minimum.

B. Energy Performance: Fiberglass windows shall have energy performance ratings per NFRC.
   1. Thermal Requirements (Assembly): U-0.55, maximum, (R-1.8 minimum) but shall not be less than value determined by Mechanical Engineer by "Building Modeling" in order to meet project's LEED objectives.
   2. Air Leakage: Shall not exceed 0.2 cmf/ft^2 when tested at a pressure of at least 1.57 pounds per square foot (psf) in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 or NFRC 400.
   3. Provide early delivery sample window of the type and profile used in the classrooms for the mock-up required in the Unit Masonry section 042000.

1.3 FIBERGLASS WINDOWS

A. Window Operation
   1. Projected.
   2. Casement.
   3. Fixed.
   4. Single-Hung.

1.4 MATERIALS

A. Fiberglass: AAMA 305 glass fiber reinforced thermoset profile.

B. Glazing: Refer to Division 08, Section "Glazing".

1.5 AUXILIARY MATERIALS

A. Insect Screening
   1. Provide at operable vents.
   2. Screen: Glass-fiber-mesh or aluminum wire fabric.
   3. Wickets: Sliding or hinged.

B. Integral Louver (Venetian) Blinds.

END OF SECTION

SECTION 085656

SECURITY WINDOW SCREENS ***/ GLAZING***

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for security window screens for preventing glass breakage and forced entry.

1. Security glazing may be used in lieu of mesh.

1.2 PERFORMANCE REQUIREMENTS

A. Test Requirements:

1. Comply with test criteria of SMA 6001-2002 ***for screens.***

a. Impact Test: An impact of 50 ft/lbs of force causing a deflection of not more than 3 inches as specified for medium rating.

b. Sag Test: 90 lbs. of weight applied for 5 minutes with a permanent sage of not more than 0/063 inches as specified for heavy rating.

c. Force Entry Test: Three loads of force: A:150 lbs, B: 300 lbs, C:50 lbs applied to screen. As specified for heavy rating.

2. Security glazing shall comply with Forced-Entry Resistance: Class III per ASTM F 1233.

B. Product Certificates ***(screens)***: Certifications, performance and testing must comply with impact, sag, and forced entry resistance requirements of SMA 6001-2002. Manufacturer must submit the AAMA notice of product certification in compliance with CFR 200.935 as “Security Screen-medium”.

1.3 MATERIALS

A. Aluminum Extrusions: All frame and retainer sections shall be extruded aluminum shaped produced from commercial quality 6063-T5 alloy and shall be free from defect that impair strength and durability.

B. Sub Frame: All sub frame members to be made of extruded aluminum alloy with a nominal wall thickness of .062 inches that incorporates an aluminum snap on cover to conceal the installation fasteners. All frame corners to be miter cut and crimped.

C. Hinge: Two hinges shall be located at the jamb opposite of the operating mechanisms. Each hinge shall fit in an aluminum raceway that allows for removal of hinge or adding of hinges without the need of processing to the subframe or screen. The hinges shall be powder-coated pre-assembled 3-wing design made of aluminum, using nylon bushings. Pins, pressure, plates, and screws shall be stainless steel. Grub screw to allow removal of pin, grub screw shall only be accessible once the screen is opened.

D. Screens: Screen to be full configuration and be operable. Screen main frame to be of mitered construction and contain a noise reduction gasket to prevent rattle between main frame and sub frame, frame members and tie bar to have a hollow, with.078 nominal wall thickness. No exposed fastener to the interior or exterior will be acceptable. Screen to lock in a closed secure position by means of a single point release lock.

E. Mesh: Screen cloth to be .028 inch stainless steel 12 x 12 mesh black painted. Each edge of screen to have a 1/2 inch 90 degree bend.

1. Laminated Polycarbonate (option to mesh): Polycarbonate sheets laminated with clear urethane interlayer that complies with ASTM C 1349, Appendix X2, and has a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation. Provide laminated units that comply with requirements of ASTM C 1349 for maximum allowable laminating process blemishes and haze.

F. Locking Mechanism: Provide single handle that activates a cast metal bolt at the sill and a two directional metal lock and keeper mid span of the upper lite.

G. Limit Device: An adjustable arm made of galvanized steel shall be located at the head to limit the screen from swinging open past 90 degrees from the manufacturer, field adjustment shall be possible to accommodate existing conditions. Optional hold open stays are available.

END OF SECTION

SECTION 086300

METAL-FRAMED SKYLIGHTS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for factory assembled and field assembled aluminum frame skylight systems with insulating glazing consisting of either polycarbonate, heat strengthened and laminated glass units, or translucent fiberglass sandwich panels.

1.2 QUALITY ASSURANCE

A. Energy Performance:

1. Thermal Requirements (Assembly):

a. Skylight with Curb, Glass: U-1.17 maximum, (R- .85 minimum) but shall not be less than value determined by Mechanical Engineer by "Building Modeling" in order to meet project's LEED objectives.

b. Skylight with Curb, Plastic: U- 1.10 maximum, (R- .91 minimum) but shall not be less than value determined by Mechanical Engineer by "Building Modeling" in order to meet project's LEED objectives.

c. Skylight without Curb, All: U- .69 maximum (E- 1.45 minimum), but shall not be less than value determined by Mechanical Engineer by "Building Modeling" in order to meet project's LEED objectives.

2. Air Leakage: Shall not exceed 0.3 cfm/ft2 for unit skylights having condensation weepage openings, when tested at a pressure of at least 1.57 pounds per square foot (psf) in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 or NFRC 400.

1.3 UNIT SKYLIGHTS

A. Integral Curb: Self-flashing type.

B. Polycarbonate glazing: Thermoformable extruded polycarbonate sheets with a minimum impact strength of 12 foot/lb. Per ASTM D 256, test method A, and burglar resistant per UL 972. UV resistant and double glazed.

C. Insulating Glass:
1. Exterior lite 1/4 inch heat strengthened glass.
2. Interior lite 2 plies 1/8 inch clear, heat strengthened glass with 0.030 clear polyvinyl butyral interlayer.
3. Low E coating.

D. Fiberglass sandwich panel: Manufacturer's standard, uniformly colored, translucent fiberglass reinforced polymer face sheets permanently adhered to a grid core.

E. Aluminum Components.

F. Thermal break.

G. Protective screens when required by Design Team.

1.4 FRAMED SKYLIGHTS

A. Framing Materials: Aluminum.
   1. Extrusions: ASTM B221.
   2. Sheet and plate: ASTM B 209.
   3. Bars, rods, and wire: ASTM B 211.

B. Polycarbonate Insulating Panels: Double layer, minimum 2.2 inches thick.

C. Insulating Glass
   1. Exterior lite: Heat strengthened glass.
   2. Interior lite: Clear laminated glass.
   3. Low-E coating.

D. Fiberglass Sandwich Panels: Manufacturer's standard, uniformly colored, translucent, fiberglass reinforced polymer sheets permanently adhered to a grid core.

1.5 INSTALLATION

A. Install unit skylights according to construction details of NRCA's "The NRCA Roofing and Waterproofing Manual".

END OF SECTION

SECTION 087100

DOOR HARDWARE

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for hinges, pivots, sliding and folding door hardware, and other hanging hardware; locks, exit devices, cylinders and other latching hardware; closers, holders, self-closing hinges and other controlling hardware; and push plates, pulls, kickplates, and other door trim.

1.2 QUALITY ASSURANCE

A. Hardware for Fire Rated Openings: NFPA 80, and local requirements.

B. Materials and Application: ANSI A156 series standards.

1.3 DOOR HARDWARE

A. Quality Level: Grade 1, ANSI/BHMA A156.

B. Locksets and Latchsets: Mortise type.

C. Lock Cylinders: Interchangeable or recodeable type.

D. Keying: Owner's requirements keying and key control system.

E. Hinges and Butts: Full mortise type with nonremovable pins at exterior doors.

F. Closers, Door Control, and Exit Devices
   1. Grade 1 devices.

G. Pivots: Offset or center hung type.

H. Push/Pull Units: Through bolted type.

I. Hardware Finishes
   1. Satin chrome.
   2. Polished stainless.
   3. Satin stainless.

1.4 AUXILIARY MATERIALS

A. Door Trim Units: Kickplates, edge trim, and related trim.
B. Stops and overhead door holders.
C. Soundstripping.
D. Weatherstripping and thresholds.
E. Electromagnetic hold open devices.

LEED SUGGESTIONS

2.1 LEED for Schools requires Minimum Acoustical Performance as a prerequisite for Indoor Environmental Quality. This may require sound gasketing of the doors. The Design Team is encouraged to study this prerequisite carefully so as to avoid not being able to obtain certification by failing to meet the requirements of the prerequisite.

2.2 Selection of the proper type and quality of gasketing materials for exterior door openings can have a significant effect on energy savings for the building. The seal should be continuous around the entire perimeter of the door. High-quality closers should also be used on exterior doors to ensure that no door is inadvertently left open.

2.3 Thresholds with thermal breaks should be considered. Avoid creating conditions that interfere with the operation of other door hardware. Do not overlook difficulties that people with disabilities might encounter when using the door. Door gasketing must also be coordinated with door and frame types because benefits gained through using quality gasketing can be lost if the door does not have similar thermal performance capabilities.

LESSONS LEARNED

3.1 Carefully review OFCC's requirements for three manufacturers with your Door and Hardware consultant.

3.2 Review and coordinate door hardware characteristics and integration requirements with the Technology Designer for access control and intrusion detections systems.

END OF SECTION

SECTION 087113

AUTOMATIC DOOR OPERATORS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for an automatic door operator is the operating mechanism attached to a door for the purpose of mechanically opening and closing a door upon the receipt of an actuating signal.
   1. Application: Provide a minimum of one at main entrance.

1.2 AUTOMATIC DOOR OPERATOR

A. Electromechanical Operating System: Unit powered by permanent magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor, and with manual operation including spring closing with power off.

LESSONS LEARNED

2.1 Indicate doors to receive automated openers on the Door Schedule.

END OF SECTION

SECTION 088000

GLAZING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for transparent and translucent glass for general and special purpose applications.

1.2 QUALITY ASSURANCE

A. Comply with applicable codes and regulations and with the Consumer Product Safety Commission CPSC 16 CFR 1201 and with applicable recommendations of Flat Glass Marketing Association (FGMA) "Glazing Manual."

B. Energy Performance: Glazing shall combine with framing to achieve rating per NFRC.
1. Thermal ***Requirements (Assembly)***: Shall not be less than value determined by Mechanical Engineer by "Building Modeling" in order to meet project's LEED objectives ***for each fenestration type***.
2. Sealed Insulated Unit: Third pane glazing and blinds enclosed by third pane not required or recommended in daylighting application. Use of motorized roll-up blind is acceptable where room darkening is required.
3. Solar Heat Gain Coefficient (SHGC): Assembly maximum, 0.40.
4. When selecting windows, utilize the following chart to determine the best window for each application and exposure:

Application	**Exposure**	**Type**
View Glass (non-daylighting apertures) ***with blinds between glazing***	South	clear ***sealed insulated unit***, low-e
	North	clear ***sealed insulated unit***, low-e
	East/West, unshaded	tinted ***sealed insulated unit***, low-e
Windows above lightshelves	South	clear ***sealed insulated unit***
High windows above view glass	North	clear ***sealed insulated unit***
Roof monitor	South	clear ***sealed insulated unit***

1.3 GLASS

A. Primary Glass Products.

B. Heat Treated Glass Products.

C. Laminated Glass Units.

D. Sealed Insulating Glass Units
1. Glazing: Shall be triple glazed consisting of 1 inch thick insulated outer unit comprised of 1/4 inch outer panel, 1/2 wide hermetically sealed air or gas space, and 1/4 inch thick clear inner panel.

E. Fire-Rated Glazing Products; Provide any of the following as required to meet performance conditions:
   1. Specialty Tempered Monolithic Glass
   2. Laminated Ceramic Glazing Material
   3. Laminated Glass with Intumescent Interlayer
   4. Gel-Filled, Dual-Glazed Units
   5. Wire glass of any form is not acceptable.

1.4 GLASS USAGE

A. Exterior

1. Glass for Exterior Doors
   a. 1 inch thick insulated glass with optional low-e coating.
2. Exterior Sidelights, Transoms, Storefront, and Curtainwall: Shall be 1 inch thick insulated glass consisting of 1/4 inch thick, outer panel, a 1/2 inch wide hermetically sealed air or gas space, and 1/4 inch clear glass inner panel.
3. Windows: ***(vision glass) Sill elevation less than 6' above floor.***
4. Windows: (daylighting) Placed above nominal vision line and designed to provide or supplement interior illumination.
5. Sound Rated Glazing (35 or better)
   a. Kind LT, consisting of two lites of fully tempered float glass.
   b. Outer Lite: Class 1 float glass.
      1) Thickness: 6.0 mm, minimum
   c. Inner Lite: Class 1 float glass.
      1) Thickness: 6.0 mm.
   d. Plastic Interlayer
      1) Thickness: 0.060 inch, but not less than that required to comply as a Type II safety glass material.
      2) Color: Clear, unless otherwise noted.
6. Ceramic-Coated Spandrel Insulating Glass
7. Laminated Glass for Skylights and Sloped Glazing
   a. Glazing shall be 1-1/4 inch thick insulated glass consisting of 1/4 inch thick outer panel, 1/2 inch wide hermetically sealed air or gas space, and 1/2 inch thick laminated glass inner panel.
      1) Laminated Glass: Kind LT, consisting of two lites of fully tempered float glass.
         a) Inner and Outer Light: Type I (transparent glass, flat) float glass.
            .1 Class I.
            .2 FT (fully tempered).
            .3 Thickness: 6 mm.
         b) Plastic Interlayer: 0.060 inch thick.
      2) Low Emissivity Coating: Optional.

B. Interior
   1. Glass for Vestible Doors, Sidelights, and Transoms: 1/4 inch thick clear tempered glass.
   2. Glass for Interior Fire Rated Doors and Windows: 1/4 inch fire-rated glazing product.
   3. Glass for Interior Non-Fire Rated Doors and Windows: 1/4 inch clear tempered safety glass.
   4. Sound Rated Doors (30 or better)
      a. Kind LT, consisting of two lites of fully tempered float glass.
      b. Outer Lite: Class 1 clear float glass.
         1) Thickness: 6.0 mm.
      c. Inner Lite: Class 1 clear float glass.
         1) Thickness 6.0 mm.
      d. Plastic Interlayer
         1) Thickness: 0.060 inch, but not less than that required to comply as a Type II safety glass material.
         2) Color: Clear, unless otherwise noted.
            a) Provide a semi-transparent film, where privacy is indicated.

LEED SUGGESTIONS

2.1 Carefully selecting glass and associated elements of the wall system can drastically reduce energy consumption for both winter and summer seasons. There is no simple set of instructions for absolute analysis of the situation; a range of considerations is involved.

A. Although it has been estimated that only 4% of the total energy consumption in the U.S. is heat transferred through building window glass, every source of conservation is worthy of consideration. The general public easily recognizes the window-glass heat-loss problem.

2.2 Coatings on glass are an important part of the overall capability now available for minimizing heat transmission through vision lites. Their effectiveness depends on many factors, which are explained and documented in published product literature and other publications. Solar-control low-e coatings maximize the amount of daylight transmitted through the glass, while minimizing both the amount of solar heat transmitted into the building and the amount of heat loss from the long-wave infrared portion of the heat spectrum (radiant heat generated by electric coil-type heat and sensible heat from air-handling systems). For most commercial buildings, regardless of climate, in which the primary concern is reducing the solar heat gain, the coating's location is of less concern, and placing it on either the second or third surface should remain an option; for units with clear glass on both outdoor and indoor lites, the low-e coating is typically placed on the second surface.

2.3 LEED for Schools Credit Energy and Atmosphere (Optimize Energy Performance) provides up to 10 points for improving the building performance rating compared to the baseline building performance rating per ASHRAE/IESNA 9.0.1-2004. Selecting glass to reduce energy losses through fenestration and energy consumption for cooling that is caused by solar heat gain through fenestration can help contribute toward earning some of those points. Additionally, credits for Indoor Environmental Quality that can be obtained for daylighting will be affected based on the amount and location of fenestrations. Glass selection is a factor affecting "daylighting" because it is a function of visible light transmittance.

END OF SECTION

SECTION 088300

MIRRORS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for unframed mirrors.

1.2 PRODUCTS

A. Glass Mirrors: ASTM C 1503.

B. Clear Glass: Nominal thickness of 6.0 mm.

C. Miscellaneous Materials: Setting blocks, edge sealer, and mirror mastic.

D. Mirror Hardware: Bottom aluminum J-channels and top aluminum J-channels.

E. Mirror Edges: Rounded polished or beveled polished.

END OF SECTION

SECTION 089000

LOUVERS AND VENTS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for exterior wall louvers.

1.2 QUALITY ASSURANCE

A. Wind Loads: Minimum 29 lb/sq.ft.

1.3 PRODUCTS

A. Fixed, Extruded-Aluminum Louvers
   1. Exterior
      a. Horizontal Storm-Resistant Louver.
      b. Vertical Storm-Resistant Louver.
      c. Horizontal, Drainable-Blade Louver.
      d. Horizontal, Continuous-Line, Drainable-Blade Louver.
   2. Interior
      a. Horizontal, Nondrainable-Blade Louver.
      b. Vertical, Sightproof, Louver.
      c. Fixed, Acoustical Louver.

B. Louver Screens
   1. Provided at each exterior louver.
   2. Screening Type: Bird screening.

C. Blank-Off Panels: Uninsulated or insulated.

D. Wall Vents (Brick Vents): Extruded or cast aluminum.

END OF SECTION

DIVISION 09 FINISHES

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DIVISION 09: FINISHES

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SECTION 092116

GYPSUM BOARD ASSEMBLIES

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for non-structural metal support assemblies for gypsum board and interior gypsum board, gypsum board assembles, accessories, and trim.

1.2 QUALITY ASSURANCE

A. Refer to "Recommended Specification on Levels of Gypsum Board Finish" as published by the Gypsum Association (and AWCI/CISCA/PDCA) for finish levels required.

B. Recommended deflection limit for gypsum board assemblies is L/240.
   1. Tile finishes applied to cementitious backer units will require deflection limits of L/360 or less.

1.3 STEEL FRAMING

A. Steel Framing, General: Comply with ASTM C 754 for conditions indicated.
   1. Steel Sheet Components: Metal complying with ASTM C 645 requirements.
      a. Protective Coating:
         1) Interior Applications: ASTM A 653, G40 (Z120), hot-dip galvanized zinc coating.

B. Partition and Soffit Framing:
   1. Steel Studs and Runners
   2. Slip-Type Head Joints
      a. Double Runner
      b. Deflection Track
      c. Firestop Track
   3. Flat Strap and Bracing Plate
   4. Cold-Rolled Channel Bridging
   5. Flat-Shaped, Rigid Furring Channels
   6. Cold-Rolled Furring Channels
   7. Z-Shaped Furring

C. Suspension Systems
   1. Wire Hangers
   2. Flat Hangers
   3. Carrying Channels
   4. Furring Channels
   5. Grid Suspension Systems for Ceilings

1.4 PANEL PRODUCTS

A. ***General:*** Interior Gypsum Wallboard***;*** 5/8 inch minimum thickness, Type X.
   1. Abuse/Impact/Mold-Resistant Gypsum Panels: Panels shall comply with ASTM C 1629, Level 1 requirements.
   2. Moisture and Mold Resistant Gypsum Wallboard: Moisture and mold- resistant core and surfaces. Gypsum board shall be designed to provide extra protection against mold and mildew compared to standard paper-faced wall board products. When tested by an independent lab per ASTM D 3273 ("Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber") gypsum board shall achieve an average panel score of 8 or greater out of a possible high score of 10.

B. Tile-Backing Panels
   1. Cementitious Backer Units
      a. Application: Provide as tile backer at all "wet walls".
   2. Glass-Mat, Water-Resistant Backing Board

1.5 TRIM ACCESSORIES

A. Interior Trim
   1. Cornerbead: Use at outside corners.
   1. LC-Bead: Use at exposed panel edges.
   2. Expansion (Control) Joint: Maximum 30 ft. o/c.

1.6 JOINT TREATMENT MATERIALS

A. Joint Tape

B. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
   1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
   2. Embedding and First Coat: For embedding tape and first coat on joints, flanges of trim accessories, and fasteners, use setting-type taping compound.
   3. Fill Coat: For second coat, use drying-type, all-purpose compound.
   4. Finish Coat: For third coat, use drying-type, all-purpose compound.
   5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

1.7 AUXILIARY MATERIALS

A. Sound Attenuation Blankets

LEED SUGGESTIONS

2.1 LEED for Schools provides a credit under Interior Environmental Quality for specifying low- emitting materials for gypsum board, insulation, acoustical ceiling systems, and wall coverings.

LESSONS LEARNED

3.1 Mold-related claims against building owners are increasing. Reasons asserted for the increase in mold-related lawsuits include tighter building envelopes that hinder the escape of moisture, the use of building materials with organic components that “feed” mold (such as paper facings on gypsum board), shorter construction schedules that sequence finish work before the interior environment is conditioned, and inadequate protection of construction materials before, during, and after installation. Requirements for installing interior gypsum products in semi-conditioned spaces need consideration.

END OF SECTION

SECTION 092400

PORTLAND CEMENT PLASTERING

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for interior and exterior plastic (stucco) finishes, including furring, lathing, accessories, and trim for plaster.

1.2 FRAMING/METAL LATH

A. Lath and Plaster Support Systems
   1. Metal Supports for Suspended and Furred Ceiling: ASTM C 1063.
   2. Steel Studs and Runners, Nonload (Axial) Bearing: ASTM A 645-00, G60.
   3. Expanded Metal Lath: ASTM C 847, self-furring diamond mesh or rib lath; ASTM A 653 G60.
   4. Woven Wire Lath: ASTM C 1032, galvanized steel wire.
   5. Welded Wire Lath: ASTM C 933, galvanized steel wire.

1.3 PORTLAND CEMENT PLASTER

A. Application
   1. 3 coats over metal lath type.
   2. 3 coats over concrete unit masonry type.

1.4 ACCESSORIES

A. Accessories: ***Zinc-coated (galvanized) steel.***

END OF SECTION

SECTION 092513

ACRYLIC PLASTER CEILINGS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for factory mixed acrylic emulsion coating systems, formulated with colorfast mineral pigments and fine aggregates for use over sheathing for high humidity and abuse ceiling ***and exterior soffit*** applications.

1.2 SHEATHING

A. Glass-Mat Gypsum Backing Board.

B. Exterior Cement Board.

C. Tile Backer.

1.3 FINISH SYSTEM – MATERIALS

A. Reinforcing Mesh: Nominal 4.2 oz./sq.yd., symmetrical, interlaced open weave glass fiber fabric.

B. Base Coat: Acrylic based, fiber reinforced, flexible waterproofer.

C. Primer: A synthetic resin, pigmented, copolymer based primer. Tint to same shade as finish.

D. Finish Coat Materials: Manufacturer's siliconized acrylic based coating complying with the following requirements for material composition and method of combined materials:

1. Factory mixed formulation of polymer emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.

END OF SECTION

SECTION 093000

TILING

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for manufactured surfacing units of impervious, vitreous, semi-vitreous, and non-vitreous materials; glazed, unglazed, abrasive, and textured surfaces and related mortar, grout, trim, antifracture membranes and accessories.

1.2 QUALITY ASSURANCE

A. Tile Council of North America (TCA) “Handbook for Ceramic Tile Installation” shall be used as a guide to assist in standardizing installation specifications.

B. ANSI Ceramic Tile Standard: Provide tile that complies with A137.1, “Specifications for Ceramic Tile”.

C. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI Standards referenced in “Setting and Grouting Materials” Article.

1.3 UNGLAZED CERAMIC MOSAIC TILE

A. Type: Porcelain factory-mounted flat tile with abrasive admixture at wet areas.

B. Thickness: 1/4 inch nominal.

C. Face: Plain face with cushion edges.

1.4 GLAZED CERAMIC MOSAIC TILE

A. Type: Porcelain factory-mounted flat tile.

B. Thickness: 1/4 inch nominal.

C. Face: Plain face with cushion edges.

1.5 UNGLAZED QUARRY TILE

A. Wearing Surface: Provide one of the following:
   1. Nonabrasive, smooth
   2. Nonabrasive, textured
   3. Abrasive aggregate embedded in surface

B. Thickness: 1/2 inch nominal

C. Face: Plain or patterned face

1.6 UNGLAZED PAVER TILE

A. Composition: Porcelain

B. Thickness: 3/8 inch nominal

C. Face: Plain with square or cushion edges

1.7 GLAZED WALL TILE

A. Type: Interior type body, flat tile.

B. Thickness: 5/16 inch nominal.

C. Face: Plain face with modified square or cushion edges.

1.8 SETTING MATERIALS

A. Portland Cement Mortar: ANSI A 108.1A.

B. Dry-Set Portland Cement Mortar: ANSI A 118.1.

C. Latex-Portland Cement Mortar: ANSI A 118.4.
1. Prepackaged dry mortar mix.

D. Chemical-Resistant, Water-Cleanable, Tile-Setting and Grouting Epoxy: ANSI A 118.3.

E. Water-Cleanable, Tile-Setting Epoxy Adhesive: ANSI A 118.3.

1.9 GROUT

A. Sand-Portland Cement Grout: ANSI A 108.10.

B. Polymer – Modified Tile Grout: ANSI A 118.7.

C. Standard Sanded Cement Grout: ANSI A 118.6.

D. Standard Unsanded Cement Grout: ANSI A 118.6.

E. Chemical-Resistant, Water-Cleanable, Tile-Setting and Grouting Epoxy: ANSI A 118.3.

1.10 WATERPROOFING AND CRACK-SUPPRESSION MEMBRANES FOR THIN-SET TILE INSTALLATIONS

A. Manufacturer’s standard product that complies with ANSI A 118.10.

1.11 ACCESSORIES

A. Metal Edge Strips: Provide at tile transitions to protect edge of tile.

B. Elastomeric Sealants: One-Part, Mildew-Resistant Silicone Sealant.

1.12 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A 108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

1.13 SETTING METHODS

A. Method and typical detailing for tile work shall be in accordance with the following TCA alphanumeric method, listing from the "Handbook for Ceramic Tile Installation," latest edition, by the Tile Council of America.

WALL TILING INSTALLATION GUIDE

(Reprinted from the 2005 Handbook for Ceramic Tile Installation, 42nd Edition)

Simplest methods are indicated; those for heavier services are acceptable. Very large or heavy tiles may require special setting methods. Consult ceramic tile manufacturer.

SERVICE REQUIREMENTS	**WALL TYPE (numbers refer to Handbook method numbers)**					
	Masonry or Concrete	Page	Woods Stud	Page	Metal Studs	Page
Commercial Construction – Dry or limited water exposure: dairies, breweries, kitchens	W202 W221 W223	41 42 42	W223 W231 W243 W244 W246	42 44 45 46 47	W223 W241 W242, W243 W244 W246	42 44 45 46 47
Commercial Construction – Wet: gang showers, tubs, showers, laundries	W202 W211 W221	41 43 42	W231 W244 W246 B411 B414	44 46 47 50 52	W241 W244 W246 B411 B414, B415 B425 B426	44 46 47 50 52 51 53

WALL TILING INSTALLATION GUIDE

(Reprinted from the 2005 Handbook for Ceramic Tile Installation, 42nd Edition)

Performance – Level Requirement Guide and Selection Table

Based on results from ASTM Test Method C-627 "Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson Type Floor Tester." All methods are material dependent – performance rating should not exceed rating of weakest component – consult each material manufacturer for individual component rating.

SERVICE REQUIREMENTS Find required performance level and choose installation methods that meets or exceeds it. Performance results are based on ceramic tile meeting ANSI A137.1, or tile designated by tile manufacturer.	FLOOR TYPE – Numbers refer to Handbook Method numbers **Concrete** **Page**
Heavy: Shopping malls, stores, commercial kitchens, work areas, laboratories, auto showrooms and service areas, shipping/receiving, and exterior decks. (Passes ASTM C627 cycles 1 through 12)	F103, F111, F112 , 19 F113, F121
Moderate: Normal commercial and light industrial use in public space of restaurants and hospitals. (Passes ASTM C627 cycles 1 through 10.)	F112, F115 19, 20 F122 [c], F200 22, 21 RH110, RH111 26, 27 RH115, RH116 27,28
Light: Light commercial use in office space, reception areas, kitchens, and bathrooms. (Passes ASTM C627 cycles 1 through 6.)	F122[c] 22

END OF SECTION

SECTION 095113

ACOUSTICAL PANEL CEILINGS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for ceiling panels and ceiling suspension assemblies.

1.2 QUALITY ASSURANCE

A. Acoustical Panel Quality Standard: ASTM E 1264.

B. Metal Suspension System Quality Standard: ASTM C 635.

1.3 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at levels for intended use.

1.4 MINERAL BASE PANELS, WATER FELTED

A. Type, form and finish, provide one of the following:
1. ASTM E 1264, Type III or IV, Form 1 or 2 with painted finish.

1.5 PANELS WITH SCRUBBABLE FINISH (CLEANABLE)

A. Type: ASTM E 1264, Type XX or IV, or gypsum based panel.
1. USDA approved kitchens.

1.6 CEMENTITIOUS FIBER BOARD CORE

A. Type form and finish, provide one of the following:
1. ASTM E 1264, Type XIV, Form 1 (No Backing) or Form 2 (Backed with mineral or glass fiber backing), pattern I (random swirl).

1.7 SUSPENSION SYSTEMS

A. Metal Suspension Systems
1. Wire hangers, braces, and ties.
2. Angle hangers.
3. Seismic perimeter stabilizer bars, struts, and clips, if required by seismic zone.
4. Hold-down clips (vestibules, restrooms).
5. Impact clips.
6. Wide-face, capped, double-web steel: Intermediate duty.
7. Wide-faced, capped, double-web, hot-dip galvanized steel: Intermediate duty.

LEED SUGGESTIONS

2.1 Acoustical Panel Ceilings if specified correctly can contribute to several LEED Credits.

A. Construction Waste Management: Most manufacturers have a take-back program eliminating construction waste for these products.

B. Low-Emitting Materials: Ceiling products can be selected that will comply with California Section 01350 requirements for low emissions.

C. Daylight and Views: Highly reflective surfaces can increase daylighting effectiveness.

D. Minimum Acoustical Performance and Enhanced Acoustical Performance: Careful review of NRC, AC, and CAC can assist in obtaining the prerequisite as well as a credit.

LESSONS LEARNED

3.1 Light reflectances for most standard products fall within the top range of 0.75 LR or greater. Lower values are typical for some textured, embossed, or scored patterns; nonwhite units; and those covered with fabric. This lower reflectance is not necessarily significant, however, unless the ceiling is depended upon as a distributor of ambient illumination. Ceiling light reflectance performance is especially important in buildings with substantial levels of indirect lighting, and in building designs incorporating daylighting. Using daylight as a lighting source often requires directing a portion of the daylight toward the ceiling for subsequent re-reflection and diffusion. This strategy may be used to deliver uniform, usable light levels without glare throughout the illuminated space.

3.2 Resistance to humidity varies among acoustical ceiling components. Most regular composition tiles and panels deteriorate when exposed to high humidity or humidity fluctuation. High-density, ceramic ceiling panels are specifically recommended for high-humidity conditions, as are vinyl-film-faced and metal-foil-faced products. Acoustical units designed not to sag in high-temperatures as high as 104 degrees F (40 degrees C), and high-humidity (90% to 100% relative humidity) conditions, are available. Similar care must be exercised when selecting suspension system components for high-humidity areas, including areas such as saunas, shower rooms, indoor swimming pools, and kitchens. Also, to reduce moisture-related problems, make provisions for ventilating the ceiling plenum.

3.3 Installing thermal or acoustical insulation on the back of suspended acoustical panel ceilings is not recommended by manufacturers. Excessive loading caused by added insulation can cause sagging and unsafe installations. Condensation may occur if ceiling insulation places the dew point inside the plenum. Condensation within the plenum can damage both acoustical units and suspension systems. Uncovered mineral-fiber insulation in the plenum may increase particulate counts in air supplies and contribute to poor indoor air quality. If other considerations require that acoustical or thermal insulation be installed on top of the acoustical ceiling, manufacturers may not warrant installations or they may have weight restrictions, requirements for vapor retarders, and other limitations. Because blanket insulation rolls span multiple cross tees and contacts the backs of acoustical units less frequently, rolls are preferred to batts.

END OF SECTION

SECTION 096400

WOOD FLOORING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for wood strip flooring and finish.

1.2 QUALITY ASSURANCE

A. Hardwood Flooring: Comply with NOFMA's "Offical Flooring Grading Rules" for species, grade, and cut.

B. Maple Flooring: Comply with applicable MFMA grading rules for species, grade, and cut.

C. Softwood Flooring: Comply with WCLIB No. 17 grading rules for species, grade, and cut.

1.3 WOOD STRIP FLOORING FOR GENERAL USE (STAGE / PLATFORM)

A. Solid-Wood, Strip Flooring.
   1. Species and Grade: Hardwood.
      a. No. 2 common red oak
      b. MFMA-RL Second and Better Grade hard maple
   2. Cut: Plain sawn, quarter/rift sawn, or edge grain
   3. Thickness: 25/32 inch minimum.

B. Solid-Wood Plank Flooring:
   1. Species and Grade: Softwood.
      a. C and better or D – Flooring Douglas Fir
   2. Cut: Plain sawn.
   3. Thickness: 3/4 inch nominal.

C. Field-Applied Finish: Solvent-based, oil-modified, or water-based urethane finish system.

1.4 ACCESSORIES

A. Wood Sleepers and Subfloor.

B. Wood Underlayment.

C. Cork Expansion Strip.

D. Wood Trim.

E. Vented Base.

1.5 PREPARATION

A. Concrete Slabs: Verify that slabs are dry according to test methods recommended by flooring manufacturer or, if none, by test methods in NOFMA's "Installing Hardwood Flooring."

1. When concrete slabs are tested according to ASTM F 1869, Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride, 4-1/2 pounds of water/1000 sq.ft. of slab in a 24hour period is generally acceptable as a maximum moisture-emission level.

LEED SUGGESTIONS

2.1 LEED for Schools requires that a minimum of 50% of wood-based materials be certified as having been obtained from forests that comply with FSC STD-01-001, FSC Principles and Criteria for Forest Stewardship in order for a project to qualify for Credit MR7.

LESSONS LEARNED

3.1 The Maple Flooring Manufacturers Association (MFMA) has noted that the use of water-based finishes has occasionally produced a side bonding effect, which may result in localized excessive cracks between boards. They recommend consulting an MFMA contractor and the manufacturer to obtain procedures for sealing and finishing maple strip flooring with water-based products.

END OF SECTION

SECTION 096466

WOOD ATHLETIC FLOORING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for wood sports-floor assemblies.

1.2 QUALITY ASSURANCE

A. Maple Flooring: NFMA.

1.3 WOOD STRIP FLOORING FOR ATHLETIC APPLICATION

A. Strip Flooring: Northern hard maple, kiln dried, random length, tongue and groove, and end matched.
   1. Grade: MFMA-RL, provide Second and Better Grade or Thirds for areas normally exposed to view in high schools only.
      a. Provide Third Grade for areas under stacked portion of telescoping bleachers and at middle schools.
   2. Cut: Edge or Flat
   3. Thickness: 25/32 inch
   4. Face Width: 2-1/4 inches or 1-1/2 inches
   5. Backs: Channeled (kerfed) for stress relief

B. Installation System: Provide one of the following:
   1. Maple, strip flooring on floating double layer, plywood subfloor.
   2. Maple, strip flooring on floating wood sleepers.
   3. Maple, strip flooring on fixed, wood sleepers and subfloor.

C. Finish: High build gym floor finish and game markings, approved by Maple Flooring Manufacturers Association (MFMA).
   1. Type: MFMA Group 3, Gymnasium Type (Surface) Finishes; urethane-oil type or Group 5, Water Based Finishes; polyurethane
   2. Floor-Sealer Formulation: Pliable, penetrating type
   3. Finish-Coat Formulation: Formulated for gloss finish and multi-coat application
   4. Game-Line and Marker Paint: Industrial enamel compatible with finish coats and recommended in writing by manufacturers of finish coats, and paint for this use.

1.4 AUXILIARY MATERIALS

A. Vented Cove Base: Semi-rigid plastic angle molding.

1.5 PREPARATION

A. Where direct application of wood flooring to concrete substrate is indicated, test for dryness before proceeding with installation. Check levelness of concrete substrate to ensure not more than 1/8 inch deviation in any direction when checked with a 10 foot straight edge. Grind down high spots or fill in low spots to correct improper conditions.

B. Concrete Slabs: Verify that slabs are dry according to test methods recommended by flooring manufacturer or, if none, by test methods in NOFMA's "Installing Hardwood Flooring."

1. When concrete slabs are tested according to ASTM F1869, Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride, 4-1/2 pounds of water/1000 sq.ft. of slab in a 24 hour period is generally acceptable as a maximum moisture-emission level.

LEED SUGGESTIONS

2.1 VOC restrictions of authorities having jurisdiction may affect the selection of installation adhesives and floor-finish systems. The Section Text places responsibility on the floor covering manufacturers for selecting appropriate adhesives and floor-finish systems for conditions indicated. The Section Text also includes requirements for low-emitting adhesives required for LEED Credit EQ 4.1 and low-emitting finish systems required for LEED Credit EQ 4.2.

2.2 LEED Credit MR 7 requires that a minimum of 50% of wood-based products be from forests certified by an FSC-accredited certification body to comply with FSC 1.2, Principles and Criteria.

LESSONS LEARNED

3.1 The Maple Flooring Manufacturers Association (MFMA) has noted that the use of water-based finishes has occasionally produced a side bonding effect, which may result in localized excessive cracks between boards. They recommend consulting an MFMA contractor and the manufacturer to obtain procedures for sealing and finishing maple strip flooring with water-based products.

END OF SECTION

SECTION 096500

RESILIENT FLOORING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for resilient tile flooring, resilient sheet flooring, resilient base, resilient stair treads and risers, resilient stair nosings, resilient edging, and transitions for carpet.

1.2 QUALITY ASSURANCE

A. Fire Test Performance: Unless otherwise indicated, provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory.
   1. ASTM E 648 (Critical Radiant Flux) of 0.45 watts per sq.cm. or greater, Class I.
   2. ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or less.

B. Provide adequate testing of concrete slabs, including relative humidity testing.

1.3 TILE FLOORING

A. Enhanced Tile: ASTM F 1066, Class II, homogeneous resilient tile, but with superior recovery from long-term indentation. Product shall comply with any of the following: a polymer binder, enhanced vinyl content, polyolefin fiber reinforcement, or polyvinyl esters and inorganic fillers (not including quartz) provide improved permanent indentation resistance. Factory-applied finish shall provide excellent cleaning properties.

1. Physical Properties: product must pass one of the following:

a. Static Load (ASTM F 970): At a static load of 250 pounds, tile shall have a residual indentation of less than 0.005 inch.

b. Indentation (ASTM F 1914): At the end of one minute the indentation must be less than .01 inch.

2. Size

a. 12 inch by 12 inch, minimum.

b. Thickness: 0.120 inch minimum

3. Wearing Surface: Smooth.

4. Finish: Manufacturer's factory applied finish not requiring removal after installation, including but not limited to the following:

a. UV/ceramic technology, Tritonite II.

b. Polyurethane.

c. Acrylic.

B. Rubber Tile: ASTM F 1344, Class 1-A or 1-B, 0.125 inch thick.

C. Solid Vinyl Floor Tile: ASTM F 1700.
   1. Thickness: 0.120 inch minimum.

D. Resilient Quartz Tile: ASTM F 1066, Class I, Type A or ASTM F 1700, Class II. Product shall be a combination of vinyl and quartz resulting in a higher static load limit than standard vinyl completion tile. Factory-applied finish shall provide excellent cleaning properties.

1. Physical Properties:
a. Static Load (ASTM F 970): At a static load of 2,000 pounds, tile shall have a residual indentation of less than 0.005 inch.
2. Size
a. 12 inch by 12 inch, minimum.
b. Thickness: 0.080 inch minimum
3. Wearing Surface: Smooth.
4. Finish: Manufacturer's factory-applied finish not requiring removal after installation, including but not limited to the following:
a. UV/ceramic technology, Tritonite II.
b. Polyurethane.
c. Acrylic.

1.4 VINYL SHEET FLOORING

A. Unbacked Sheet Vinyl Floor Covering: ASTM F 1913, 0.080 inch thick.

B. Sheet Vinyl Floor Covering with Backing: ASTM F 1303, 0.080 inch thick.

1.5 RUBBER SHEET FLOORING

A. Provide three-layer construction rubber flooring sheets conforming to ASTM F-1860-98 Standard Specification for Rubber Sheet Flooring and Backing.

B. Sheet Rubber Flooring: ASTM F 1859 Standard Specification for Rubber Sheet Flooring Without Backing.

1.6 RESILIENT BASE AND ACCESSORIES

A. Resilient Base: Rubber wall base 4 or 6 inch height, 0.125 inch thick, complying with ASTM F 1861, Type TS or TP, Group I or II.

B. Resilient Stair Treads, Risers, and Skirtings: Rubber accessories, complying with ASTM F 2169, Type TS or TP, Group II tread with contrasting color for visually impaired.

C. Integral-Flash-Cove-Base Accessories:
1. Cove Strip.
2. Cap Strip.

D. Resilient Molding Accessories.

1.7 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds.

B. Adhesives.

C. Stair-Tread-Nose Filler.

D. Metal Edge Strips.

E. Floor Polish
1. Acrylic as recommended by membrane manufacturer.
2. Clear topcoat (Aliphatic Polyurethane), non-immersible, high performance, zero VOC, coating.
3. Static Coefficient of Friction – not less than 0.5

1.8 EXAMINATION

A. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by tile manufacturer.

a. When concrete slabs are tested according to ASTM F 1869, Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride, 3 pounds of water/1000 sq.ft. of slab in a 24-hour period is generally accepted in the resilient floor covering industry as a safe maximum moisture emission level. Some manufacturer's installation instructions state that up to 5 pounds of water/1000 sq.ft. in 24 hours is acceptable for ***resilient tile flooring***.

1) Alternative testing methods may be used when approved by flooring manufacturer.

2. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits of any kind.

1.9 Cleaning and Protection

A. Floor Polish:

1. Apply three to five coats with a minimum of 24 hours of drying time between each coat.
2. Coordinate type of polish with Owner's maintenance department.

LEED SUGGESTIONS

2.1 Floor coverings manufactured from post-consumer recycled rubber are available. For products advertised as having recycled content, contact manufacturers to determine the percentages of post-consumer and industrial waste used in manufacturing process.

2.2 When installing adhesives, manufacturers and installers must comply with VOC restrictions of authorities having jurisdiction. However, if the project is requiring a LEED credit for Low-Emitting Materials, the product should also meet the requirements of the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from From Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

LESSONS LEARNED

3.1 Although resilient floor coverings resist moisture, installations can fail if the bond between the floor tile or sheet floor covering and the substrate is weakened or destroyed by moisture on the surface seeping through the joints between units. Heat welding or chemically bonding the seams eliminates these joints. Generally, resilient sheet flooring manufacturers, installers, and end-users prefer the appearance and performance of heat-welded seams over chemically bonded seams. Some sheet manufacturers also offer alternative, proprietary seamless installation techniques. Although sheet products are usually specified for seamless installations, some large-size tiles can be heat welded or chemically bonded. If a seamless installation is required, verify availability and installation methods with manufacturers.

END OF SECTION

SECTION 096516

LINOLEUM FLOORING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for linoleum sheet flooring.

1.2 SUBMITTALS

A. Maintenance Procedures: To seal linoleum, manufacturers generally recommend an initial application of floor polish. This floor polish is usually different from the products used with resilient products. To inform the Owner about linoleum's maintenance requirements the specifications need to include a requirement for submitting maintenance data and review maintenance procedures.

1.3 QUALITY ASSURANCE

A. Fire Test Performance: Unless otherwise indicated, provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory.
   1. ASTM E 648 (Critical Radiant Flux) of 0.45 watts per sq. cm. or greater, Class I.
   2. ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or less.

B. ASTM F 2034 "Specification for Sheet Linoleum Floor Covering".

C. Provide adequate testing of concrete slabs, including relative humidity testing.

1.4 LINOLEUM SHEET FLOORING

A. Sheet linoleum flooring complying with ASTM F 2034.

B. Roll Size: Manufacturer's standard length by not less than 78 inches wide.

C. Thickness: 0.10 inch (2.5 mm), minimum.
   1. 0.08 (2.0 mm) is not acceptable.

D. Seams: Heat welded or cold bonded.

1.5 AUXILIARY MATERIALS

A. Heat Welding Bead.

B. Adhesive.

C. Trowelable Underlayments and Patching Compounds.

D. Floor Polish.

1.6 EXAMINATION

A. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by ***flooring and adhesive*** manufacturer***(s)***. ***Conduct two tests for every 1000 sq. ft. of concrete slab: one for moisture transmission from the surface of the concrete and one for internal relative humidity of the concrete slab.***

a. ***Test concrete slabs*** according to ASTM F 1869, Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subflooring Using Anhydrous Calcium Chloride. 3 pounds of water/1000 sq.ft. of slab in a 24-hour period is generally accepted in the linoleum floor covering industry as a safe maximum moisture emission level***, but must be verified against the flooring and/or adhesive manufacturer's specific requirements for the product to be used.***

b. ***Test concrete slabs according to ASTM F 2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In-Situ Probes. 75% - 85% internal relative humidity is generally regarded as acceptable, but must be verified against the flooring and/or adhesive manufacturer's specific requirements for the product to be used.***

LESSONS LEARNED

2.1 Manufacturers caution against using excessive amounts of liquid during maintenance procedures. Maintenance solutions that are abrasive or that measure more than 10 pH may damage linoleum.

2.2 Products generally have a factory-applied finish that provides temporary protection during installation. After installation, manufacturers typically recommend an initial application of two or three coats of liquid polish to seal the surface. Verify the recommendations of manufacturers for the products selected. Liquid floor polish is generally used for linoleum floor covering applications instead of paste wax.

2.3 Review concrete curing methods specified to confirm that liquid curing compound is dissipating type.

2.4 In renovations require removal of all residual adhesives to clean bare concrete by shot blasting concrete slabs to receive linoleum flooring.

2.5 A below-slab vapor retarder and conditioning the space to its design level for temperature and humidity with the permanent mechanical system prior to moisture testing and flooring installation will provide the best conditions for a successful installation.

END OF SECTION

SECTION 096566

RESILIENT ATHLETIC FLOORING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for adhered sheet vinyl athletic flooring and athletic flooring with pad and accessories including game lines.

1.2 SHEET VINYL ATHLETIC FLOORING

A. Materials and Construction: ASTM F 1303, Type I (minimum binder content of 90 percent) requirements, Class C (foamed plastic) backing.

B. Applied Finish: Factory applied UV urethane.

C. Overall Thickness: 0.25 inch, minimum.

D. Seaming Method: Heat welded.

1.3 ACCESSORIES

A. Trowelable Leveling and Patching Compound.

B. Adhesives.

C. Heat Welding Bead.

D. Game Line and Marker Paint.

1.4 EXAMINATION

A. Concrete Substrates: Verify that concrete slabs comply with ASTM F 710 and the following:
   1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond, moisture, and pH tests recommended in writing by flooring manufacturer.
      a. Moisture Content of Slab: 3 pounds per 1,000 sq.ft. or less per RMA test method.

END OF SECTION

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SECTION 096723

RESINOUS FLOORING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Resinous flooring system ***with optional cove base***. Applied as a self-leveling slurry with broadcast aggregates.
- ***1. Epoxy body coats***
- ***2. Urethane body coats (kitchen)***

1.2 RESINOUS FLOORING

A. ***Epoxy*** System Components
- ***1.*** Body Coat(s)
  - a. Epoxy.
  - b. Formulation Description: 100 percent solids.
  - c. Application Method: Self leveling slurry with broadcast aggregates.
    - ***1)*** Thickness: 3/16 inch minimum.
  - d. Aggregates: Colored quartz (ceramic coated silica) or vinyl flakes.

B. ***Urethane System Components (Kitchen)***
- ***1. Body Coast(s)***
  - ***a. Resin: Urethane***
  - ***b. Formulation Description: Water-based***
  - ***c. Application Method: Self-leveling slurry with broadcast aggregates.***
    - ***1) Thickness: 1/4 inch, minimum.***
  - ***d. Aggregates: Natural silica.***

C. Topcoat (Optional): UV-resistant sealing or finish coat(s).
- ***1.*** Resin: Urethane.
- ***2.*** Formulation Description: 100 percent solids.
- ***3.*** Type: Clear.

D. Accessories
- ***1.*** Primer.
- ***2.*** Waterproof Membrane.
- ***3.*** Reinforcing Membrane.
- ***4.*** Patching and Fill Material.

E. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:
- ***1.*** Compressive Strength (ASTM C579): 6,000 psi.
- ***2.*** Tensile Strength (ASTM C307): 1,500 psi.
- ***3.*** Water Absorption (ASTM C413): 1.0 percent maximum.
- ***4.*** Coefficient of Thermal Expansion (ASTM C531): 0.00004 inch per inch times deg. F.
- ***5.*** Abrasion Resistance (ASTM D4060): 0.023 gram loss.
- ***6.*** Tensile Elongation Percent (ASTM D638): 2-4.

1.3 EXAMINATION

A. Concrete Substrates: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond, moisture, and pH tests recommended in writing by flooring manufacturer.

a. Moisture Content of Slab: 3 pounds per 1,000 sq.ft. or less per RMA test method.

END OF SECTION

SECTION 096766

FLUID-APPLIED ATHLETIC FLOORING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for fluid-applied athletic flooring with pad and accessories including game lines.

1.2 FLUID-APPLIED ATHLETIC FLOORING

A. Polyurethane Flooring over Resilient, Base Mat (PFR)
   1. Resilient, Base Mat: Manufacturer's standard base-mat underlayment of granulated rubber in polyurethane binder.
      a. Thickness: 5/32 inch, minimum
   2. Base-Mat Adhesive: Manufacturer's standard two-component polyurethane.
   3. Base-Mat Sealer: Manufacturer's standard two-component polyurethane compound formulated for sealing base mat.
   4. Elastomeric Resin: Two-component, solid, self-leveling, pigmented, zero-mercury polyurethane containing no rubber fillers.

1.3 ACCESSORIES

A. Trowelable Leveling and Patching Compound.

B. Adhesives.

C. Heat Welding Bead.

D. Game Line and Marker Paint.

1.4 EXAMINATION

A. Concrete Substrates: Verify that concrete slabs comply with ASTM F 710 and the following:
   1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond, moisture, and pH tests recommended in writing by flooring manufacturer.
      a. Moisture Content of Slab: 3 pounds per 1,000 sq.ft. or less per RMA test method.

END OF SECTION

SECTION 096813

TILE CARPETING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for tile carpeting.

1.2 QUALITY ASSURANCE

A. Carpet shall comply with requirements of the CRI's "Green Label Plus" Indoor Air Quality Testing Program.

1.3 PROJECT CONDITIONS

A. Concrete subfloors must meet the following requirements before carpet may be installed:
   1. pH range of 5 to 9
   2. Moisture-emission rate of 3 lb/1000 sq.ft. per 24 hours or less.

1.4 WARRANTY

A. Carpet Tile: 10 years (minimum).

(continued on next page)

1.5 MATERIALS

A. Carpet Tile

SCHOOL CARPET MINIMUM AVERAGE SPECIFICATIONS		
Carpet Property/Characteristic	**Minimum Specifications**	**Test Method**
Type Yard	Solution or Yarn Dyed	--
Color	Multi-Colored Products (select colors complimentary to soil type/color in region)	--
Surface/Style	Level Loop, Multi-Level Loop, Textured Loop, or Cut & Loop	--
Static	3.5kv (max – not to exceed)	AATCC-134 Step Method
Indoor Air Quality (IAQ)	CRI IAQ Certification "Green Label Plus"	CRI Test Program ASTM D-5116
In glue-down installation, include CRI IAQ Testing Program label for installation adhesives. Carpet over cushion, include CRI IAQ Testing Program label for carpet cushion.		
Flammability – Radiant Panel Test	Class I	ASTM E-648
NBS Smoke	<450 Flaming Mode	ASTM E-662
Tuft Bind (dry)	8 lbs, all products (16-20 lbs suggested for unitary backing)	ASTM D-1335
Delamination	Secondary backed products, 3.5 lbs	ASTM D-3936
Dimensional Stability	Removable modular products, 0.2% or less	ISO 2551
Colorfastness: light	4 or better (60 AFU 3 cycles)	AATCC 16-E
Colorfastness: ozone	4 or better after 2 cycles	AATCC 129
Colorfastness: crocking	4 or better (wet & dry)	AATCC 165
Colorfastness: water	4 or better, AATCC Transference Scale (only yarn dyed carpet) (grade change in color and staining)	AATCC 107
Soil Resistant Treatment	Minimum average of 350 ppm fluorine on pile fiber of 3 separate tests	CRI TM-102

1.6 INSTALLATION

A. Installation Method: Glue down with releasable adhesive or partial glue down with releasable adhesive.

LEED SUGGESTIONS

2.1 LEED credit for Indoor Environmental Quality (low-emitting materials) requires that carpet tile and installation adhesive meet or exceed the requirements for the Carpet and Rug Institute's (CRI) "Green Label Plus" program. ***LEED-for-Schools 2009 IEQc4.1 and IEQc4.3 can be satisfied by LEED NC 2009 EQc4.1 and EQc4.2. For LEED-NC 2009 EQc4.1 and EQc4.3, carpet adhesive only needs to satisfy Green Label requirements and not Green Label Plus.***

2.2 Compared with broadloom carpet, carpet tiles may have some unique advantages for environmental considerations. Expectations for a high-quality life-cycle for most carpet tiles and capabilities for spot or area replacement, flexibility, and access may be factors to consider. Carpet tiles can be spot glued effectively, reducing adhesive use without diminishing the quality of a commercial carpet tile installation. They are easier to transport, store, and handle compared to broadloom, which makes carpet tiles a more likely applicant for alternatives to land-fill disposal.

A. If carpet is being removed, contact carpet suppliers for carpet recycling programs.

END OF SECTION

SECTION 096816
SHEET CARPETING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for carpet materials and accessories for a direct-glue down or pre-applied adhesive installation of one of the following:.
   1. Tufted Broadloom
   2. Variable Cushion Tufted Textile (VCTT)

1.2 QUALITY ASSURANCE

A. Chemical Emission/Indoor Air Quality: All carpet specified must be in compliance with the Carpet and Rug Institute (CRI) "Green Label Plus" Indoor Air Quality Carpet Testing Program. The program label and registration number serve as evidence of compliance.

1.3 PROJECT CONDITIONS

A. Concrete subfloors must meet the following requirements before carpet may be installed:
   1. pH range of 5 to 9.
   2. Moisture-emission rate of 3 lb/1000 sq.ft. per 24 hours or less.

1.4 WARRANTY

A. Tufted Broadloom: 10 years (minimum).
B. Variable Cushion Tufted Textile: 15 years (minimum)

1.5 CARPET

A. Carpet, Tufted Broadloom: Shall meet or exceed the following CRI guidelines:

SCHOOL CARPET MINIMUM AVERAGE SPECIFICATIONS		
Carpet Property/Characteristic	**Minimum Specifications**	**Test Method**
Type Yard	Solution or Yarn Dyed	--
Color	Multi-Colored Products (select colors complimentary to soil type/color in region)	--
Surface/Style	Level Loop, Multi-Level Loop, Textured Loop, or Cut & Loop	--
Static	3.5 kv (max – not to exceed)	AATCC-134 Step Method
Indoor Air Quality (IAQ)	CRI IAQ Certification "Green Label Plus"	CRI Test Program ASTM D-5116
In glue-down installation, include CRI IAQ Testing Program label for installation adhesives. Carpet over cushion, include CRI IAQ Testing Program label for carpet cushion.		
Flammability – Radiant Panel Test	Class I	ASTM E-648
NBS Smoke	<450 Flaming Mode	ASTM E-662
Tuft Bind (dry)	8 lbs, all products (16-20 lbs suggested for unitary backing)	ASTM D-1335
Delamination	Secondary backed products, 3.5 lbs	ASTM D-3936
Dimensional Stability	Removable modular products, 0.2% or less	ISO 2551
Colorfastness: light	4 or better (60 AFU 3 cycles)	AATCC 16-E
Colorfastness: ozone	4 or better after 2 cycles	AATCC 129
Colorfastness: crocking	4 or better (wet & dry)	AATCC 165
Colorfastness: water	4 or better, AATCC Transference Scale (only yarn dyed carpet) (grade change in color and staining)	AATCC 107
Soil Resistant Treatment	Minimum average of 350 ppm fluorine on pile fiber of 3 separate tests	CRI TM-102

B. Carpet, Variable Cushion Tufted Textile (VCTT): Shall meet or exceed the following

guidelines:

B. Carpet, Variable Cushion Tufted Textile (VCTT): Shall meet or exceed the following guidelines:

SCHOOL VCTT MINIMUM AVERAGE SPECIFICATIONS		
Carpet Property/Characteristic	**Minimum Specifications**	**Test Method**
Type Yard	Solution or Yarn Dyed	--
Color	Multi-Colored Products (select colors complimentary to soil type/color in region)	--
Surface/Style	Level Loop, Textured Loop	--
Static	3.0 kv (max – not to exceed)	AATCC-134 Step Method
Indoor Air Quality (IAQ)	CRI IAQ Certification "Green Label Plus"	CRI Test Program ASTM D-5116
In glue-down installation, include CRI IAQ Testing Program label for installation adhesives. Carpet over cushion, include CRI IAQ Testing Program label for carpet cushion.		
Flammability – Radiant Panel Test	Class I	ASTM E-648
NBS Smoke	<450 Flaming Mode	ASTM E-662
Tuft Bind (wet or dry)	11 lbs, all products	ASTM D-1335
Delamination	No delamination	ASTM D-3936
Colorfastness: light	4 or better (60 AFU 3 cycles)	AATCC 16-E
Colorfastness: ozone	4 or better after 2 cycles	AATCC 129
Colorfastness: crocking	4 or better (wet & dry)	AATCC 165
Colorfastness: water	4 or better, AATCC Transference Scale (only yarn dyed carpet) (grade change in color and staining)	AATCC 107
Backing	• Thermoplastic vinyl composite • Fully fused to provide for no delamination • Closed cell, vinyl backing • Backing system to provide a barrier to moisture penetration • Product to provide for chemically welded seam	--

1.6 AUXILIARY MATERIALS

A. Vinyl or rubber edge guard between carpet and sealed concrete.

B. Vinyl or rubber reducer strip between carpet and resilient flooring.

1.7 INSTALLATION

A. Comply with CRI 104, Section 9: "Direct Glue Down" or Pre-applied Adhesive Installation, Section 11.4 (Peel and Stick).

B. VCTT: Chemically weld seams.

LEED SUGGESTIONS

2.1 LEED Credit for Indoor Environmental Air Quality (low-emitting materials) requires that carpet tile and installation adhesive meet or exceed the requirements for the Carpet and Rug Institute's (CRI) "Green Label Plus" Program. ***LEED-for-Schools 2009 IEQc4.1 and IEQc4.3 can be satisfied by LEED NC 2009 EQc4.1 and EQc4.2. For LEED-NC 2009 EQc4.1 and EQc4.3, carpet adhesive only needs to satisfy Green Label requirements and not Green Label Plus.***

END OF SECTION

SECTION 096900

ACCESS FLOORING

GENERAL GUIDELINES

1.1 SECTION INCLUDES
- A. Qualitative requirements for access flooring panels and understructure.

1.2 PERFORMANCE REQUIREMENTS
- A. CISCA A/F, “Recommended Test Procedures for Access Floors”
  1. Concentrated Loads: Provide floor panels, including those with cutouts, capable of withstanding a concentrated design load of 1000 lbf, with a top-surface deflection under load and a permanent set not to exceed, respectively, 0.080 inch and 0.010 inch according to CISCA A/F, Section I, “Concentrated Loads”.
  2. Ultimate Loads: Provide access flooring systems capable of withstanding a minimum ultimate concentrated load of 2500 lbf without failing, according to CISCA A/F, Section II, “Ultimate Loading”.
  3. CISCA A/F Wheel 2 Rolling Load: 500 lbf.
  4. Pedestal Axial-Load Performance: Provide pedestal assemblies, without panels or other supports in place, capable of withstanding a 5000 lbf axial load per pedestal, according to CISCA A/F, Section V, “Pedestal Axial Load Test”.

1.3 FLOOR PANELS AND UNDERSTRUCTURE
- A. Floor Panels, General: Provide modular panels complying with the following requirements that one person, using a portable lifting device, can interchange with other field panels without disturbing adjacent panels or understructure.
  1. Panel Attachment to Understructure: By gravity for main field areas bolted of pedestal may be necessary at perimeters and high-traffic areas.

- B. Formed-Steel Panels
  1. Solid.
  2. Grates With or Without Dampers.
  3. Perforated With or Without Dampers.

- C. Pedestals: Assembly consisting of base, column with provisions for height adjustment, and head (cap); made of steel or aluminum or a combination of both.

- D. Floor Panel Coverings
  1. Solid Vinyl Tile: Static dissipative.
  2. Carpet: Antistatic modular, adhesively bonded.

1.4 ACCESSORIES
- A. Cutouts.
- B. Service Outlets.
- C. Diffusers.
- D. Cavity Dividers.
- E. Vertical Closures.
- F. Ramps.
- G. Railings.

END OF SECTION

SECTION 098000

ACOUSTIC TREATMENT

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for sound absorbing wall units and mounting accessories, and acoustical sound absorbing and diffusing units.

1.2 QUALITY ASSURANCE

A. Fire Test Response Characteristics
   1. Flame Spread: 25 or less.
   2. Smoke Developed: 450 or less.

1.3 MATERIALS

A. Core Materials: Glass-fiber board; mineral-fiber board; tackable, impact-resistant, high-density face layer; or impact-resistant, acoustically transparent, copolymer face-sheet layer for high-abuse applications.

B. Spline-Mounted Acoustical Wall Panels with Perforated Mineral-Fiber Board Core
   1. Facing Material: Woven polyester, nonwoven polyester, polyolefin, or acoustically transparent vinyl fabric.
   2. Nominal Panel Thickness: 3/4 inch minimum.
   3. NRC: NRC 0.50 to NRC 0.90.

C. Spline-Mounted Acoustical Wall Panels with Glass-Fiber Board Core
   1. Facing Material: Woven polyester, nonwoven polyester, polyolefin, or acoustically transparent vinyl fabric.
   2. Nominal Panel Thickness: 3/4 inch minimum.
   3. Noise Reduction Coefficient: NRC 0.20 minimum.

D. Back-Mounted Acoustical Wall Panels with Perforated Mineral-Fiber Board Core
   1. Facing Material: Woven polyester, nonwoven polyester, polyolefin, or acoustically transparent vinyl fabric.
   2. Nominal Core Thickness and System NRC: 1/2 inch and not less than NRC 0.35

E. Back-Mounted, Edge-Reinforced Acoustical Wall Panels with Glass-Fiber Board Core
   1. Facing Material: Woven polyester, nonwoven polyester, polyolefin, or acoustically transparent vinyl fabric.
   2. Nominal Core Thickness and System NRC: 3/4 inch and not less than NRC 0.65

F. Abuse-Resistant Acoustical Panels, General
1. Flame spread of panels shall be 25 or less under the ASTM E 84.
2. Panels are Class A.
3. Panels shall consist of wood fibers and a hydraulic cement binder formed under controlled conditions of heat and pressure.
4. Prime Painted Panels

G. Wall Sound Diffusers
1. Standard barrel shaped units with the following properties:
a. WDS, Low Frequency Absorption: Glass fiber mat core laminated with 1.5 inches, 1.5 pcf sound absorbing glass matting; NRC 0.30 – 0.40.

H. Back-Mounting Devices: Adhesive, hook-and-loop tape, impaling chips, or metal "Z" clips.

1.4 ACOUSTICAL CEILING PANELS

A. Acoustical Baffles
1. Polyester, polyvinyl, or nylon fabric- wrapped panels, with core of 6 to 7 pcf fiberglass; seamless and bonded to panels

B. Ceiling-Mounted Diffusers
1. Manufacturer's standard asymmetric pyramidal units with properties as follows:
a. CD – Standard: Glass fiber mat core laminated with fire retardant resin; NRC 0.12 – 0.17.
b. CDA – Low Frequency Absorption: Glass fiber mat core laminated with 1.5 inches, 1.5 pcf sound absorbing glass matting; NRC 0.30-0.40.
a. CDL – Sound Reflective: Glass fiber mat core lined with resin hardener; NRC 0.03 – 0.08.

C. Ceiling-Mounted Reflectors
1. Manufacturer's standard panels for ceiling suspension, designed to reflect sound energy, and with properties as follows:
a. CR – Standard: Glass fiber mat core laminated with fire-retardant resin; NRC 0.15-0.25.
b. CRA - Low Frequency Absorption: Glass fiber mat core laminated with 1.5 inches, 1.5 pcf sound absorbing glass matting; NRC 0.30-0.40.
c. CRL – Sound Reflective: Glass fiber mat core lined with resin hardener; NRC 0.03 – 0.08.

LEED SUGGESTIONS

2.1 LEED for Schools includes a prerequisite for "Minimum Acoustical Performance". By using sound absorptive panels, both background noise and sound transmission can be decreased, thus assisting in compliance with the "Minimum Acoustical Performance".

END OF SECTION

SECTION 099100
PAINTING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for exterior and interior painting with opaque finishes, including painted mechanical and electrical identification, primers, sealers, and finish paints.

1.2 SYSTEM DESCRIPTION

A. To establish a level of quality, the guide references the Master Painters Institutes (MPI) categories. The MPI categories listed are to assist in providing general guidelines for paint type selection. Use of MPI's "Approved Product List" is optional.

B. All materials used shall be lead and mercury free and VOC compliant with local authorities with jurisdiction.

1.3 EXTERIOR PAINTING SCHEDULE

A. Concrete, Stucco, and Masonry (Other Than Concrete Masonry Units) (Satin): (Latex System). Similar to MPI EXT 3.1A.

B. Concrete Masonry Units: (Latex System), similar to MPI EXT 4.2A.

C. Metal - Ferrous: (Latex System), similar to MPI EXT 5.1M.

D. Metal - Galvanized: (Latex System), similar to MPI EXT 5.3A.

E. Metal - Heat Resistant: (Maximum Temperature 1,000 degrees F.), similar to MPI #21.

1.4 INTERIOR PAINTING SCHEDULE

A. Concrete Surfaces: (Latex), similar to MPI INT 3.1M.

B. Concrete Masonry Surfaces, similar to MPI INT 4.2E.

C. Metal - Ferrous: (Latex System), similar to MPI INT 5.1S.

D. Metal - Ferrous: (Dry-Fall System), similar to MPI INT 5.1CC.

E. Metal - Galvanized: (Latex System), similar to MPI INT 5.3N.

F. Metal - Galvanized: (Dry Fall System), similar to MPI INT 5.3H.

G. Wood - Painted: (Latex System), similar to MPI INT 6.3V.

H. Gypsum Board: (Latex System), similar to MPI INT 9.2M.

I. Plaster Surfaces: (Latex System), similar to MPI INT 9.2M.

LEED SUGGESTIONS

2.1 As of July 7, 2008, the USGBC allows for Performance/Intent Equivalent Alternate Compliance Paths for obtaining Low-Emitting Materials Credit EQ 4. LEED for Schools Project Teams may substitute LEED for New Construction v2.2 EQc4 Low-Emitting Materials credits in place of corresponding LEED for Schools EQc4 Low-Emitting Materials credits.

END OF SECTION

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SECTION 099300

STAINING AND TRANSPARENT FINISHING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for exterior and interior painting with transparent and semi-transparent finishes.

1.2 SYSTEM DESCRIPTION

A. To establish a level of quality, the guide references the Master Painters Institute's (MPI) categories. The MPI categories listed are to assist in providing general guidelines for paint type selection. Use of MPI's "Approved Product List" is optional.

1.3 EXTERIOR STAIN SCHEDULE

A. Wood trim, provide one of the following:
   1. Semi-transparent, oil or alkyd resin base stain, 2 coats, similar to MPI EXT 6.D.
   2. Solid color, oil or alkyd resin base wood stain, 2 coats, similar to MPI EXT 6.3C.

1.4 INTERIOR STAIN SCHEDULE

A. Wood Trim
   1. Polyurethane varnish finish: 2 finish coats of polyurethane varnish over clear sanding sealer and an optional oil stain, similar to MPI INT 6.1J.
      a. Provide wood filler on open grain wood before applying first varnish coat.

END OF SECTION

SECTION 099419

MULTICOLORED COATING SYSTEM

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for interior multi-colored coating system for high traffic areas.

1.2 QUALITY ASSURANCE

A. Fire-Performance Characteristics: Provide coatings with the following surface-burning characteristics as determined by testing identical products per ASTM E84 by UL or other testing and inspecting agencies acceptable to authorities having jurisdiction. Identify coatings with appropriate markings of applicable testing and inspecting agency.
   1. Flame Spread: 25 or less.
   2. Smoke Developed: 450 or less.

B. Owner Training: Applicator must provide adequate training of Owner's personnel in repair procedures, along with verification that proper equipment is available to Owner's personnel.

C. To establish a level of quality, the guide references the Master Painters Institutes (MPI) categories. The MPI categories listed are to assist in providing general guidelines for paint type selection. Use of MPI's "Approved Product List" is optional.

1.3 INTERIOR PAINTING SCHEDULE

A. Concrete, similar to MPI #112.
   1. Prime Coat: Latex primer sealer
   2. Finish Coat: Multi-color as recommended by manufacturer
   3. Surfaces: Concrete walls and ceiling

B. Concrete Masonry Surfaces, similar to MPI #112.
   1. Concrete masonry block filler
   2. Prime Coat: Latex primer sealer
   3. Finish Coat: Multicolored as recommended by manufacturer

END OF SECTION

SECTION 099600

HIGH PERFORMANCE COATINGS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Surface preparation and application of high-performance coating systems.

1.2 QUALITY ASSURANCE

A. Quality Standards: “MPI Approved Products List” and “MPI Architectural Painting Specifications Manual.”

1.3 MATERIALS

A. Undercoats
   1. Block Fillers.
   2. Interior Primers/Sealers.
   3. Metal Primers.
   4. Wood Stains.

B. Topcoats
   1. Water-Based, Light-Industrial Coatings.
   2. Epoxy Coatings.
   3. Polyurethane Coatings.
   4. Interior High-Performance Architectural Latex Coatings.

1.4 INTERIOR PAINTING SCHEDULE

A. Concrete Surfaces (Gloss): (Water Based Epoxy System), similar to MPI INT 4.1G.
   1. Primer: Latex Wall Primer, 1.0 - 1.2 mils DFT/coat.
   2. Finish Coats: Water Based Catalyzed Epoxy (Gloss) (55-75 units at 60 degrees F.), 2.5 - 3.0 mils DFT/coat.
   3. Surfaces: Floors, stairs, striping on floors.

B. Gypsum Board (Semi-Gloss): (Water Based Epoxy System), similar to MPI INT 9.2F.
   1. Primer: Vinyl Acrylic Latex, 1.1 mils DFT/coat.
   2. Finish Coats: Water Based Catalyzed Epoxy, Semi-Gloss (20-30 units at 60 degrees F.), 2.5 - 3.0 mils DFT/coat.
   3. Surfaces: Gypsum walls, ceiling, bulkheads, graphics.

END OF SECTION

10 DIVISION SPECIALTIES

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SECTION 101100

VISUAL DISPLAY SURFACES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for markerboards and visual aid boards, framing systems, and accessories.

1.2 MARKERBOARDS

A. ***Porcelain Enamel*** Face Sheet.

B. Core: 3/8 inch thick particleboard.

C. Backing: .005 inch thick aluminum foil.

D. Trim: Anodized extruded aluminum with tray and 1 inch map rail with natural cork insert.

E. Trim: Factory applied anodized extruded aluminum.
1. ***Marker*** tray: Box type.
2. Map Rail: 1 inch display rail with cork insert and a map hook and clips for every 48 inches of map rail and fraction thereof.

1.3 TACK ASSEMBLIES

A. Material, provide one of the following:
1. Natural cork.
2. Plastic impregnated cork sheet.
3. Vinyl fabric faced industrial fiberboard.

B. Trim: Factory-applied anodized extruded aluminum.

1.4 PEGBOARDS

A. Material: Tempered hardboard with holes punched on one inch centers.

1.5 VISUAL DISPLAY RAILS

A. Cork, Vinyl-Fabric, or Polyester-Fabric Faced Visual Display Device.

1.6 SUPPORT SYSTEM (optional)

A. Support System for Visual Display Boards: Rail or modular supports.

1.7 SLIDING VISUAL DISPLAY UNITS

A. Horizontal-Sliding Units.

1.8 ACCESSORIES

A. Provide the following accessories for each individual chalkboard and markerboard unit:
   1. 2 map rail ends.
   2. 1 flag holder (one per room).
   3. Special-purpose graphics.

END OF SECTION

SECTION 101200

DISPLAY CASES

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for an illuminated display case with its accessories.

1.2 QUALITY ASSURANCE

A. Composite wood products made without urea formaldehyde.

1.3 PRODUCTS

A. Bulletin Boards
- ***1. Cabinet: Aluminum or wood framed.***
- ***2. Glazed Doors: Sliding or hinged.***
- ***3. Illumination System: (optional).***
- ***4. Tack Surface: Natural cork, plastic-impregnated-cork, vinyl-fabric-faced, or polyester-fabric-faced tackboard assembly.***
- ***5. Mounting: Surface mounted or recessed.***

B. Display Cases
- ***1. Recessed Cabinets: Extruded aluminum or hardwood-veneer-plywood box.***
  - ***a. Cabinet Frame and Trim: Aluminum or hardwood species.***
- ***2. Surface-Mounted Cabinets: Extruded-aluminum or hardwood-veneer-plywood box.***
  - ***a. Cabinet Frame and Trim: Aluminum or hardwood species.***
- ***3. Glazed Doors: Sliding or hinged.***
- ***4. Adjustable Tempered-Glass Shelves.***
- ***5. Tack Surface: Natural cork, plastic-impregnated-cork, vinyl-fabric-faced, or polyester-fabric-faced tack assembly.***
- ***6. Illumination System: (optional).***

END OF SECTION

SECTION 101400

SIGNAGE

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for directional items, letters, signage, and plaques used in establishing identity, communication, or way finding.

1.2 QUALITY ASSURANCE

A. Comply with signage requirements indicated in the Americans with Disabilities Act.

1.3 PANEL SIGNS

A. Type: Unframed.

B. Material: ***Zinc, laminated polycarbonate-faced sheet; acrylic sheet; high pressure decorative laminate, photopolymer sheet; laminated, engraved sheet; laminated, etched photopolymer sheet with raised graphics and Braille; or laminated, sandblasted polymer sheet with raised graphics and Braille.***

C. Copy: Raised text, Braille and pictograms.

1.4 PLAQUES

A. Plaques.
- ***1.*** Metal: Bronze.
- ***2.*** Border Style: Plain bevel.
- ***3.*** Background Texture: Manufacturer's standard pebble texture.
- ***4.*** Background Finish: Provide dark statuary finish to comply with the requirement specified for bronze finishes, except provide background texture specified above in lieu of mechanical finish indicated.

1.5 DIMENSIONAL CHARACTERS

A. Cast Characters.
B. Aluminum Extrusions.
C. Fabricated Channel Characters.
D. Molded Plastic Characters.
E. Cutout Characters.

1.6 INSTALLATION

A. Wall-Mounted Signs: Mechanical fasteners.
- ***1. Mounted on glass with matching opaque plate on opposite side of glass.***

B. Dimensional Characters: Flush or projected mount.

C. Cast-Metal Plaques: Concealed or face mounting.

DEDICATION PLAQUE

John Smith Elementary School

Lincoln Logs Local School District

1



(Date)

(Name), Board President

(Name), Board Member
(Name), Board Member

(Name), Board Member
(Name), Board Member

2

(Name), Superintendent
(Firm Name), Architect

(Name), Treasurer
(Firm Name), Construction Manager

(Other Contractors)

Funded through a partnership with the

3

OHIO FACILITIES CONSTRUCTION COMMISSION

John Kasich, Governor

Elements

Group 1: Name of School, Name of District, and OFCC Seal. **Use of the Seal is mandatory. A copy is available from the OFCC.**

Group 2: Date of Dedication, District Officials (including Board Members and Administrators), Architectural firm, and Construction Management firm. Contractors may be included as the Board of Education deems appropriate.

Group 3: State of Ohio participation. Wording should be consistent with above. Placement of Group 3 may be above Group 2 at option of the District.

END OF SECTION

SECTION 101426

POST AND PANEL / PYLON SIGNAGE

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for non-illuminated post and panel signs.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC A117.1.

1.3 WARRANTY

A. Materials and Workmanship: 5 years.

1.4 PRODUCTS

A. Panel Signs
   1. Message Panel Sign Materials: Aluminum sheet or composite aluminum-faced sheet.
      a. Edge Condition: Square cut or bullnose.
      b. Corner Condition: Square or rounded to radius indicated.
   2. Panel Sign Frames: Extruded aluminum mitered with concealed anchors and welded.
      a. Profile: Square or rounded.
      b. Corner Condition: Square or rounded to radius indicated.
      c. Frame Type: Mounted on posts.
   3. Hollow-Box-Type Panel Signs
      a. Message Panel Material: Aluminum sheet or composite aluminum-faced panel.
      b. Corner Condition: Square or rounded to radius indicated.

B. Posts
   1. Aluminum: Square, rectangular, semicircular, or rounded-end.

END OF SECTION

SECTION 101453

TRAFFIC SIGNAGE

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for traffic signs.

1.2 QUALITY ASSURANCE

A. Comply with US Manual on Uniform Traffic Control Devices for signs within public rights-of-way.

1.3 POST-MOUNTED SIGNS

A. Exterior “Accessible Parking” Signs
   1. 12 by 18 inch, 18 gauge steel with 1 inch radius corners. Bolt through top and bottom of sign face into 2 by 2 inch square steel post by 11 foot long (3.65 pounds/feet) with vandal-resistant fasteners.
   2. Finish: Baked enamel finish. Color of sign face is to be blue with white graphics. Color of post is to be selected by the Design Professional.

B. Stop and other traffic regulatory signs.

C. Visitor parking signs.

D. Breakaway post supports for signs within the rights-of-way.

END OF SECTION

SECTION 102113

TOILET COMPARTMENTS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for compartments and cubicles appropriate for toilet rooms, including hardware and accessories.

1.2 QUALITY ASSURANCE

A. Flame-Spread Index: 75 or less.

1.3 COMPONENTS

A. Phenolic-Panel Core: Dark color or through-color matching face sheet.

B. Solid-Polymer Units: Either high-density polyethylene (HDPE) or polypropylene (PP) panel material.

C. Solid Color Reinforced Composite.

D. Brackets (fittings)
1. Stirrup Type: Stainless steel.
2. Full-Height (continuous) Type: Stainless steel or polymer.

E. Hardware and Accessories: Clear-anodized aluminum or stainless steel.
1. Fasteners: Stainless steel.
2. Shoes: Stainless steel orpolymer.
3. Hinges: Self-closing.
4. Latch and Keeper: Emergency access and accessibility requirements.

1.4 INSTALLATION

A. General: Install panels with either three stirrup brackets or continuous type.

B. Install with vandal-resistant fasteners.

END OF SECTION

SECTION 102123

CUBICLES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for medical treatment curtains, tracks, and other hardware.

1.2 MATERIALS

A. Curtains
1. Curtain Fabric: 100 percent polyester, flame-resistant.
2. Mesh Top: No. 50.
3. Curtain Drop: Beaded chain.

B. Curtain Tracks: ***Surface-mounted, aluminum box channel type.***

C. Curtain Carriers: One piece nylon, breakaway.

END OF SECTION

SECTION 102213

WIRE MESH PARTITIONS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for fixed partitions used as enclosures, dividers, partitions, ***storage lockers, and equipment barriers*** fabricated of wire mesh.

1.2 STANDARD-DUTY WIRE MESH PARTITIONS

A. Wire Mesh: 0.135 steel woven wire, 1-1/2 inch diamond mesh or 1 by 2 inch rectangular.
   1. Doors: Swinging, swinging dutch, or sliding.
   2. Service Windows.
   3. Accessories
      a. Sheet Metal Base.
      b. Adjustable Filler Panels.
      c. Wall Clips.
   4. Finishes: Shop primed, baked enamel, or powder coated.

B. Framing: Cold rolled “C” section channels and angles.

END OF SECTION

SECTION 102226

OPERABLE PARTITIONS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for track supported, operable panels and partitions, top hung and floor supported, manually operated.

1.2 SYSTEM DESCRIPTION

A. Sound Transmission Class: 50 minimum or as determined for compliance with LEED for Schools, Indoor Environmental Air Quality, “Minimum Acoustical Performance”, prerequisite 3.

B. Flame-Spread Index: 25 or less.

1.3 OPERABLE ACOUSTICAL PANELS

A. Panel Types
1. Manually operated, individual or paired acoustical panel partitions.
2. Electrically operated, continuously hinged acoustical panel partitions.
3. Manually operated, individual or paired glass panel partitions.

B. Operation: Manual, unless otherwise noted.

C. Frame: Steel or aluminum.

D. Face/Liner Sheets: Steel or steel with gypsum board.

E. Finish Facing: Vinyl coated fabric wall covering, carpet wall covering, fabric wall covering, or paint.

F. Accessories
1. Panel mounted ***markerboards.***
2. Minimum 3/16 inch thick tackable cork surface beneath finish material.
3. Pass doors.
4. Windows.

END OF SECTION

SECTION 102813

TOILET ACCESSORIES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for grab bars, towel dispensers, soap dispensers, toilet paper dispensers, shower accessories, metal framed mirrors, mop holder with shelf, shower curtain and rod, towel hooks, napkin disposals and vendors, hand dryers, and other accessories.

B. Accessories mounted on or recessed in walls and toilet compartments.

1.2 MATERIALS

A. Stainless Steel: ***AISI Type 304.***

B. Sheet Steel: ***ASTM A 1008.***

C. Galvanized – Steel Sheet: ASTM A 653, G60.

D. Galvanized Steel Mounting Devices: ASTM A 153.

E. Chrome Plating: ASTM B 456.

F. Mirrors: ASTM C 1503.

G. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

1.3 COMPONENTS

A. Grab Bars: Stainless Steel.

B. Towel Dispensers: Folded or roll towels.

C. Combination Towel Dispenser / Waste Receptacle: Roll or folded towels.

D. Folding Shower Seat

E. Soap Dispenser

F. Toilet Paper Dispenser: Roll or combination, roll.

G. Mirror

1. Stainless Steel Framed Mirror: Mirror shall have a one piece, ***stainless steel angle frame.***

H. Mop and Broom Holders

I. Shower Rods
   1. Shower curtains: Vinyl.

J. Towel Hooks

K. Sanitary Napkin Disposals and Vendors

L. Diaper Changing Stations

M. Child-Protective Seat

N. Hand Dryers
   1. Regulations: NFPA 70, UL, and ADA compliant.
   2. Operation: Touch button or electronic sensor activated with timed power cut-off switch.
   3. Cover Material and Finish: Cast-iron or steel with enamel finish; or stainless steel, no. 4 finish.

1.4 INSTALLATION

A. Install accessories with vandal-resistant fasteners.

END OF SECTION

SECTION 104400

FIRE PROTECTION SPECIALTIES

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for fire fighting devices and storage cabinets, except items or devices connected to a fire protection system.

1.2 QUALITY ASSURANCE

A. Integrity of fire rated walls must be maintained with installation of recessed or semi-recessed fire extinguisher cabinet.

B. Fire Extinguishers: NFPA 10.

1.3 FIRE EXTINGUISHERS

A. Type
   1. Class K fires, potassium acetate kitchen.
   2. Multipurpose dry chemical type in all other locations.

B. Public Area Mounting: Cabinet mounted.

C. Service Area Mounting: Metal brackets.

1.4 CABINETS

A. Cabinet Material: Steel

B. Door Style
   1. Vertical duo panel with frame, unless otherwise indicated.
      a. Door Glazing: Tempered glass.
         1) Acrylic bubbles are not acceptable.
   2. Solid panel at gymnasium.

C. Accessories
   1. Door locks (optional).
   2. Alarm (optional).

END OF SECTION

SECTION 105113

LOCKERS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for storage facilities providing temporary security of contents; related hardware and locking devices; athletic and school lockers.

1.2 METAL LOCKERS

A. Type: Corridor (wardrobe) lockers, sheet steel, 0.0209 inch thick back and sides, 0.0528 inch thick doors and frame.
   1. Provide knock-down (mechanically assembled) standard locker construction.
   2. Material: Cold-rolled or metallic-coated steel sheet.
   3. Door Style: Louvered vents at top and bottom, security vents, perforated vents, or concealed vents.
   4. Hinges: Knuckles or continuous.
   5. Locks.
   6. Recessed Latching: Provide either three-point latching or single point spring actuated latch. Single point gravity is not acceptable.

B. Type: Athletic lockers, all welded.
   1. Body
      a. Tops and Bottoms: 0.0528 inch unperforated, cold-rolled steel sheet.
      b. Backs
         1) 0.0428 inch solid
         2) 0.0528 inch perforated (exposed)
         3) 0.0897 inch expanded (exposed)
      c. Sides
         1) 0.0528 inch solid
         2) 0.0528 inch perforated
         3) 0.0897 inch expanded
   2. Doors
      a. 0.0677 perforated
      b. 0.0897 expanded
   3. Recessed Latching: Provide either three-point latching or single point spring actuated latch. Single point gravity is not acceptable.
      a. Provide strike and eye for padlock.

C. Tops: Sloped.

D. Number Plates: Aluminum plates with minimum 3/8 inch high etched, embossed or stamped numbers.

E. Locker Benches

LESSONS LEARNED

2.1 Storage provisions of the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" (hereafter, ADA-ABA Accessibility Guidelines) and ICC/ANSI A117.1, "Accessible and Usable Buildings and Facilities", apply to metal lockers.

2.2 Special lockers that comply with accessibility requirements are available from most locker manufacturers. Considerations in selecting accessible metal lockers include hardware requirements and locations of shelves, hooks, and coat rods. Also, the locker layout must be designed to accommodate requirements for clear floor space.

A. According to ADA-ABA Accessibility Guidelines, "Where lockers are provided, at least 5 percent, but no fewer than one of each type, shall comply" with accessibility requirements for clear floor space, reach ranges, and operable parts. Requirements are as follows:

1. Clear Floor Space: A minimum clear floor space of 30 by 48 inches must be provided in front of each accessible locker. The long dimension may be either parallel or perpendicular to the locker. Clear space must be free of obstructions such as benches and overlapping door swings.

2. Reach Ranges: For an unobstructed approach, the maximum forward and side reach is 48 inches above the floor. Shelves and equipment may not be mounted higher than the maximum reach permitted. The lowest shelf must be at least 15 inches above the floor. Mounting heights of interior equipment, such as coat hooks and coat rods, are determined by dimensions of metal lockers and locations of the equipment within them, but all mounting heights must be within reach ranges.

3. Operable Parts: Parts such as latches and locks must be placed within the reach ranges indicated above. Also, "Operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts shall be 5 pounds maximum."

B. Special latches, keys, card-controlled electronic locks, and other accommodations complying with this requirement are available from locker manufacturers and are required, if locks are to be used.

END OF SECTION

SECTION 105613

METAL STORAGE SHELVING

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for open manufactured shelving for general storage.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance for Four-Post Metal Storage Shelving: MH 28.1.

B. Structural Performance for Post-and Beam Metal Storage Shelving: MH 28.2.

1.3 PRODUCTS

A. Four-Post Metal Storage Shelving: Metal storage shelving system with shelves that span between and are supported by corner posts.
- ***1. Open or Closed Type***
  - ***a. Load-Carrying Capacity per Shelf: 350 lb (minimum).***
  - ***b. Posts: Steel.***
  - ***c. Bracing: Single or double diagonal cross bracing at back and ends.***
  - ***d. Shelves: Metallic-coated steel sheet or metallic-coated steel wire.***
  - ***e. Base: Open, with exposed post legs or closed, with base strips fabricated from same material and with same finish as shelving.***
  - ***f. Accessories: Finished end panels, shelf dividers, bins, and shelf-label holders.***
  - ***g. Finish: Baked enamel or powder coat.***

B. Post-and-Beam Metal Storage Shelving
- ***1. Load-Carrying Capacity per Shelf: 400 lb (minimum).***
- ***2. Posts: Steel.***
- ***3. Shelves: Particleboard, steel sheet, metallic-coated steel sheet, or ribbed-metal decking.***
- ***4. Accessories: Tie plates, supports back-to-wall and back-to-back, letter-/legal-size record boxes, letter-size record boxes, and record box support rails.***
- ***5. Finish: Baked enamel or powder coat.***

END OF SECTION

SECTION 105626

MOBILE STORAGE SHELVING

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for mechanically-assisted, carriage-mounted, high-density mobile storage units, support rails, fabrication, and installation including leveling of support rails.

1.2 SYSTEM DESCRIPTION

A. Carriage System Design and Features: The carriage system consists of a formed structural steel frame with hardened steel wheel riding on steel rails recessed-mounted to the floor. Rails shall be types selected by the manufacturer to ensure smooth operation and self-centering of mobile storage units during travel without end play or binding. Rail types, quantities, and spacing shall be selected by the manufacturer to suit installation conditions and requirements. All bearings used in the drive mechanism shall be permanently shielded and lubricated.

1.3 QUALITY ASSURANCE

A. Ease of Movement: Provide mechanically-assisted units capable of being moved by exerting a maximum horizontal force of 5 pounds on the operating wheel.

1.4 COMPONENTS

A. Rails:
1. Material: ASTM/AISI Type 1035 or 1045 steel, manufacturer's selection.
2. Capacity: 1,000 pounds per lineal foot of carriage, minimum.
3. Minimum Contact Surface: 5/8 inch wide, minimum.
4. Provide rail sections in minimum 6-foot lengths.
5. Rail configuration shall permit attachment to top of structural floor system with provision for leveling rails to compensate for variations in floor surface level.
6. Provide rail connections designed to provide horizontal and vertical continuity between rail sections, to gradually transfer the concentrated wheel point load to and from adjoining rail sections. Butt joints are not permitted.

B. Carriages:
1. Provide manufacturer's design movable carriages fabricated of welded or bolted steel construction. Galvanized structural components and/or riveted carriages are unacceptable.
2. Provide fixed carriages of same construction and height as the movable carriages, anchored to rails. Setting fixed shelving directly on floors is not permitted.
3. When required, provide bolted carriage splices designed to maintain proper unit alignment and weight load distribution.
4. Design carriages to allow the shelving uprights to recess and interlock into the carriages a minimum of 3/4 inch. Top-mounted carriages are unacceptable.
5. Provide each carriage with two wheels per rail.

C. Drive/Guide System:
   1. Design: Provide drive system which prevents carriage whipping, binding, and excessive wheel/rail wear under normal operation.
      a. If line shafts are used, all wheels on one side of carriage shall drive.
      b. If synchronized drives are used, a minimum of one wheel assembly driving both sides of carriage at center location is required. Drive shaft shall exhibit no play or looseness over the entire length of that assembly.
   2. Shafts: Solid steel rod or tube.
   3. Shaft Connections: Secured couplings.
   4. Bearing Surfaces: Provide rotating load bearing members with ball or roller bearings. Provide shafts with pillow block or flanged self-aligning type bearings.

D. Wheels:
   1. Materials: Type 1045 solid steel. Minimum load capacity per wheel: 3200 lbs.
   2. Size: Minimum 5 inches, outside diameter drive wheels.
   3. Guides: Determined by manufacturer; minimum 2 locations.

E. Face Panels:
   1. Materials: Plastic laminate clad particle board with plastic edging on vertical edges.
   2. Finishes: Selected from manufacturer's standard available colors and patterns.

F. Accessories:
   1. Waist High Carriage Locks: Provide manufacturer's standard.

END OF SECTION

SECTION 107500

FLAGPOLES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for flagpoles.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide flagpole assemblies, including anchorages and supports, capable of withstanding the effects of wind loads, determined according to NAAMM FP 1001, “Guide Specifications for Design of Metal Flagpoles”.
   1. Base flagpole design on polyester flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.
   2. Basic Wind Speed: 90 mph; 3-second gust speed at 33 feet aboveground, unless otherwise noted as a greater wind speed.

1.3 PRODUCTS

A. Flagpoles
   1. Aluminum Flagpoles: Cone or Entasis tapered.

B. Mounting Type
   1. Foundation Tube.
   2. Vertical Wall Mount.
   3. Outrigger Wall Mount.

C. Fittings:
   1. Finial.
   2. Halyard
      a. Internal, winch system where pole is over 40 feet.
      b. External with locking cleat cover and halyard cover, where pole is under 40 feet.

END OF SECTION

DIVISION 11 EQUIPMENT

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DIVISION 11: EQUIPMENT

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116643	Interior Scoreboards
118226	Waste Compactors and Destructors
119200	Art Room Equipment - Kilns

SECTION 111300

LOADING DOCK EQUIPMENT

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for equipment and material for the protection of service docks and for the loading and unloading of various types of service vehicles including:
   1. Dock bumpers.
   2. Dock levelers.
   3. Dock lifts (scissors lifts).
   4. Truck restraints.

1.2 QUALITY ASSURANCE

A. Dock Leveler Standard: MH 30.1.

B. Dock Lifts Standard: MH 29.1.

C. Truck Restraints: MH 30.3.

1.3 DOCK BUMPERS

A. Type: Molded rubber or laminated tread.

B. Mounting: Horizontal, vertical, or integral to leveler.

1.4 DOCK LEVELERS

A. Type: Mechanical or hydraulic, recessed in dock or edge of dock.

B. Rated Capacity: 25,000 pounds.

C. Function: Dock levelers shall compensate for differences in height between truck bed and loading platform.

D. Safety Device: Truck restraint designed to hold vehicle at load dock, if grade would allow vehicle to roll away.

1.5 DOCK LIFTS

A. Scissors-type hydraulic dock lift of capacity, size, and construction indicated; complete with controls, safety devices, and accessories required.
   1. Mounting: Recessed.
   2. Type: Stationary.
   3. Lift Capacity: Not less than 5,000 pound axle load at ends and 5,000 pound axle load at sides.
   4. Vertical Travel: Maximum of 60 inches from lowered height of 12 inches.

END OF SECTION

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SECTION 113100

RESIDENTIAL EQUIPMENT

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for residential type equipment.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements
1. NFPA 70
2. UL and NEMA
3. AGA and ANSI
4. NAEAC
5. ANSI A117.1

1.3 EQUIPMENT

A. Items funded by the OFCC:
1. Cooktop
2. Range
3. Oven
4. Microwave
5. Exhaust Hood
6. Refrigerator/Freezer
7. Dishwasher
8. Washer
9. Dryer

END OF SECTION

SECTION 114000

FOOD SERVICE EQUIPMENT

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for equipment used for liquid and solid food storage, preparation, display, serving and cleanup in commercial kitchens.

B. Kitchen hood provided in Division 25.

1.2 QUALITY ASSURANCE

A. Codes and Standards
   1. NSF Seal of Approval.
   2. Underwriters' Laboratories Label.
   3. NFPA 54, National Fuel Gas Code.
   4. NFPA 70, National Electrical Code.
   5. NFPA 96, Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment.
   6. ASME Boiler Code.
   7. Public Health Service Publication "Food Service Sanitation Manual".

1.3 FOOD SERVICE EQUIPMENT MATERIALS

A. Stainless Steel: AISI Type 302 or Type 304, No. 4 polished finish.
   1. Unexposed finish shall be No. 2B.

B. Tops, Sinks, Dishtables and Drainboards: 14 gauge stainless steel.

C. Cabinet Bodies and Doors: 16 gauge stainless steel.

D. Drawers: 18 gauge stainless steel body with 16 gauge stainless steel front.

E. Shelves: 14 gauge stainless steel.

F. Cold Pans: 14 gauge stainless steel.

END OF SECTION

SECTION 115123

LIBRARY STACK SYSTEMS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for library shelving and accessories.

1.2 QUALITY ASSURANCE

A. Quality Standard: Steel bracket shelving to comply with ANSI Z39.73.

1.3 LIBRARY SHELVING

A. Steel Bracket Units
   1. Type: Single- or double-faced units.
   2. Frame Style: Upright post, display, or wall hung.
   3. Panels: End panels, countertops, canopy tops, and back panels.
      a. Face: Wood veneer or high-pressure decorative laminate.

B. Steel Case Shelving
   1. Panels: At top, back, and ends of units over steel panels.
      a. Face: Wood veneer or high-pressure decorative laminate.

C. Wood Case Shelving
   1. Type: Single- or double-faced units.
   2. Panels: At top, back, and ends.

LEED SUGGESTIONS

2.1 LEED materials and resources credits, from the U.S. Green Building Council's (USGBC) LEED Rating System are usually awarded for construction of the base building prior to the installation of fixtures, furniture, and equipment (FFE). Because bookstacks are often considered FFE items, optional specification language for LEED credits has not been included in this Section.

2.2 If the designer does not wish to classify library shelves as FFE items, USGBC should be contacted for an interpretation on the specific project. In such cases, this Section may be altered by adding language similar to that found in the "LEED Submittals" Paragraph in Part I of the "Interior Architectural Woodwork" Section, and then by altering Part 2 "Wood Materials" Article in this Section's Text to require low-emitting materials. Other requirements can be added to suit the Project.

END OF SECTION

SECTION 115213

PROJECTION SCREENS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for projection screens, their accessories, and necessary mounting and installation hardware.

1.2 FRONT PROJECTION SCREENS

A. Material and Viewing Surface of the Front Projection Screens: Provide screens manufactured from mildew and flame-resistant fabric of type indicated for each type of screen specified:
   1. Matte white viewing surface. Peak gain of 0.9 to 1.0, and gain of not less than 0.8 at an angle of 50 degrees from the axis of the screen surface.
   2. Material: Vinyl coated glass fiber fabric.
   3. Size of Viewing Surface
      a. At classrooms; 60 inches by 80 inches. (100 inches diagonal)

B. Manually Operated Screens: Fabricated for wall installation and consisting of case, screen, and mounting accessories.

C. Electrically Operated Screens: UL labeled units consisting of case, screen, motor, controls, mounting accessories, and other components.

LESSONS LEARNED

2.1 Coordinate layout and installation of projection screens with adjacent construction, including ceiling frame, light fixtures, HVAC equipment, fire-suppression system, and partitions.

A. Coordinate with location of ***ultra-short throw interactive projectors***.

END OF SECTION

SECTION 115313

LABORATORY FUME HOODS

GENERAL GUIDELINES

1.1 SECTION INCLUDES
- A. Qualitative requirements for bench-top laboratory fume hoods, floor-mounted laboratory fume hoods, and piping and wiring within fume hoods.

1.2 PERFORMANCE REQUIREMENTS
- A. Containment: Tested according to ASHRAE 110.

1.3 QUALITY ASSURANCE
- A. Product Standard: SEFA.

1.4 PRODUCTS
- A. Fume Hoods
  1. Exterior: Steel with chemical-resistant finish or fiberglass.
  2. Interior Lining: Glass-fiber cement board, glass-fiber cement board with acid-resistant finish, steel sheet with epoxy coating, glass-fiber-reinforced polyester, epoxy, glass-fiber-reinforced epoxy, stainless steel, phenolic composite, or polypropylene.
- B. Accessories
  1. Airflow indicator.
  2. Airflow alarm.
  3. Sash alarm.

1.5 FIELD QUALITY CONTROL
- A. Hoods field tested according to “Flow Visualization and Velocity Procedure” requirements in ASHRAE 110.

1.6 FUME HOOD SCHEDULE
- A. Bench Top Fume Hood Type
  1. Ventilation Type: Constant volume, constant volume with variable-air-volume control, bypass, auxiliary-air bypass, or restricted bypass with variable-air-volume control.
  2. ASHRAE 110 As-Manufactured (AM) Rating: AM 0.05 maximum.
  3. ASHRAE 110 As-Installed (AI) Rating: AI 0.10 maximum.
  4. Work Top: Epoxy or phenolic composite.
  5. Cup Sinks: Epoxy, polypropylene, or stainless steel.
  6. Service Fittings.
- B. Floor-Mounted Fume Hood Type
  1. Ventilation Type: Constant volume, constant volume with variable-air-volume control, bypass, auxiliary-air bypass, or restricted bypass with variable-air-volume control.
  2. ASHRAE 110 As-Manufactured (AM) Rating: AM 0.05 maximum.
  3. ASHRAE 110 As-Installed (AI) Rating: AI 0.10 maximum.
  4. Floor: Epoxy or phenolic composite.
  5. Cup Sinks: Epoxy, polypropylene, or stainless steel.
  6. Service Fittings.

END OF SECTION

SECTION 116143

STAGE CURTAINS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for stage curtains and tracks.

1.2 QUALITY ASSURANCE

A. Flame-Resistant Rating: NFPA 701.

1.3 MATERIALS

A. Curtain Fabrics

1. Main Curtain

a. 25 oz. per lineal yard woven cotton velour fabric; 54-inch minimum width.

2. Intermediate Curtain and Side Leg Drops

a. 20 oz. per lineal yard woven cotton velour fabric; 54-inch minimum width.

3. Rear Curtain

a. Muslin: Shear, plain woven fabric of 100 percent uncounted cotton weighing not less than 6 oz. per lineal yard; 100-inch minimum width.

B. Rigging

1. Curtain Battens: Steel pipe.

2. Trim and Support Cable: Steel air craft cable.

3. Trim and Support Chain: Grade 80 hardened alloy steel chain.

C. Curtain Tracks: With pulleys, blocks, carriers, and operating line.

1. Aluminum, straight or curved, for walk-along operation.

2. Steel, medium duty.

END OF SECTION

SECTION 116623

GYMNASIUM EQUIPMENT

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for equipment intended for use in athletic activities including:
1. Basketball backstops
2. Volleyball equipment
3. Gym dividers
4. Miscellaneous gymnasium equipment

1.2 QUALITY ASSURANCE

A. Standards: National Federation of State High School Associations ***(NFHS)***

B. Electrical Components, Devices, and Accessories: NFPA 70, Article 100.

1.3 BASKETBALL BACKSTOPS

A. Frame Assembly
1. Elementary School: Adjustable goal height.

B. Backboards: 3 feet 6 inches by 6 feet 0 inches
1. Tempered glass at main court and overhead supported units at side courts.
a. Provide fiberglass or wood backboards at wall-mounted side courts.

C. Goal: Front mount direct to frame assembly. Provide breakaway type rim.

D. Operation: Electric winch at overhead-supported folding backstops only.

E. Backstop Safety Lock: One on each overhead-supported backstop.

F. Backboard padding.

1.4 VOLLEYBALL EQUIPMENT

A. Volleyball Floor Plates and Sleeves
1. Floor Plate: Cast brass with flush hinged type.
2. Sleeve: Steel construction with concrete base flange and predrilled top flange to receive floor plate.

B. Volleyball Standards and Net
1. Extruded aluminum or extruded high strength steel standards.
a. Provide minimum of 10 height adjustments.
2. Net: Provide 4-inch square mesh fabricated from #24 nylon and vinyl-coated steel top cable.

C. Accessories (optional): Net tensioning system, bottom net lock tightener, judges' stands, safety pads, post standard transporter, wall storage rack, and storage cart.

1.5 GYM DIVIDERS

A. Type: Fold up, roll up, or walk draw.

B. Curtain Material
1. Lower Section: 18 ounce solid vinyl polyester reinforced fabric, flame resistant.
2. Upper Section: Open polyester grid weave, coated with PVC, flame resistant.

C. Operation: Electric or manual.

D. Suspension System: Anchored to structural framing.

E. Accessories
1. Wall-mounted key switch control.

1.6 MISCELLANEOUS GYMNASIUM EQUIPMENT

A. ***Safety*** Padding
1. Flame***,*** puncture, and tear-resistant vinyl coated nylon fabric over foam filler adhered to plywood backing board.
2. Cover Material: 14 oz. minimum.
3. Flame-resistant rating: Passes NFPA 701.
4. Fabric cover to be treated with fungicide for mildew resistance.

B. Mat Hoist (optional)
1. Stationary overhead-supported mat hoist capable of hoisting one 45 by 45 foot mat.

C. Chinning Bar ***(optional)***
1. Bar shall be 1-1/16 inch diameter by 3 feet 6inches in length, supported by formed brace supports approximately 1 foot 5 inches from wall.

END OF SECTION

SECTION 116643

INTERIOR SCOREBOARDS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for interior scoreboard and accessories.

1.2 MATERIALS

A. Unit to score volleyball, basketball, and wrestling.

B. Wall mounted unit.

C. Tenth of a second timing for last 50 seconds.

D. Control console for each board installed.

E. Carrying case.

F. Shot clocks at high schools.

1.3 INSTALLATION

A. Provide console control outlet in spectator bleachers.

END OF SECTION

SECTION 118226

WASTE COMPACTORS AND DESTRUCTORS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for waste compactors, component fittings, and accessories.

1.2 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Waste Compactor Standards: Comply with ANSI Z245.2, "Equipment Technology and Operations for Wastes and Recyclable Materials—Stationary Compactors—Safety Requirements," and NFPA 82, "Incinerators and Waste and Linen Handling Systems and Equipment."

C. Waste Bin and Hopper Standard: Comply with ANSI Z245.30, "Refuse Collection, Processing, and Disposal Equipment—Waste Containers—Safety Requirements."

1.3 WASTE COMPACTORS

A. Self-Contained Horizontal (Liquid Wastes) Compactors: Manufacturer's standard packaged units with components, options, and accessories needed to comply with requirements and provide complete functional systems.
   1. Minimum WASTEC Rating/NSWMA Base Size: 1.00 cu.yd (0.765 cu.m).
   2. Controls
      a. Provide fully enclosed doghouse with side door, to be fed from ground.
      b. Key-controlled motor.

LEED SUGGESTIONS

2.1 LEED certification of a project requires documentation that all prerequisite requirements (prerequisites) have been met, plus a minimum number of Credit points. The U.S. Green Building Council's MR-Prerequisite 1, "Storage and Collection of Recyclables," requires "an easily accessible area that serves the entire building and is dedicated to the collection and storage of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, and metals." Most other LEED rating systems have a similar requirement. Waste compactors are generally an essential part of efficient collection and storage of waste for recycling.

A. Recycling significantly reduces the volume of waste to be transported and can improve sanitation where the waste originates. Presorting and separating waste materials as part of a recycling program requires temporary on-site storage of recyclable waste. Separating and compacting materials such as cardboard and other paper products reduces storage space necessary between collections.

END OF SECTION

SECTION 119200

ART ROOM EQUIPMENT - KILNS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for kilns and accessories.

1.2 QUALITY ASSURANCE

A. UL / CSA Listed.

1.3 KILN FEATURES

A. Dimensions: Minimum 23.5-inch width and 27-inch depth.

B. Power Supply: Gas or 208V electric.

C. Temperature: 10 cone or 2350 degree Fahrenheit minimum.

D. Automatic Controller.

1.4 ACCESSORIES

A. Vent

B. 3-inch Brick

C. Furniture kit

END OF SECTION

DIVISION 12 FURNISHINGS

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DIVISION 12: FURNISHINGS

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122413 Roller Window Shades
123550 Educational Casework
123553 Laboratory Casework
124813 Entrance Floor Mats and Frames
124816 Entrance Floor Grilles
126600 Telescoping Stands
129100 Site Furnishings

SECTION 122113

HORIZONTAL LOUVER BLINDS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for horizontal louver blinds with aluminum slats.

1.2 PRODUCTS

A. Horizontal Louver Blinds, Aluminum Slats
   1. Coating: Reflective.
   2. Maximum Light-Blocking Type.
   3. Tilt Control: Manual with wand or manual with cord.
   4. Lift Operation: Manual with cord.
   5. Valance.

END OF SECTION

SECTION 122413

ROLLER WINDOW SHADES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for roller window shades.

1.2 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Passes NFPA 701.

B. Motorized Operators: UL listed.

C. Comply with WCMA A 100.1.

1.3 PRODUCTS

A. Shade Band Material: PVC-coated fiberglass, PVC-coated polyester, PVC-coated fiberglass and polyester blends, or fiberglass and acrylic blend.

B. Rollers: Electrogalvanized or epoxy primed steel or extruded-aluminum tube.

C. Top: Fascia and end caps; fascia, end caps, and top/back cover; pocket-style headbox with bottom cover or pocket with ceiling slot opening.

D. Shade Type: Audiovisual light blocking or skylight.

E. Shade Operation: Manual with spring roller; manual with continuous-loop bead chain, clutch, and cord tensioner and bracket; manual with gear and crank; or motorized operator.

F. Valance.

LEED SUGGESTIONS

2.1 Shading coefficient (SC) and the more recently preferred solar heat gain coefficient (SHGC) are values derived from the solar-optical properties of the glass or other glazing, the in-between air space, and the fenestration covering assembly. The relationship of glazing, shading, and fenestration energy flow is well-documented in the 2001 ASHRAE HANDBOOK – Fundamentals, Ch. 30. Both coefficients measure how well a glazed opening blocks heat caused by sunlight; the lower the SC or SHGC, the less heat gained in the protected space. The optimum solar0optical property levels for lowering SC and SHGC and reducing heat gain are as follows:

A. Transmittance – Low
B. Absorptance – Low
C. Reflectance – High

2.2 Roller shades with metalized fabric backings can lower the solar heat gain through glazed openings by blocking transmission of and reflecting incoming solar radiation. Low absorptance of metalized fabrics minimizes heat gain caused by radiant heat. Metallized shades mounted in front of a single pane will reduce directly transmitted solar energy by at least 80%. Besides reflecting heat, metallized fabrics reflect light and control glare.

2.3 SC and SHGC values for light- or dark-colored roller shades vary significantly. Reducing heat gain through glazed openings from solar exposure is best accomplished with light-colored shades because light-colored surfaces reflect light more efficiently and absorb less heat than dark-colored surfaces. Solar-optical values for the shade material and color should be obtained from the manufacturer and considered when calculating HVAC cooling loads.

2.4 Fixed lites with tinted or coated glazing assemblies with low SC and SHGC ratings may not require shading devices. Internal shading devices can only affect solar radiation that has passed through the tinted or coated glass and can reduce only that portion of the heat gain than can be reflected back through the glass again. According to the 2001 ASHRAE HANDBOOK – Fundamentals, "the energy benefit of a shade decreases as the SC of the unshaded glass decreases, due to the low transmittances and the inability of the occupant to change this factor."

2.5 In cold climates, roller shades can be manipulated to admit heating solar radiation when opened or to help retain room heat when fully closed. Depending on the building orientation, site conditions, outside-air temperature, and glazing assembly characteristics, it is possible for solar heat gain to offset heat loss through glazed openings during heating operations.

2.6 Designed use of daylighting is an issue that is increasingly being considered by Design Professionals. Daylighting can be used in building design in lieu of or as a supplement to electric lighting, with consequent reduction in energy consumption. Given constantly changing and widely variable conditions, predicting daylight distribution and glare in actual buildings can be complex. Integrating the effects of daylighting with those of electric lighting so adequate illumination levels can be achieved and maintained may also be complicated. Computer programs are currently being developed to aid in the design and analysis of daylighting. Because blinds and shades can be easily and effectively used to manipulate daylighting, they may play an important role in practical lighting design decisions.

END OF SECTION

SECTION 123550

EDUCATIONAL CASEWORK

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for educational casework including open casework, modular casework, and music casework, manufactured with plastic laminate facing and countertops.

1.2 QUALITY ASSURANCE

A. Casework Grade: Provide plastic laminate faced casework complying with the referenced quality standard and the following grade:
   1. Grade: custom ***per Architectural Casework Quality Standards***.

B. Design Requirements for Educational Casework
   1. Design system of cabinets which will be chip and abrasion-resistant under normal usage and will protect student clothing, materials, musical instruments and cases from damage under normal use.
   2. Design shelving to withstand continuous use without surface or front edge breakdown.
   3. Hanger rods or hooks to support a minimum vertical load of 200 pounds applied anywhere.
   4. Full-height door to support a minimum vertical load of 200 pounds applied at outer edge.

1.3 MATERIALS

A. Low-Emitting Materials: Adhesives and composite wood products shall not contain urea formaldehyde.

B. Plastic laminates, provide one of the following:
   1. High pressure decorative laminate complying with NEMA LD3, Grade GP-28.
   2. High pressure decorative laminate complying with NEMA LD3, Grade CL-20.
   3. High pressure decorative laminate complying with NEMA LD3, Grade BK-20.

C. Edge Banding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish, 3mm thick at doors and drawer fronts, 1mm thick elsewhere.

D. Melamine Faced Particleboard: Medium density particleboard complying with ANSI A208.1, Grade M-2, with decorative surface of thermally fused, melamine impregnated web complying with ALA 1992.

E. Particleboard: ANSI A208.1, Grade M-2.

F. Hardboard: AHA A135.4, Class 1 tempered.

G. Plywood: Hardwood plywood of any species similar in color and grain to exposed wood. HPVA HP-1, Grade C faces and Grade J crossbands. Semi-exposed backs of plywood with exposed faces shall be the same species as faces.

H. Epoxy Tops and Sinks (Science Rooms): Factory molded of modified epoxy-resin formulation, uniform mixture throughout full thickness with smooth, nonspecular finish.

I. Hardware and Accessories
1. Batt Hinges: BHMA A 156.9.
   a. Frameless, concealed (European type) are not acceptable.
2. Pulls.
3. Door Catches.
4. Drawer Slides: BHMA A 156.9.
5. Drawer and Door Locks on all doors and drawers.
6. Adjustable Shelf Supports.
7. Grommets.
8. Tote Trays.
9. Articulating Keyboard Trays.
10. Glass: 1/4 inch laminated safety glass.
11. Coat Rods.
12. Mirrors.

PLASTIC LAMINATE CASEWORK CONSTRUCTION
(Dimensions are minimum)

<table>
<tr><th></th><th>CORE</th><th>SURFACE</th><th>EDGE</th><th>CONSTRUCTION/ JOINERY</th><th>HARDWARE</th></tr>
<tr><td>Cabinet Boxes - Base and Wall</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>*Exposed vertical surfaces</td><td rowspan="4">All front and Sides: 3/4" Particleboard
Base bottom: 3/4" plywood
Wall top and Bottom: 3/4" Particleboard
Back: entrapped - 3/8" particleboard or 1/4" tempered hardboard</td><td>GP28</td><td rowspan="4">Finish all exposed edges (including wall cabinet top and bottom with 1mm (PVC)).</td><td rowspan="4">Join using concealed dado, dowels, assembly screws, or interlocking mechanical fasteners. Where the concealed dado or dowel method are employed, cases shall be assembled utilizing glue and pressure.</td><td rowspan="4"></td></tr>
<tr><td>*Semi-exposed parts (interior of open cabinets, not including drawer bodies)</td><td>CL20 or melamine</td></tr>
<tr><td>*Concealed surfaces</td><td>CL20 or melamine</td></tr>
<tr><td>*Panel ends</td><td>GP28</td></tr>
<tr><td>Countertops (wet areas)</td><td>1" exterior grade veneer core plywood or phenolic resin particleboard</td><td>GP50 balanced with backing sheet</td><td>3mm PVC</td><td>Apply silicone sealant to joint between HPL top and backsplash. Field joints >48" apart and >48" from end of top.</td><td></td></tr>
</table>

	CORE	SURFACE	EDGE	CONSTRUCTION/ JOINERY	HARDWARE
Countertops	1" particleboard 1" epoxy resin (science rooms)	GP50 balanced with backing sheet	GP50	Apply silicone sealant to joint between HPL top and backsplash. Field joints >48" apart and >48" from end of top.	
Cabinet Doors	3/4" particleboard	GP28 with CL20 liner on back.	3mm PVC		Heavy duty, 5 knuckle, 2-3/4" institutional type hinge (no concealed hinges).
Drawer Fronts	3/4" particleboard	GP28 with CL20 liner on back.	3mm PVC	***Dovetailed, lock shoulder or d***oweled, glued under pressure.	Wire design pulls.
Drawer Sides and Backs	1/2" particleboard or 5/8" medium density fiberboard	Melamine on all visible surfaces with drawer in normal open position.			Combination epoxy coated steel and nylon roller bearing drawer slides. Self-closing. Full extension for file drawers.
Drawer Bottoms	Fully captured Construction - Minimum thickness: 1/4". Platform construction - minimum thickness: 1/2".	Melamine panel product or particle-board.			Platform construction; must use wrap around drawer slide.
Shelves	1" particleboard	GP28	1mm PVC on front and back edges.	Multiple holes (minimum 5mm diameter at 1-1/4" O.C.).	

1.4 COMPONENTS

A. Open Casework for Coats: Open plastic laminate units with either coat rods or coat hooks and shelves or divided shelf space into smaller spaces (i.e. 12 inches ***wide*** by 72 inches ***high*** by ***12*** inches deep) for children's personal storage. Exact dimensions ***and design may*** vary depending on shape of room. ***Design should be "age appropriate". For example, lower grade classrooms could include 12 inches wide by 48 inches high by 12 inches deep "cubbies" with a 12" x 12" x 12" shelf above. A seat/shelf may be included as well. Design should be coordinated with District to meet student needs.***

B. Tall Wardrobe: Coat and personal belonging storage for staff. Cabinet should be 24 inches deep, 84 inches tall, and range from 18 to 24 inches wide. Some wardrobe units have a file drawer in bottom depending on staff needs.

C. Tall Storage: Cabinet with door in various depths and widths, and either 72 to 84 inches high. Interior configuration will vary from adjustable and fixed shelves to built-in files or tote tray bin storage depending on specific needs.

D. Mail Cubicles: Plastic laminate unit with either removable or fixed divider shelves for staff mail. Mail slots are usually about 12 to 14 inches deep, 10-1/2 to 12 inches wide, and 2 to 3 inches high.

E. Worksurface: Plastic laminate countertop with grommets and grommet holes for card access to electrical receptacles and computer ports below worksurface. Worksurface would be placed at required height for specific tasks with kneespace under it and structural supports to the floor. There would be no backsplash at a worksurface.

F. Bookcases: Plastic laminate open (no doors) 12-inch deep units in various widths and heights with adjustable shelves. Units would have a plastic laminate countertop on it.

G. Deep Tall Shelving: Plastic laminate open units (no doors) that are either 72 or 84 inches high and deeper than 12 inches. Widths will vary. Units should not be over 36 inches wide to avoid warping of shelves under weight of books.

H. Circulation Desk Casework: Plastic laminate unit (could have wood edges) designed specifically for the function of checking in and out books in a media center, reference assistance from staff to students, and work area for media center staff. Unit needs to be ADA accessible, and should include space for computers, file storage, minimal book storage, worksurface for writing, and space for the return of books. Size, shape, and specifics of this unit should be based on shape of room, size of media center, type of school, and school programs. Include grommet and grommet holes for cord access to computer ports and electrical receptacles.

I. Secretarial Workstation: Plastic laminate unit (could have wood edges) designed specifically for the function of secretarial/administrative duties. Unit needs to be ADA accessible, and should include space for computers, file storage, small personal supply storage, manual and form storage and worksurfaces for writing and telephone. 42 inches high, 10 to 12 inches deep transaction surfaces are often used. Size, shape, and specifics of this unit should be based on shape of room, size of school, and functions of staff. Include grommets and grommet holes for cord access to computer parts and electrical receptacles.

1.5 MUSIC CASEWORK

A. Cabinet Wall Panels: 3/4 inch thick industrial grade particleboard, minimum 45 pcf with thermoset polyester laminate complying with NEMA LD3-1991, GP 20 and ALA 1992 specifications standards.

B. Cabinet Shelving
1. Cabinets up to 27 inches wide: One piece high molecular blow molded polyethylene with 1-3/8 inch radius front edge or ABS surfacing thermo-formed with ribbed pattern and hair cell texture. Mount to cabinet walls with steel clip supports.
2. Robe/Uniform Storage Cabinets over 27 inches wide: Two piece high molecular blow molded polyethylene with 1-3/8 inch radius front edge or ABS surfacing thermo-formed with ribbed pattern and hair cell texture. Mount to cabinet walls with steel clip supports.
3. Instrument Storage Cabinets over 27 inches wide: Industrial (cabinet) grade particleboard, minimum 45 pcf, 3/4 inch thick with 1-1/2 inch thick front edge drop with 1-3/8 inch radius and postforming grade high pressure plastic laminate. Mount to cabinet walls with steel clip supports. Provide tubular steel support at front edge.

C. Edges: Laminate doors and leading edge of music instrument storage cabinet vertical and upper horizontal members shall have a high impact rigid PVC extrusion, 3mm in thickness. The 3mm thick edging shall be applied with hot melt adhesive, and shaped to provide radiused front edges.

D. Grille doors shall be constructed of electronically welded, .314-inch diameter heavy gauge steel perimeter and crossbrace wire, and .194-inch diameter vertical stringer wire. Five knuckle hinge and lock hasp shall be formed and welded to door frame and cross members. Lock hasp provides space for name/number plate.

E. Finish Hardware
1. Hinges, compartment doors: Two case hardened spring steel barrel hinges with .094-inch thick leaves and .25-inch diameter nonremovable pins. Through bolt to cabinet wall.
2. Hinges, full-height cabinet doors: Continuous steel hinges.
3. Locking slide bolt designed for padlocks, with strike plate; 14 gauge steel; provide clear plastic label holder for identification card insert.
4. Cabinet levelers: Four leveling glides within minimum 3/8-inch diameter threaded rod in steel corner brackets.

LEED SUGGESTIONS

2.1 The U.S. Green Building Council's - Green Building Rating System require that a minimum of 50% of wood-based materials be certified as having been obtained from forests that comply with FSC STD-01-001, FSC Principles and Criteria for Forest Stewardship, for a building to qualify for Credit MR 7. Because the percentage of certified wood-based materials is determined from the costs of the various wood-based materials, casework can have a significant effect on meeting the 50% requirement. The Certified Forest Products Council lists on its website a number of cabinet manufacturers who produce cabinets made from certified wood.

2.2 LEED Credit EQ 4.4 (low-emitting materials) that require composite wood products be made without using urea-formaldehyde binders or adhesives. Urea-formaldehyde binders are commonly used in particleboard and MDF, and urea-formaldehyde adhesive is used in hardwood plywood. Softwood plywood and hardboard do not used urea formaldehyde. Particleboard made with a phenol-formaldehyde binder, which emits far less formaldehyde than urea formaldehyde and which qualifies as an "exterior glue," is available. MDF made without urea formaldehyde is also available.

END OF SECTION

SECTION 123553

LABORATORY CASEWORK

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for plastic-laminate laboratory casework, including countertops, sinks, and service fittings.

1.2 QUALITY ASSURANCE

A. Construction shall equal or exceed that of “Educational Casework”.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Flammable Liquid Storage Cabinets: NFPA 30.

1.3 MATERIALS

A. Materials:
1. Particleboard: ANSI A 208.1, Grade M-2, made with binder containing no urea formaldehyde or straw-based particleboard complying with ANSI A 208.1, Grade M2, except for density, made with binder containing no urea formaldehyde.
2. Plastic Laminate: High pressure decorative laminate complying with NEMA LD3.
   a. Thermostet panels may be used for semi-exposed surfaces, only.
3. Edgebanding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish, 3mm thick at doors and drawer fronts, 1mm thick elsewhere.
4. Acid Storage Lining: 1/4 inch thick polypropylene, epoxy, or phenolic composite lining material.

B. Countertops
1. Materials: Epoxy resin ***or phenolic composite***, 1 inch thick minimum.

C. Sinks
1. Material: Cast epoxy resin.

D. Service Fixtures
1. Piped Service: Air, gas, vacuum, steam, hot water, cold water, and distilled water.
   a. Comply with SEFA 7, “Laboratory and Hospital Fixtures – Recommended Practices.”
      1) Comply with “Vandal-Resistant Faucets and Fixtures” recommendations in SEFA 7.
2. Power Receptacles: Comply with NEMA WD 1, NEMA WD6, and UL498. Duplex type, configuration 5 20R.
   a. Receptacle Grade: Hospital.

1.4 HARDWARE

A. Locks: Cam type, complying with BHMA A156.H, Type E07281.

B. Hinges: Stainless-steel or epoxy-coated steel 5 knuckle, complying with BHMA 156.9, Grade 1, with antifriction bearings and rounded tips.
1. Frameless concealed hinges, Type BD1602, are not acceptable.

C. Pulls: Bent metal wire of stainless steel.

D. Drawer Slides: Steel, self-closing; complying with BHMA A156.9, Type B05091.
1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Full over travel extension, ball-bearing type.

E. Adjustable Shelving Supports: Powder-coated steel shelf rests complying with BHMA A156.9, Type B04013.

F. Catches: Roller type or magnetic type.

1.5 ACCESSORIES (optional)

A. Reagent Shelves.

B. Burette Rods.

C. Upright Rod Assembly and Metal Crossbar.

D. Lattice Assembly.

E. Pegboards.

END OF SECTION

SECTION 124813

ENTRANCE FLOOR MATS AND FRAMES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for special floor surfaces at entrances including roll-up linked tread type floor mat can be either recessed or surface mounted, or entrance tiles. Are not intended to be mounted over a drainage pit.

B. There shall be a five-step or fifteen foot walk off mat at all entry points into the building. If the area cannot accommodate a fifteen foot mat, the mat should be as long as the area will accommodate.

1.2 ROLL-UP MATS

A. Recessed Mat Frames
   1. Extruded Aluminum: ASTM B 221, alloy 6063-T5.

B. Roll-Up Vinyl or Aluminum Linked Tread Floor Mat.
   1. Tread Surface: Level-cut, nylon pile carpet.

1.3 ENTRANCE TILES

A. Carpet-Type Tiles.

LEED SUGGESTIONS

2.1 Dust and dirt can be carried into buildings on people's footwear, contributing to Indoor Air Quality (IAQ) problems and reducing the durability of interior floor finishes. Comprehensive walk-off systems specifically engineered for this purpose can offer a cost effective solution.

END OF SECTION

SECTION 124816

ENTRANCE FLOOR GRILLES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for recessed foot grilles and frames.

1.2 COMPONENTS

A. Aluminum Foot Grilles
   1. Top Surface: Serrated aluminum or carpet insert.

B. Frame: Same material and finish as foot grille.

END OF SECTION

SECTION 126600

TELESCOPING STANDS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for telescoping bleachers.

1.2 DESIGN REQUIREMENTS

A. Comply with ADA Rules and Regulations, and ICC/ANSI 300-2002 Bleachers, Folding and Telescopic Seating, and Grandstands.

1.3 COMPONENTS

A. Bench seats; wood or contour plastic seating
   1. Wood Bench Bleachers
      a. Depth: 10 inches
   2. Molded Plastic Bleachers
      a. Profile: Contoured seat surface
      b. Depth: 10 inches (12 inches, option with 24 minimum row spacing)

B. Operation, provide one of the following:
   1. Manual (limit 12 rows).
   2. Automatic friction or nonfriction type integral power unit.

C. Wheelchair-Accessible Seating: Seating cutouts or retractable truncated benches. ***Refer to ADAAG 4.33.3.***

D. Deck: Plywood.

E. Safety Rails.

F. Accessories: Steps, stairs, ramps, closure panels, signage, and scorer's table.

END OF SECTION

SECTION 129100

SITE FURNISHINGS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for site furniture and fixtures.

1.2 PRODUCTS

A. Trash Receptacles: Precast concrete or metal to act as a holder for can or bag.

B. Seating: Precast concrete or metal.

C. Bicycle Racks: Steel pipe or tubing.

END OF SECTION

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DIVISION 13: SPECIAL CONSTRUCTION

134814 Sound Barriers

SECTION 134814

SOUND BARRIERS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for sound barriers.

1.2 SYSTEM DESCRIPTION

A. Acoustical Performance: Sound absorbing panels shall have a mineral rock wool sound-absorbing batt between the perforated face and solid back panel. The rock wool is to be a minimum of 1/2 inch from the surface of the perforated panel and shall fill the panel cavity and be 2 inches thick. It shall have a density of 6-lbs. per cu.ft. and conform with ASTM standard E-136. The mineral rock wool sound-absorbing material shall absorb less than 1% water, be noncorrosive, melt about 2,000 Deg.F., have a flame spread of 15 or less and a smoke development of 0 when tested in accordance with ASTM standard E-84, be rated noncombustible by ASTM standard E-136, be non-hygroscopic, and have a NRC of 1.05.

1.3 MATERIALS

A. Panels shall be fabricated from 22 to 16 gauge sheet steel conforming to the structural quality of ASTM A-446 and galvanized in accordance with ASTM A-525, Class G-90. Each panel shall have a width of 12 inches and a thickness of 2 ¾ inches or 3 ¾ inches.

B. The individual panels shall be “nested” horizontally into structural members. The panels may be installed vertically or horizontally in heights up to 12 feet before intermediate girts may be required. Interior perforated side of panel is to be galvanized. Exterior panels are to be galvanized and finished with the following coil coating. The panel system can be galvanized or a combination of galvanized and pre-coated elements depending upon customer requirements; i.e., galvanized face panel and pre-coated back tray or pre-coated face panel and galvanized back tray.

END OF SECTION

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142100 Electric Traction Elevators
142400 Hydraulic Elevators

SECTION 142100

ELECTRIC TRACTION ELEVATORS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for electric traction passenger elevators.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements
1. ASME A17.1 “Safety Code for Elevators and Escalators.”

1.3 COMPONENTS

A. Passenger Elevator Machines: Either variable-voltage, variable-frequency ac or variable-voltage dc type; with solid-state power converters.

B. Elevator Description:
1. Auxiliary Operations: Battery-powered lowering or standby powered lowering.
2. Security Features: Card-reader or keyswitch operation.
3. Car Enclosures:
a. Front Walls (Return Panels): Stainless Steel
b. Side and Rear Wall Panels: Plastic Laminate
c. Doors: Enameled Steel

C. Signal Equipment
1. Emergency communication system complying with ASME A 17.1 and the U.S. Architectural and Transportation Barriers Compliance Board’s “American with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG).”

LEED SUGGESTIONS

2.1 Energy consumption is the primary environmental concern with elevators. Careful selection of elevator type, controllers, and machines can have a significant impact on elevator energy consumption. Electric traction elevators use far less energy than hydraulic elevators. Solid-state power conversion uses less energy than the motor generators of the past, VVVF ac systems use less energy than dc systems, and regenerative systems will reduce power consumption more than non-regenerative systems. Sophisticated microprocessor operation systems can reduce energy requirements through more efficient elevator system operation and may also reduce embodied energy by requiring fewer elevators. When life-cycle costs, rather than just initial costs, for elevator systems are considered, many of these energy-saving features will prove to be cost-effective.

END OF SECTION

SECTION 142400

HYDRAULIC ELEVATORS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for hydraulic passenger elevators.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements
1. ASME A17.1 “Safety Code for Elevators and Escalators.”

1.3 COMPONENTS

A. Pump Units: Mounted on oil tank in steel enclosure or submersible pump, suspended inside tank.
1. Motor: Solid-state starting.

B. Cylinder Protection: PVC or HDPE pipe casing.

C. Signal Equipment
1. Car Control Stations: Semi-recessed or recessed type, one per car.
2. Emergency Communication System must comply with ASME A 17.1 and ADAAG.

D. Elevator Description
1. Auxiliary Operations
a. Battery-Powered Lowering.
2. Security Features: Card-reader operation or keyswitch operation.
a. Front Walls (Return Panels): Stainless steel.
b. Side and Rear Wall Panels: Enameled steel or plastic laminate.
c. Doors: Enameled steel.
d. Ceiling: Luminous ceiling.
e. Handrails: Stainless steel.

END OF SECTION

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DIVISION 21: FIRE SUPPRESSION

210501 Common Work Results for Fire Suppression
211000 Water-Based Fire-Suppression Systems

SECTION 210501

COMMON WORK RESULTS FOR FIRE SUPPRESSION

GENERAL GUIDELINES

1.1 SECTION INCLUDES QUALITATIVE REQUIREMENTS FOR:

A. Pipe and pipe fittings.

B. Dielectric fittings.

C. Mechanical sleeve seals.

D. Piping specialties.

E. Installation requirements common to piping systems and specification sections.

F. Installation requirements common to equipment specification sections.

G. Testing and repair.

H. Final completion.

I. Record drawings.

J. Maintenance and operating manuals.

K. Lubrication and packing.

L. Piping systems and equipment per NFPA, state, and local codes.

M. Requirements for a fire pump, jockey, controllers and equipment if required.

1.2 SUBMITTALS

A. Submittal data is required for dielectric fittings, flexible connectors, mechanical sleeve seals, and piping specialties.

B. Refer to specific sections of this specification for additional submittal requirements.

1.3 QUALITY ASSURANCE

A. Any manufacturer other than basis of design shall be responsible for any additional requirements for electrical service, physical space limitations, and capacities at no additional cost to the project.

B. Materials and installation shall comply with requirements of governing regulations and controlling agencies.

C. All materials used shall be first grade of their kind and shall be new and in first-class condition when installed.

D. Work done by the Contractor shall include the services of an experienced superintendent.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Piping and tubing shall include factory-applied end caps.

B. All piping and tubing shall be elevated from grade for onsite storage.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

D. Protect fire pump, jockey pump and controllers from moisture and dirt.

1.5 SEQUENCING AND SCHEDULING

A. Coordinate equipment installation with other building components.

B. Arrange for pipe spaces, chases, slots, and openings in the building structure during progress of construction.

C. Coordinate installation sleeves and supporting devices with concrete and structural components.

D. Coordinate connection of piping systems with underground and overhead utilities and services.

E. Coordinate requirements for access panels and doors.

F. Coordinate installation of identifying devices.

1.6 PROJECT CONDITIONS

A. Piping support shall only be permitted at steel joist panel points.

B. Any supplemental steel required for support between building structural members shall be the responsibility of the Div. 21 Contractor.

1.7 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 21 piping sections for pipe, tube, and fitting materials and joining methods.

1.8 JOINING MATERIALS

A. Refer to individual Division 21 piping sections for special joining materials not listed below.

1.9 DIELECTRIC FITTINGS

A. Fittings shall be zinc plated with a thermoplastic liner, rated for 250 degrees F maximum.

1.10 MECHANICAL SLEEVE SEALS

A. Seals shall be designed with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve and shall include connecting bolts and pressure plates.

1.11 PIPING SPECIALTIES

A. Piping sleeves shall be constructed of galvanized sheet metal or steel pipe. Steel pipe shall meet requirements of ASTM A 53, Type E, Grade A, Schedule 40. Sleeves for copper piping shall be of compatible material to prevent interaction of piping materials.

B. Escutcheons shall be manufactured wall, ceiling, and floor plates, split-type, and of heavy chrome-plated construction.

1.12 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Division 21 piping section specifies unique installation requirements.

B. Install components with pressure rating equal to or greater than system operating pressure.

C. Install all piping at right angles or parallel to the building walls. Diagonal runs are prohibited.

D. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for panel removal.

E. Install all piping specialties to meet manufacturer's requirements.

F. Install pipe sleeves at all wall penetrations. Provide Schedule 40 steel pipe.
   1. PVC pipe sleeves are not permitted.
   2. Do not install sleeves through structural members.

G. Maintain fire rating at fire wall penetrations through the use of approved fire sealant materials installed in pipe sleeve.

1.13 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to facilitate service, maintenance, and repair or replacement of components.

B. Maintain lubrication gaskets and packing during construction and assure that at time of acceptance by the Owner, equipment is in first-class operating condition.

1.14 EQUIPMENT START-UP

A. Start-up of all fire pump equipment shall be video-taped by the Div 21 contractor. Two DVD copies shall be turned over to the Owner's maintenance staff.

1.15 TESTING AND REPAIR

A. All piping systems shall be throughly cleaned and flushed prior to final testing.

B. Pressure testing shall be completed for the piping systems:

C. All testing must be witnessed and accurately recorded noting methods of testing, times, dates, and results.

D. Any damage as a result of tests shall be repaired or damaged materials replaced at no cost to the Owner.

1.16 FINAL COMPLETION

A. All work shall be cleaned prior to issuance of Substantial Completion.

B. Retouch or repaint factory painted prime and finish coats where scratched or damaged.

C. Deliver extra sprinkler heads as required by this Specification, to Owner and obtained signed receipts of delivery.

D. Clean equipment, restore damaged materials, and leave the Work in acceptable condition.

E. Remove all site tools, equipment, surplus materials and rubbish continuously at no additional cost to the Owner.

F. Contractor shall submit written certificates warranting each item of equipment.

1.17 RECORD DRAWINGS

A. The Contractor shall keep a running record of each change and deviation from the Drawings on a clean and undamaged set of Drawings.

B. The final Project Record Drawings shall be submitted to the Engineer for approval at the completion of the project.

C. Record Drawings shall include the location of concealed piping and ductwork.

1.18 MAINTENANCE AND OPERATING MANUALS

A. The Maintenance and Operating Manuals shall comply with other Sections of this Specification. Submit in triplicate for inclusion in Maintenance and Operating Manuals.

B. Bind the written operating instructions, approved shop drawings, equipment catalog cuts, equipment warranties, and manufacturer's instructions into a binder.

END OF SECTION

SECTION 211000

WATER-BASED FIRE SUPPRESSION SYSTEMS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for piping systems, sprinkler equipment, fire pumps, controls, tank and accessories, standpipes/hose cabinets, and double detector check valves.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and materials. Submit hydraulic calculations and drawings showing the sprinkler piping layout with the sprinkler designer's registration seal.

1.3 QUALITY ASSURANCE

A. Piping shall be installed per NFPA 13, state and local fire codes.

B. Testing of the piping shall be per NFPA 13.

C. Sprinkler heads shall be UL and FM labeled and shall be located on spacing requirements as noted in NFPA 13 according to the hazard designation. Extended coverage sprinkler heads are acceptable.

D. Fire pumps shall be UL and FM labeled.

E. Stand pipes and hose cabinets shall be provided per NFPA 14, state and local codes.

F. Backflow preventers shall meet the current requirements of ASSE 1015, ASSE 1047 and/or ASSE 1048.

1.4 PIPING SYSTEMS

A. Piping to include schedule 40 black steel and/or schedule 10 thin wall steel.

B. Grooved piping with ductile iron couplings and EPDM gasket may be used in lieu of threaded pipe.

C. An option to the final connection to the sprinkler head shall be flexible braided stainless steel hose assembly per UL, FM, and NFPA 13 requirements.

1.5 SPRINKLER EQUIPMENT

A. The types of heads shall be used in the following locations;
   1. Unfinished exposed spaces and mechanical spaces - brass heads.
   2. Finished spaces with ceilings – concealed or semi recessed heads.
   3. Finished spaces in storage rooms and janitor closets - white pendent heads.
   4. Corridors, locker/shower rooms, restrooms - concealed white head assemblies.
   5. Heads in the gym shall have wire guards.
   6. If heads are exposed in the locker/shower rooms, use a wire guard on each head.

B. Provide vane type water flow indicator with tamper switch and electronic retard.

C. Provide valve position supervisory switch for monitoring all valves.

D. Provide test station with valve and drain assembly for testing sprinkler system.

E. Provide a fire department siamese connection on the exterior of the building or a free standing siamese post for connection to the building sprinkler system.

F. Provide a wall indicator wall or post indicator valve for shutoff of the sprinkler system supply. The valve shall be supervised with a tamper switch.

1.6 FIRE PUMPS, CONTROLS, AND ACCESSORIES

A. Provide a UL labeled fire pump, controls and accessories.

B. The fire pump shall be [vertical turbine] [horizontal split case] [vertical in line] fire pump.

C. Power to the pump shall be [limited service electric motor] [shaft coupled diesel engine].

D. Controls shall be for a limited service motor.

E. A transfer switch shall be provided if there is more than one power supply feeding the fire pump.

F. The jockey pump shall be provided to pressurize the piping system for detection of a head activating by a fire or by a trouble condition.

G. In the case of a condition where a local water supply must be provided, a tank or tanks shall be installed to provide an adequate amount of water to fight a fire based on NFPA 13 requirements for the flow rate and duration based on the hazard designation. Types of tanks shall include concrete or fiberglass. Level controls shall be installed in the tank to maintain the water level and indicate an alarm for an inadequate water supply.

1.7 STANDPIPES/HOSE CABINETS

A. Cabinets on the stage shall be surface mounted.

1.8 DOUBLE DETECTOR CHECK VALVES

A. The double detector check valve assembly shall consist of two spring loaded double check valves, with a cast iron body with epoxy lining or stainless steel body UL and FM approved. Provide a detector water meter if required by the local fire authority. Provide inlet and outlet resilient seated O.S. & Y. gate valves. Provide bypass piping with test cocks. Provide inlet and outlet pressure gauges.

1.9 INSTALLATION

A. Piping shall be installed from approved hangers located at steel joist panel points.

B. When required by inadequate water pressure and flow conditions, furnish and install the fire pump, jockey pump, controls, transfer switch and required piping.

C. Piping in gymnasiums shall be above the bottom chords of the roof structure.

D. Heads in the corridors shall be centered between the corridor walls. All others heads in the finished spaces with ceilings shall be located within 6 inches of the ceiling grid.

E. Install double detector check assembly with water meter on the incoming water supply to the sprinkler system.

F. Clean pipe to prevent MIC (microbially influenced corrosion).

END OF SECTION

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PLUMBING

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221323	Grease/Oil/Acid Interceptors
221413	Storm Piping System
221500	Compressed Air System
223100	Domestic Water Softener Equipment
223200	Domestic Water Filtration Equipment
223400	Domestic Water Heating Systems
224000	Plumbing Fixtures
226313	Gas Piping Systems

SECTION 220501

COMMON WORK RESULTS FOR PLUMBING

GENERAL GUIDELINES

1.1 SECTION INCLUDES QUALITATIVE REQUIREMENTS FOR:

A. Pipe and pipe fittings.

B. Dielectric fittings.

C. Mechanical sleeve seals.

D. Piping specialties.

E. Installation requirements common to piping systems and specification sections.

F. Installation requirements common to equipment specification sections.

G. Testing and repair.

H. Final completion.

I. Record drawings.

J. Maintenance and operating manuals.

K. Lubrication and packing.

1.2 SUBMITTALS

A. Submittal data is required for dielectric fittings, flexible connectors, mechanical sleeve seals, and piping specialties.

B. Refer to specific sections of this specification for additional submittal requirements.

1.3 QUALITY ASSURANCE

A. Any manufacturer other than basis of design shall be responsible for any additional requirements for electrical service, physical space limitations, and capacities at no additional cost to the project.

B. Materials and installation shall comply with requirements of governing regulations and controlling agencies.

C. All materials used shall be first grade of their kind and shall be new and in first-class condition when installed.

D. Work done by the Contractor shall include the services of an experienced superintendent.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Piping and tubing shall include factory-applied end caps.

B. All piping, tubing, and equipment shall be elevated from grade for on-site storage.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

D. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.5 SEQUENCING AND SCHEDULING

A. Coordinate mechanical equipment installation with other building components.

B. Arrange for pipe spaces, chases, slots, and openings in the building structure during progress of construction.

C. Coordinate installation sleeves and supporting devices with concrete and structural components.

D. Coordinate connection of plumbing systems with underground and overhead utilities and services.

E. Coordinate requirements for access panels and doors.

F. Coordinate installation of identifying devices.

1.6 PROJECT CONDITIONS

A. Piping support shall only be permitted at steel joist panel points unless noted otherwise.

B. Any supplemental steel required for support between building structural members shall be the responsibility of the Plumbing Contractor.

1.7 PIPE AND PIPE FITTINGS

A. Pipe threads shall meet ASME B1.20.1 for factory-threaded pipe and pipe fittings.

B. Pipe-flange gasket materials shall meet ASME B16.21, nonmetallic, flat, asbestos-free.

C. Pipe Flanges
1. Full face shall be Class 125, cast iron and cast-bronze material.
2. Narrow face shall be Class 250, cast-iron and cast steel material.

D. Flange bolts and nuts shall meet ASME B18.2.1.

E. Solder filler materials shall meet ASTM B 32.
1. Alloy Sn95 and Sn94 shall be used.

F. Brazing filler materials shall meet AWS A5.8.

G. Welding filler metals shall comply with AWS D10.12.

H. Solvent materials shall meet standard solvent cement requirements.
   1. PVC piping shall meet ASTM D 2564. Include primer according to ASTM F 656.
   2. Plastic pipe seals shall meet ASTM F 477
   3. Flanged, ductile-iron gasket, bolts, and nuts shall meet AWWA C 110.

1.8 DIELECTRIC FITTINGS

A. Fittings shall be zinc plated with a thermoplastic liner, rated for 250 degrees F maximum.

1.9 MECHANICAL SLEEVE SEALS

A. Seals shall be designed with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve and shall include connecting bolts and pressure plates.

1.10 PIPING SPECIALTIES

A. Piping sleeves shall be constructed of galvanized sheet metal or steel pipe. Steel pipe shall meet requirements of ASTM A 53, Type E, Grade A, Schedule 40. Sleeves for copper piping shall be of compatible material to prevent interaction of piping materials.

B. Escutcheons shall be manufactured wall, ceiling, and floor plates, split-type, and of heavy chrome-plated construction.

1.11 PLUMBING PIPING SYSTEMS - COMMON REQUIREMENTS

A. Division 22 piping sections specify unique installation requirements.

B. Install components with pressure rating equal to or greater than system operating pressure.

C. Install all piping at right angles or parallel to the building walls. Diagonal runs are prohibited.

D. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for panel removal.

E. Install all piping specialties to meet manufacturer's requirements.

F. Install pipe sleeves at all wall penetrations. Provide Schedule 40 steel pipe.
   1. PVC pipe sleeves are not permitted.
   2. Do not install sleeves through structural members.

G. Maintain fire rating at fire wall penetrations through the use of approved fire sealant materials installed in pipe sleeve.

H. Install unions in piping 2 inch and smaller adjacent to each valve and at final connection to each piece of equipment.

I. Install flanges in piping 2-1/2 inch and larger adjacent to flanged valves and at final connections to equipment with flanged pipe connections.

1.12 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to facilitate service, maintenance, and repair or replacement of components.

B. Maintain lubrication gaskets and packing during construction and assure that at time of acceptance by the Owner, equipment is in first-class operating condition.

1.13 EQUIPMENT START-UP

A. Start-up of all plumbing equipment shall be video-recorded by the plumbing contractor. Two DVD copies shall be turned over to the Owner's maintenance staff.

1.14 TESTING AND REPAIR

A. All piping and ductwork systems shall be throughly cleaned and flushed prior to final testing.

B. Pressure testing shall be completed for the following piping systems:
1. Domestic water, sanitary and vent, storm and gas piping systems, and other systems as noted on the plans.

D. All testing must be witnessed and accurately recorded noting methods of testing, times, dates, and results.

E. Any damage as a result of tests shall be repaired or damaged materials replaced at no cost to the Owner.

1.15 FINAL COMPLETION

A. All work shall be cleaned prior to issuance of Substantial Completion.

B. Retouch or repaint factory painted prime and finish coats where scratched or damaged.

C. Deliver any equipment as required by this Specification to Owner and obtained signed receipts of delivery.

D. Clean equipment, restore damaged materials, and leave the Work in acceptable condition.

E. Remove all site tools, equipment, surplus materials and rubbish continuously at no additional cost to the Owner.

F. Contractor shall submit written certificates warranting each item of equipment.

1.16 RECORD DRAWINGS

A. The Contractor shall keep a running record of each change and deviation from the Drawings on a clean and undamaged set of Drawings.

B. The final Project Record Drawings shall be submitted to the Engineer for approval at the completion of the project.

C. Record Drawings shall include the location of all piping systems.

1.17 MAINTENANCE AND OPERATING MANUALS

A. The Maintenance and Operating Manuals shall comply with other Sections of this Specification. Submit in triplicate for inclusion in Maintenance and Operating Manuals.

B. Bind the written operating instructions, approved shop drawings, equipment catalog cuts, equipment warranties, and manufacturer's instructions into a binder.

END OF SECTION

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SECTION 220519

METERS AND GAGES FOR PLUMBING PIPING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for thermometers and fittings, as well as pressure gauges and fittings.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 COMPONENTS

A. Thermometers: 1-percent accuracy.
   1. Liquid-in-Glass Type: Organic filled 9 inch long industrial type.
   2. Direct-Mounting Filled-System Dial Type: Vapor actuated, thermal bulb, precision brass gear.
   3. Remote-Reading, Filled-System Dial Type: Vapor actuated, thermal bulb; precision brass gear.
   4. Bimetal Dial Type: Direct mounting, bimetal coil.
   5. Insertion Dial Type: Bimetal coil.

B. Pressure Gauges: Phosphor-bronze Bourdon-tube gages, 1-percent accuracy.
   1. Vacuum Range: 30 inches Hg of vacuum to 15 psig of pressure .
   2. Pressure Range: Two-times operating pressure.

1.4 INSTALLATION

A. Provide thermometers at the following locations:
   1. Inlet and outlet domestic water heaters.
   2. Outlet of the hot water storage tank.
   3. Inlet and outlet hot water at the main thermostatic mixing valve.
   4. Domestic circulation pump outlet.

B. Provide pressure gauges at the following locations:
   1. Outlet piping of each water heater with 200 MBH input or greater.
   2. Inlet and outlet of the main reduced pressure backflow preventer.

END OF SECTION

SECTION 220533

ELECTRIC SELF-REGULATING HOT WATER TEMPERATURE MAINTENANCE CABLE

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for hot water maintenance cable.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. Follow manufacturer's requirements for installation.

B. Cable shall be UL listed, CSA certified and FM approved.

C. Cable system shall conform to ANSI/IEEE Standard 515.1.

D. Cables designed for freeze protection of water lines will not be allowed.

1.4 WARRANTY

A. Cable – Minimum 10 year warranty.

B. Follow manufacturer's installation and testing requirements.

1.5 MAINTENANCE CABLE

A. The self-regulating cable shall consist of (2) nickel-coated copper bus wires embedded in a radiation cross-linked conductive polymer core. The cable shall be capable of varying its heat output along its entire length to maintain the water in the selected temperature range.

B. Provide electronic controller for temperature control and energy savings.

1.6 INSTALLATION

A. Refer to the manufacturer's hot water temperature maintenance design guide for design details, insulation requirements, maximum circuit lengths, and accessory information.

B. The cable shall not be installed in a concealed space.

END OF SECTION

SECTION 221116

DOMESTIC WATER PIPING SYSTEM

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for domestic water piping.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. Follow manufacturer's requirements for installation.

B. Welding procedures per ANSI/ASME Section 9, AWS D10.9 and D1.1 and the National Certified Pipe Welding Bureau.

C. Brazing procedures per ANSI B31.5 and the ASME Boiler and Pressure Vessel Code SFA-5.8, Section II.

D. Soldering procedures per ANSI B16.18.

E. Comply with ANSI B31 pressure code for pressure piping.

1.4 PLUMBING PIPING

A. Domestic water piping (hot water, cold water, hot water return) shall be type L copper conforming to ASTM B88. Fittings shall be wrought copper conforming to ANSI B16.22.
   1. Grooved copper piping with ductile iron or bronze couplings and EPDM gasket may be used as an option.
   2. Copper press fittings may be used as an option per ASTM B16.18 or ASTM B16.22. O-Rings shall be EPDM.

B. An option to A. for domestic hot and cold water shall be as follows:
   1. Cross linked polyethylene (PEX) plastic tubing per ASTM F876,F877. Installed in a conduit or sleeve***, if under slab.***
   2. Polypropylene Schedule SDR 7.4 and ***SDR*** 11 meeting NSF14, 61 and 51. Piping shall also meet ASTM F2389 and Plumbing Code Chapter 605. Piping installed in air plenums shall have a Foil Wrap to meet the 25/50 smoke and fire ratings for plenum spaces. Follow manufacturer's instructions for installation and hanger requirements. Verify expansion requirements.

1.5 INSTALLATION

A. Provide pipe and tube of type, joint type, size and weight (wall thickness or class) indicated for cold water, hot water, and hot water return.

END OF SECTION

SECTION 221119

DOMESTIC WATER PIPING SPECIALITIES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for vacuum breakers, backflow preventers, plumbing thermostatic mixing valves, strainers, outlet boxes, hose bibbs, wall hydrants, water hammer arresters, trap-seal primer systems, domestic hot water return balancing device (manual), and clothes washer connection.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. Vacuum breaker wall hydrants and freeze resistant wall hydrants shall meet ASSE Standard 1019.

B. Provide backflow prevention devices wherever possible sources of undesirable materials are connected to the potable water system.

C. The backflow prevention devices shall meet the standards set by the American Society of Sanitary Engineers and the latest edition of the Plumbing Code and air gap standards under American National Standards Institute A112.1.2-1943(1979).

D. The backflow prevention devices shall be approved for use by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California.

E. Atmospheric vacuum breaker per ANSI/ASTM 1020.

F. Hose connection vacuum breaker per ASSE 1011 and CSA B64.2.

G. Reduced pressure vacuum breaker per ASSE 1013, AWWA C511, CSA B64.5.

H. Pressure type backflow preventer per ANSI/ASSE 1035.

I. Dual check valve per ANSI/ASSE 1024, CSA B64.6.

J. Thermostatic mixing valves shall meet the Ohio Plumbing Code and the requirements of ASSE 1017.

K. Strainers shall meet NSF 61 and ASTM B 62.

L. Hose bibbs and wall hydrants shall meet ASSE 1019.

M. Water hammer arresters shall meet ANSI/ASME A112.26.1M and ASSE 1010.

N. Trap seal primers shall meet ASSE 1018.

O. Clothes washer connection shall meet ANSI/ASSE 1035.

P. Emergency mixing valves shall meet ANSI 2.358.1-1998.

1.4 COMPONENTS

A. Atmospheric vacuum breaker shall have brass body, stainless steel working parts, integral strainer, rubber discs, maximum pressure, maximum 175 psi operation, unions.

B. Hose connection vacuum breaker shall have ¾ inch female hose inlet connection, ¾ inch male outlet connection, non-removal feature, plain brass finish.

C. Reduced pressure backflow preventer shall have fused epoxy coated cast iron check valve body and relief valve, replaceable bronze seats, bronze ball check valve test cocks, maximum 175 psi operation, stainless steel internal parts, air gap connection for relief piping to drain.

D. Pressure type backflow preventer shall have atmospheric vent, all brass construction, in-line continuous operation, maximum 125 psi operation.

E. Dual check valve shall have straight line poppet type check modules, replaceable seats, brass construction.

F. Water Hammer Arresters: Shall be the stainless steel bellow type.

G. Balancing devices shall be bronze with adjustable control.

H. Domestic hot water anti-scald thermostatic mixing control valve unit shall include swivel action check stops, removable cartridge with strainer, stainless steel piston and liquid fill thermal motor with bellows element mounted out of water. The mixing valve shall control the domestic hot water temperature distributed throughout the building. The mixing valve shall have a thermostatic sensing unit. The mixing valve shall fail to the cold water side. Flow rate shall determine whether a single valve shall be required or a high/low valve with pressure reducing valves is required to provide the correct temperature at the minimum and maximum hot water flow in the building.

I. Strainers: Shall be bronze threaded, flanged, or soldered.

J. Outboxes: Shall be recessed with pressure backflow preventer.

K. Hose bibbs and Wall Hydrants: Shall be recessed or surface with vacuum breakers.

L. Exterior Wall Hydrants: Shall be non-freeze, self-draining with copper/bronze construction with recessed wall box with loose key.

M. Clothes Washer Connection Box and Refrigerator Supply: Metal recessed box complete with hot and/or cold water shut-off valves and drain connection.

N. Emergency thermostatic mixing valve: shall be liquid or bi-metal thermostats, cold water bypass, high limit stop, locked temperature regulator.

1.5 INSTALLATION

A. Provide vacuum breakers on all threaded hose bibb connections.

B. Install reduced pressure principle backflow preventer in irrigation and incoming domestic water service.

C. Install pressure type vacuum breakers in lines under continuous pressure and at least 12 inches above the highest outlet downstream of the unit.

D. Provide drain line from reduced pressure backflow preventer discharge outlet; extend to nearest drain.

E. Units shall be installed in strict accordance with manufacturer's written instructions.

F. Test each backflow device and submit test data.

G. Provide thermostatic mixing valves to regulate the hot water temperature to a fixture.

H. Provide a recessed washer box ***at*** each domestic clothes washer.

I. Provide a recessed box to supply water to each refrigerator.

J. Wall hydrants with hose connections shall be provided in the mechanical room and boiler room.

K. Provide a water hammer arrestor at each solenoid valves or piece of equipment that has a quick closing type valve. Water hammer arrester for down-feed risers to be at top of riser. Size shock absorber according to fixture unit count. Provide shock absorbers at each group of water closets and urinals. Shock absorber shall be easily accessible for repair or replacement.

L. Provide trap seal primers on all floor drains to prevent trap seals from drying up.

M. Provide emergency thermostatic mixing valve with inlet and outlet thermometers to regulate tempered water to the emergency eye wash and/or showers.

END OF SECTION

SECTION 221123

PLUMBING PUMPS AND ACCESSORIES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for recirculation pumps and water pressure booster pump system.

1.2 SUBMITTALS

A. Submittals are required and shall include capacities, warranties, product data noting materials, sizes, and dimensions.

B. Pressure booster system panel shall be UL listed and labeled.

1.3 QUALITY ASSURANCE

A. Each pump shall be capable of providing the scheduled flow in gpm and head required.

B. Pump motors shall be high efficiency type.

C. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

1.4 RECIRCULATION PUMPS

A. The pump shall be all bronze, horizontal in line, oil lubricated, and 125 psi working pressure.

B. Aquastat with voltage thermostat shall start/stop pump or start/stop by the temperature control system.

1.5 WATER PRESSURE BOOSTER PUMP SYSTEM

A. The pump system shall consist of two pumps providing a constant water pressure to the piping system. The control system shall provide alternation of the pumps, on/off operation and an alarm system.

B. Provide expansion pressure tank with a bladder insert for storage capacity required, sized accordingly to meet flow requirements.

1.6 INSTALLATION

A. Provide the correct gpm, head and voltage required.
   1. Inlet piping shall consist of a line size valve and strainer. Outlet piping shall consist of a line size check valve and valve.
   2. The pump shall be supported by the inlet and outlet piping.

B. Pressure Booster System
   1. Install the pressure booster pump system according to the manufacturer's recommendations. Provide inlet and outlet piping and valves. Install the expansion tank with size as required.

END OF SECTION

SECTION 221316

SANITARY PIPING SYSTEM

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for sanitary piping and vent, as well as acid waste piping and vent.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. Follow manufacturer's requirements for installation.

B. Obtain list of Owner's chemicals to review against pipe material chemical resistance chart for acid waste piping.

1.4 SANITARY AND VENT PIPING

A. Sanitary and vent piping materials below slab

1. Schedule 40 PVC with solvent joints per ASTM D2665, D2564, D2665.
2. Cast iron hub and spigot per ASTM A74 and C 564.

B. Sanitary and vent piping above finish floor.

1. Schedule 40 PVC with solvent joints per ASTM D2665, D2564, D2665.
2. Cast iron no hub and fittings per ASTM.

C. Sanitary and vent piping above ceiling in plenum space

1. Cast iron no hub and fittings per ASTM.
2. PVC piping is not permitted in a return air plenum or in a chase exposed to the plenum.

D. Acid waste piping below slab and above slab.

1. Schedule 40 polypropylene per ASTM D4101 and ASTM 3311.
2. Schedule 40 CPVC with solvent joints per ASTM D1784, F493, F441, D3311, and NSF Standard 14.

E. Acid waste piping in plenum space and chases open to plenums

1. Schedule 40 polyvinylidene fluoride per ASTM D3222 or glass per ASTM C1053-90.

F. Underground waste and vent piping in kitchen space.

1. Cast iron hub and spigot.

1.5 INSTALLATION

A. Terminate vent piping through roof, a minimum of 12 inches above the roof.

B. Location of vent on the roof shall be a minimum of 20 feet from any rooftop or wall louver outside air intake or rooftop HVAC equipment outside air intake.

END OF SECTION

SECTION 221323

GREASE/OIL/ACID INTERCEPTORS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for grease interceptors, solids interceptors, clay traps, and acid waste neutralizing sumps.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. Grease interceptors, solid interceptors, and clay traps shall meet the latest edition of PDI Seal of Approval and Ohio Plumbing Code.

B. Acid sump shall meet Ohio Plumbing Code.

1.4 GREASE INTERCEPTORS

A. The interceptor shall be a minimum of 500 gallons, constructed of concrete, cast iron, or fiberglass. Verify size with local health authority.

B. Provide cleanouts at each end of the tank with access up to grade.

C. Provide access to grade, using a 2'-0" diameter concrete collar with a cast iron frame and lid, 4 inches above finish grade.

1.5 SOLIDS INTERCEPTORS

A. Interceptors shall be acid resistant coated fabricated steel, heavy duty cover. Provide extension to finish floor as required.

1.6 CLAY TRAPS

A. Clay trap shall be acid resistant coated fabricated steel, stainless steel mesh screen basket, gasketed cover.

1.7 ACID NEUTRALIZING SUMP

A. Tank shall be polypropylene or HDPE with bolt down gasketed lid, inlet and outlet piping, vent, flanged connections.

B. Provide access to grade, using a 5'-0" diameter concrete or corrugated metal collar with a cast iron frame and lid in a 6 inch thick reinforced concrete cover, 4 inches above finish grade.

C. A single 5 gallon sump can be specified for a single sink requiring acid neutralization.

1.8 GREASE INTERCEPTORS

A. Provide a minimum of 2'-0" cover over the tank.

B. Set tank on a 6 inch bed of compacted granular material. Backfill around the tank to within 12 inches of grade with compacted granular material.

C. The interceptor shall be located on the exterior of the building, 10'-0" minimum distance from the building.

D. Do not locate the interceptor in a drive area without providing adequate support over the tank.

E. Vent the interceptor into the building, up through the roof.

1.9 SOLIDS INTERCEPTORS

A. Piping invert under the floor to the tank will determine if an extension of the interceptor will be required to meet finish floor elevation.

B. Provide adequate clearance above the lid for cleaning and basket removal.

C. The interceptor can be located on or in the floor slab.

D. Provide access to the lid for cleaning.

1.10 CLAY TRAPS

A. Provide adequate clearance above the lid for cleaning and basket removal.

B. If the trap is installed within the casework, set on floor inside the base cabinet. Adjust the outlet piping extending to the wall to meet the invert.

C. Cleaning of the trap shall not constitute removal of the trap.

D. Piping connections shall have unions.

1.11 ACID NEUTRALIZING SUMP

A. Set basin on a 6 inch concrete slab, with the diameter the same as the outside diameter of the collar.

B. Provide stone around the basin, to just below the lid.

C. The access lid shall allow the removal of the basin lid. Size accordingly.

D. The lid and frame shall be set in a 6 inch concrete lid, 12 inches in diameter larger than the collar.

E. Fill the sump with water and the required amount of limestone chip, with size as recommended by the manufacturer.

F. Piping connections to the tank shall be flanged.

G. The sump shall be located on the exterior of the building, 10'-0" minimum distance from the building.

H. Do not locate the interceptor in a drive area without providing adequate support over the tank.

I. Vent the acid sump into the building, up through the roof.

1.12 SINGLE AND NEUTRALIZING SUMP (1 sink)

A. Provide adequate clearance above the lid for cleaning and basket removal.

B. If the trap is installed within the casework, set on floor inside the base cabinet. Adjust the outlet piping extending to the wall to meet the invert.

C. Cleaning of the sump shall not constitute removal of the trap.

D. Fill sump with water and limestone chips.

E. Piping connections shall have unions.

END OF SECTION

SECTION 221413

STORM PIPING SYSTEM

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for storm piping.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. Follow manufacturer's requirements for installation.

1.4 STORM PIPING

A. Storm piping materials below slab
   1. Schedule 40 PVC with solvent joints per ASTM D2665, D2564, D2665.
   2. Cast iron hub and spigot per ASTM A74 and C 564.

B. Storm piping above finish floor.
   1. Schedule 40 PVC with solvent joints per ASTM D2665, D2564, D2665.
   2. Cast iron no hub and fittings per ASTM.

C. Storm piping above ceiling in plenum space
   1. Cast iron no hub and fittings per ASTM.
   2. PVC piping is not permitted in a return air plenum or in a chase exposed to the plenum.

1.5 INSTALLATION

A. Connect to roof drains and/or secondary roof drains as required.

END OF SECTION

SECTION 221500

COMPRESSED AIR SYSTEM

GENERAL GUIDELINES

1.1 SECTION INCLUDES
A. Qualitative requirements for compressed air piping, compressor, regulator, and air dryer.

1.2 SUBMITTALS
A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE
A. Follow manufacturer's requirements for installation.

B. Comply with ANSI B31 pressure code for pressure piping.

1.4 COMPRESSED AIR PIPING
A. Compressed air piping shall be galvanized steel, schedule 40, per ASTM A53. Fittings shall be threaded, class 150 per ASME A733 and B1.20.1.

1.5 AIR COMPRESSOR
A. Provide single or two stage air compressor as required by air pressure requirements.

B. Provide vibration isolation.

C. Consider noise factor as to where compressor is placed.

D. Provide ASME constructed air tank.

E. Provide air cooled after cooler.

F. Provide inlet and outlet valves, unions, and flexible connections.

1.6 AIR REGULATOR
A. Provide quick disconnect hoses.

B. Provide valve to each drop.

1.7 AIR DRYER
A. Provide air dryer to match air compressor CFM.

B. Provide refrigerated unit with high temperature inlet capabilities.

C. Provide inlet and outlet valves, unions, and flexible connections.

1.8 INSTALLATION
A. Branch air connection shall connect to the top of the air main.

B. Provide proper CFM air regulator to match system use.

END OF SECTION

SECTION 223100

DOMESTIC WATER SOFTENER EQUIPMENT

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for the water softener system.

1.2 SUBMITTALS

A. Submittals are required and shall include product data, noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. The water softener shall meet with the approval of the OEPA when installed in association with a water well.

B. The softener shall be sized to meet the requirements concerning the amount of water to be softened between regenerations based on the grains hardness.

1.4 WATER SOFTENER SYSTEM

A. The tank shall be fiberglass, rated for 100 psi working pressure.

B. The backwash distributor shall be of the radial hub design.

C. The control valve shall initiate regeneration, backwash, rinse, brine draw and brine tank refill. Initiation of the regeneration sequence shall be by a volumetric water meter coupled to a timer control, preset at a specific gallons used. The timer will not let the regeneration begin until a preset time.

D. The mineral tank will be provided with a correct amount of resin, having a minimum exchange rate of 30,000 grains when regenerated with 15 lbs of salt per cubic foot.

E. A hardness test kit shall be included with the softener.

1.5 INSTALLATION

A. Provide and install the softener complete with inlet and outlet valves and unions, and bypass piping around the inlet and outlet connections.

B. Install sampling tees/valves in inlet and outlet piping to the mineral tank for testing the water.

END OF SECTION

SECTION 223200

DOMESTIC WATER FILTRATION EQUIPMENT

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Quantitative requirements for the iron filter system.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. The iron filter system shall meet with the approval of the OEPA when used in conjunction with a water well.

B. The iron filter shall be sized to meet the requirements concerning the amount of water to be filtered between regenerations based on the iron content.

C. The iron filter system shall remove all ferrous, ferric or bacterial iron from the incoming water supply without the use of chemicals.

1.4 IRON FILTER SYSTEM

A. The main service valve shall be diaphragm operated. No raw water bypass is allowed. If controller maintenance is required, the system will remain in service.

B. An automatic flow controller shall be provided to maintain backwash and rinse rates over variable operating pressures.

C. A factory assembled cycle controller shall incorporate an adjustable time switch with multi-ported pilot valve to control all steps of automatic regeneration with provisions for manual regeneration.

D. The muti-ported pilot control valve shall automatically pressure activate the main operating service/backwash valves through the steps of regeneration and return to service. In the event of a power failure, a complete regeneration can be performed by manual operation of the pilot valve.

E. The electrical time clock shall be adjustable to initiate regeneration at any time of the day and any number of days in a minimum of a 12 day period.

F. The mineral shall require no chemical regeneration. Periodic regeneration shall only be required.

G. The air induction system to introduce oxygen into the water for the oxidation process shall be of the venturi type. Forced air injection is not acceptable.

H. Attrition loss of mineral shall not exceed 3 to 5 percent per year.

I. The distribution shall be factory installed with a washed quartz gravel bed.

1.5 INSTALLATION

A. Install all equipment and associated piping and valves.

B. Install sampling tees/valves in the inlet and outlet piping to the mineral tank for testing the water.

C. Provide bypass piping around the inlet and outlet connections.

END OF SECTION

SECTION 223400

DOMESTIC WATER ***HEATING SYSTEMS***

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for instantaneous gas fired water heaters, hot water storage tanks, electric booster heater, tank type under fired heaters, and combination power vented heaters installed in a common tank.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. Gas units shall meet CSA requirements.

B. Units must meet ASHRAE 90.1, ADDM 90 1 b.

C. The gas heater shall be ASME certified for 125 psi operation and National Board listed.

D. Heater shall be rated at a minimum of 82 percent thermal efficiency.

1.4 WARRANTY

A. Water heater heat exchanger - 5 year.

B. Storage tank - 5 year limited.

C. Booster heater - 3 year limited.

D. Combination heat exchanger/storage tank – 5 year.

E. Gas-fired units shall have sealed combustion.

1.5 INSTANTANEOUS GAS FIRED WATER HEATER

A. Two pass copper fin tubes.

B. Cast iron headers.

C. Built-in draft diverter.

D. Insulated jacket.

E. ASME temperature and pressure relief valves.

F. Electronic controls.

G. Integral bronze circulation pump.

H. Flow switch.

I. Electronic ignition.

J. Cupro nickel heat exchanger.

1.6 HOT WATER STORAGE TANKS

A. Vertical storage tank.

B. Glass lining.

C. ASME constructed.

D. Insulated.

E. 150 psi work pressure.

D. Inlet and outlet piping.

1.7 COMBINATION 2 HEATERS AND STORAGE TANK

A. Vertical storage tank.

B. Polymer-lined tank.

C. ASME constructed.

D. Insulated.

E. 150 psi working pressure.

F. Inlet and outlet piping.

G. Submerged combustion heat exchangers.

H. Electronic flame safeguard.

1.8 ELECTRIC BOOSTER HEATERS

A. The tank construction shall have a 150 psi working pressure. The interior of the tank shall be glass lined. The jacket surrounding the tank shall be stainless steel front with baked enamel sides and back with 6 inch adjustable legs

B. The control circuit shall consist of a pilot switch with indicator light, built in thermostat and hi-limit, and magnetic contactors.

C. Heater elements shall be copper-sheathed, furnished with 4 bolt flange for disassembly without removing the booster head.

D. Provide ASME temperature and pressure relief valve, temperature and pressure gauge.

1.9 TANK TYPE UNDER FIRED HEATER

A. Multi-flue design.

B. Working pressure - 150 psi.

C. Glass lined.

D. ASME constructed.

E. Insulated with minimum 2 inch foam insulation.

F. Heavy jacket.

G. Vent damper control.

H. Spark ignition.

1.10 HEAT MAINTENANCE CABLE

A. Wrap piping with self-regulating cable to maintain temperature in piping.

B. Provide controller for adjusting temperature and night and weekend set back.

C. Provide cable temperature to match intended service.

D. The cable shall meet a 10-year limited warranty period.

E. Install with correct thickness of insulation.

F. Follow manufacturer's installation instructions.

1.11 INSTANTANEOUS ELECTRIC WATER HEATER

A. Use heater for one or multiple sinks and lavatories.

B. Install heater(s) above ceiling or away from student access.

C. Size per GPM requirements.

D. Verify water quality concerning excessive buildup of minerals on interior heating surfaces.

E. Provide thermostatic mixing valve if required.

1.12 INSTALLATION

A. The heater shall be designed to produce the required gallons per hour at the temperature required based on the Btu input.

B. Where two or more heaters are shown, pipe for equal flow through the heaters. Provide unions and shutoff valves at each heater connection.

C. Follow manufacturer's recommendations for installation, space requirements, and piping sizing.

D. Provide temperature and pressure gauge in the upper 1/3 portion of the tank.

E. The booster heater shall boost the 140 degree water to 180 degrees for the dishwasher final rinse.

E. Time of day control shall be provided to disable domestic water heater system when building is unoccupied.

END OF SECTION

SECTION 224000

PLUMBING FIXTURES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for plumbing fixtures and plumbing specialties.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes and dimensions.

1.3 QUALITY ASSURANCE

A. Meet requirements of the current Plumbing Code.

B. Water closets shall meet ANSI A112.19.1M. Trim shall meet ANSI A112.19.5.

C. Urinal shall meet ANSI 2124.4, ASME A112.19.2M, and ASME A112.19.6. Trim shall meet ANSI A112.19.5. The optional waterless urinal shall meet ASTM A112.19.2M and A-117.1 and 1APMO 1 GC 161-2000 and ANSI Z124.9-94.

D. Lavatories shall meet ANSI A112.19.1M and Z 124.3.

E. Drinking water coolers shall meet ANSI A112.19.2M.

F. Sink shall meet ANSI A112.19.1M and A112.19.2M.

G. Sinks shall meet ANSI A112.19.1M and A112.19.2M.

H. All fixtures shall meet the governmental regulations for low-flow operation.

I. Drinking fountains shall meet ASME A112.19.1, A112.19.2, or A112.19.9, and ANSI 117.1.

J. Drinking water coolers shall meet ARI 1010 and ANSI 117.1.

1.4 PLUMBING FIXTURES AND SPECIALTIES

A. Water closets shall be wall mounted, white vitreous china with white seat and flush valve. Water closets for kindergarten students can be floor mounted. Automatic/battery or direct wired flush valve is optional.

B. Urinals shall be white vitreous china with flush valve. Automatic/battery or direct wired flush valve is optional. An option to the urinal with flush valve shall be the waterless type vitreous china urinal with a removable ABS plastic trap.

C. Lavatories shall be wall hung, white vitreous china with hot and cold blade handle faucet on 4 inch centers. An option to the lever handles shall include commercial grade single lever faucets with a ceramic disc. An option to the lever handle faucet shall be a battery or hardwired infrared faucet.

D. Showers shall be pressure balancing, single lever with vandal resistant shower head.

E. Drinking water coolers and fountains shall be wall mounted and shall meet ADA requirements.

F. Sinks shall be 302 or 304 stainless steel, single, double, or triple compartment with faucet with hot and cold blade handles and swing spout. An option to the lever handles shall include commercial grade single lever faucets with a ceramic disc.

G. Science lab sinks shall be acid resistant for high school applications. Provide acid resistant strainer and tailpiece. Science casework contractor shall provide sink and trim.

H. Service sinks shall be floor mounted molded stone, 10 A high, 24" x 24", 3" outlet and a wall faucet with pail hook and vacuum breaker.

I. Washfountains shall be terrazzo or stainless steel or modified acrylic (complying with ANSI 2124.3 and ANSI 2124.6) with infrared sensing for water activation, ADA accessible, and floor or wall mounted.

J. Emergency eye wash shall be wall mounted, ADA accessible and set at ADA height. Also provide supply from thermostatic mixing valve per ANSI Z358.1, latest edition.

K. Emergency shower shall have a 10 inch diameter shower head, vertical or horizontal supply and have a ADA accessible handle. Also provide supply from thermostatic mixing valve per ANSI Z358.1, latest edition.

1.5 PLUMBING FIXTURES AND SPECIALTIES (cont.)

O. Provide a stainless steel, wall mounted drinking fountain for exterior installations. Unit shall be freezeproof, have push button activation and be ADA accessible. Mount to the exterior building wall.

1.6 INSTALLATION

A. Lavatories, water closets, and urinals shall have carriers attached to the floor.

B. All fixtures and trim so noted for handicap installation shall meet ADA requirements.

C. Clay trap installation for an ADA sink shall not interfere with the space requirements under the sink. Locate next to the sink casework.

D. The power transformer for the washfountain shall be a plug-in type located within the housing of the washfountain, and plugged into a duplex receptacle.

END OF SECTION

SECTION 226313

GAS PIPING SYSTEMS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for natural gas piping, gas valves, and gas regulators.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, performance ratings, and installation instructions.

1.3 QUALITY ASSURANCE

A. Conformance to National Fuel Gas Code.

B. Material and installation requirements shall follow NFPA 54, state and local gas company codes.

C. Conformance to ANSI B31.

D. Gas regulators shall be AGA rated.

1.4 GAS PIPING

A. Gas piping shall be schedule 40 black steel piping.

B. Gas piping installed external to the building from the service main to the gas meter shall be as per the gas company requirements.

C. Final connection from the building gas piping system to the gas turret in the science room can be corrugated stainless steel tubing per NFPA 54, state and local gas company requirements.

1.5 GAS VALVES

A. Gas valves 2 inches and smaller shall be full port all brass screwed gas service stops with lever handles and check.
1. (option) Gas valves 2” and smaller may be ¼ turn ball valves.

B. Gas valves 2-1/2 inches and larger shall be semi-steel, straightway flanged, 125 pounds swp, square head wrench operated, lubricated plug valve.

C. Kitchen Hood – Spring loaded (N.C.) gas valve or manual reset electric solenoid valve.

D. In the science and art rooms, provide the following:
1. A manual reset, solenoid operated shut-off valve with 120v operation with remote push button operation and fire alarm system activation.

1.6 GAS REGULATORS

A. Gas regulators shall be die cast aluminum alloy diaphragm, external vent connection, interchangeable brass orifices, cast iron body, Buna-N with nylon fabric insert diaphragm.

1.7 INSTALLATION

A. Unions and valves are not permitted in the gas piping in a return air plenum.

B. Piping 1-1/2 inches and smaller shall have threaded joints.

C. Piping 2 inches and larger shall have welded joints.

D. All regulators shall be separately vented full size to the exterior, with a turndown elbow and insect screen. Vent outlet shall not terminate next to a combustion or fresh air intake.

E. Provide a valve, union, and dirt leg at connection to each appliance. Lubricate all valves before putting the valves into service.

F. Provide 1/2 inch elastomeric insulation around all piping in walls and through floors.

G. Test all gas piping per NFPA 54.

H. Gas piping shall be accessible.

I. Science room auto shut-off valves can be located in teacher's demo unit, under sink, or exposed in storage room.

END OF SECTION

DIVISION 23

HEATING, VENTILATING, and AIR CONDITIONING

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SECTION 230501

COMMON WORK RESULTS FOR HVAC

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES QUALITATIVE REQUIREMENTS FOR:

A. Pipe and pipe fittings.

B. Dielectric fittings.

C. Mechanical sleeve seals.

D. Piping specialties.

E. Installation requirements common to piping systems and specification sections.

F. Installation requirements common to equipment specification sections.

G. Testing and repair.

H. Final completion.

I. Record drawings.

J. Maintenance and operating manuals.

K. Lubrication and packing.

1.2 SUBMITTALS

A. Submittal data is required for dielectric fittings, flexible connectors, mechanical sleeve seals, and piping specialties.

B. Refer to specific sections of this specification for additional submittal requirements.

1.3 QUALITY ASSURANCE

A. Any manufacturer other than basis of design shall be responsible for any additional requirements for electrical service, physical space limitations, and capacities at no additional cost to the project.

B. Materials and installation shall comply with requirements of governing regulations and controlling agencies.

C. All materials used shall be first grade of their kind and shall be new and in first-class condition when installed.

D. Work done by the Contractor shall include the services of an experienced superintendent.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Piping and tubing shall include factory-applied end caps.

B. All piping and tubing shall be elevated from grade for onsite storage.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

D. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.5 SEQUENCING AND SCHEDULING

A. Coordinate mechanical equipment installation with other building components.

B. Arrange for pipe spaces, chases, slots, and openings in the building structure during progress of construction.

C. Coordinate installation sleeves and supporting devices with concrete and structural components.

D. Coordinate connection of mechanical systems with underground and overhead utilities and services.

E. Coordinate requirements for access panels and doors.

F. Coordinate installation of identifying devices.

1.6 PROJECT CONDITIONS

A. HVAC support shall only be permitted at steel joist panel points.

B. Any supplemental steel required for support between building structural members shall be the responsibility of the HVAC Contractor.

1.7 PIPE AND PIPE FITTINGS

A. Pipe threads shall meet ASME B1.20.1 for factory-threaded pipe and pipe fittings.

B. Pipe-flange gasket materials shall meet ASME B16.21, nonmetallic, flat, asbestos-free.

C. Pipe Flanges
1. Full face shall be Class 125, cast iron and cast-bronze material.
2. Narrow face shall be Class 250, cast-iron and cast steel material.

D. Flange bolts and nuts shall meet ASME B18.2.1.

E. Solder filler materials shall meet ASTM B 32.
1. Alloy Sn95 and Sn94 shall be used.

F. Brazing filler materials shall meet AWS A5.8.

G. Welding filler metals shall comply with AWS D10.12.

H. Solvent materials shall meet standard solvent cement requirements.
1. CPVC piping shall meet ASTM F 493.
2. PVC piping shall meet ASTM D 2564. Include primer according to ASTM F 656.
3. Plastic pipe seals shall meet ASTM F 477
4. Flanged, ductile-iron gasket, bolts, and nuts shall meet AWWA C 110.

1.8 DIELECTRIC FITTINGS

A. Fittings shall be zinc plated with a thermoplastic liner, rated for 250 degrees F maximum.

1.9 MECHANICAL SLEEVE SEALS

A. Seals shall be designed with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve and shall include connecting bolts and pressure plates.

1.10 PIPING SPECIALTIES

A. Piping sleeves shall be constructed of galvanized sheet metal or steel pipe. Steel pipe shall meet requirements of ASTM A 53, Type E, Grade A, Schedule 40. Sleeves for copper piping shall be of compatible material to prevent interaction of piping materials.

B. Escutcheons shall be manufactured wall, ceiling, and floor plates, split-type, and of heavy chrome-plated construction.

1.11 HVAC PIPING SYSTEMS - COMMON REQUIREMENTS

A. Division 23 piping/ductwork sections specify unique installation requirements.

B. Install components with pressure rating equal to or greater than system operating pressure.

C. Install all piping and ductwork at right angles or parallel to the building walls. Diagonal runs are prohibited.

D. Install piping and ductwork tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for panel removal.

E. Install all piping specialties to meet manufacturer's requirements.

F. Install pipe sleeves at all wall penetrations. Provide Schedule 40 steel pipe.
1. PVC pipe sleeves are not permitted.
2. Do not install sleeves through structural members.

G. Maintain fire rating at fire wall penetrations through the use of approved fire sealant materials installed in pipe sleeve.

H. Install unions in piping 2 inch and smaller adjacent to each valve and at final connection to each piece of equipment.

I. Install flanges in piping 2-1/2 inch and larger adjacent to flanged valves and at final connections to equipment with flanged pipe connections.

1.12 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to facilitate service, maintenance, and repair or replacement of components.

B. Maintain lubrication gaskets and packing during construction and assure that at time of acceptance by the Owner, equipment is in first-class operating condition.

1.13 EQUIPMENT START-UP

A. Start-up of all HVAC equipment shall be video-taped by the HVAC contractor. Two copies shall be turned over to the Owner's maintenance staff.

1.14 TESTING AND REPAIR

A. All piping and ductwork systems shall be throughly cleaned and flushed prior to final testing.

B. Supply, return, and exhaust air ductwork systems shall be pressure tested to a minimum leakage rate.

C. Pressure testing shall be completed for the following piping systems:
1. Heating water, chilled water, heat pump condenser loop water, and cooling tower condenser water systems.

D. All testing must be witnessed and accurately recorded noting methods of testing, times, dates, and results.

E. Any damage as a result of tests shall be repaired or damaged materials replaced at no cost to the Owner.

1.15 FINAL COMPLETION

A. All work shall be cleaned prior to issuance of Substantial Completion.

B. Retouch or repaint factory painted prime and finish coats where scratched or damaged.

C. Deliver filters, belts, and equipment, as required by this Specification, to Owner and obtained signed receipts of delivery.

D. Clean equipment, restore damaged materials, and leave the Work in acceptable condition.

E. Remove all site tools, equipment, surplus materials and rubbish continuously at no additional cost to the Owner.

F. Contractor shall submit written certificates warranting each item of equipment.

1.16 RECORD DRAWINGS

A. The Contractor shall keep a running record of each change and deviation from the Drawings on a clean and undamaged set of Drawings.

B. The final Project Record Drawings shall be submitted to the Engineer for approval at the completion of the project.

C. Record Drawings shall include the location of concealed piping and ductwork.

1.17 MAINTENANCE AND OPERATING MANUALS

A. The Maintenance and Operating Manuals shall comply with other Sections of this Specification. Submit in triplicate for inclusion in Maintenance and Operating Manuals.

B. Bind the written operating instructions, approved shop drawings, equipment catalog cuts, equipment warranties, and manufacturer's instructions into a binder.

END OF SECTION

SECTION 230507

HVAC PIPING

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for HVAC piping.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. Follow manufacturer's requirements for installation.

B. Welding procedures per ANSI/ASME Section 9, AWS D10.9 and D1.1 and the National Certified Pipe Welding Bureau.

C. Brazing procedures per ANSI B31.5 and the ASME Boiler and Pressure Vessel Code SFA-5.8, Section II.

D. Soldering procedures per ANSI B16.18.

E. Comply with ANSI B31 pressure code for pressure piping.

1.4 HVAC PIPING

A. Heating, Chilled, Cooling Tower Condenser, and Heat Pump Condenser Water Supply and Return Piping
   1. Black steel piping
      a. Piping shall be standard weight black steel for 2-1/2 inch and smaller per ASTM A53 or A120. Fittings shall be class 125 cast iron threaded per ANSI B16.4.
      b. Piping shall be standard weight black steel for 3 inch and larger per ASTM A53 or A120. Fittings shall be butt welded.
   2. Copper piping
      a. Piping 2-1/2 inches and smaller shall be type L copper per ASTM B88. Fittings shall be wrought copper per ANSI B16.22.
   3. Grooved piping (option)
      a. Grooved piping with ductile iron or bronze couplings and EPDM gaskets.
      b. Copper and steel pipe shall be as listed above.
   4. Copper press fittings may be used as an option per ASTM B16.18 or ASTM B16.22. O-Rings shall be EPDM.
   5. Underground piping
      a. Piping shall be pre-insulated piping system with copper or steel pressure carrier pipe, polyurethane insulation and PVC jacket.
      b. Piping system shall include o-ring seals and expansion compensation.
      c. Piping system shall incorporate thrust blocks and other accessories as recommended by system manufacturer.

B. Underground, Ground Source Heat Pump System Piping
   1. High density polyethylene piping
      a. Material classification per ASTM D-1248.

C. Air Conditioning Condensate Drain Piping
   1. Piping shall be Schedule 40 PVC with solvent joints per ASTM D2665, D2564, D2665.
   2. In air plenums and through fire walls, Piping shall be type L copper per ASTM B88. Fittings shall be wrought copper per ANSI B16.22

1.5 INSTALLATION

A. Terminate vent piping through roof, a minimum of 12 inches above the roof.

B. Refer to Section 232500 HVAC Water Treatment for flushing, cleaning, and water treatment requirements.

C. All piping on site must be capped and sealed from contamination and debris throughout the construction cycle.

END OF SECTION

SECTION 230514

VARIABLE FREQUENCY DRIVES

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for electronic variable frequency drive with motor starter.

1.2 SUBMITTALS

A. Submittals are required and shall include product descriptive literature demonstrating compliance with written specification and, at a minimum, shall include the following:
   1. Inverter efficiency and power factor curves.
   2. Performance curves.
   3. Substantiating data for Mean Time Between Failure (MTBF).

1.3 QUALITY ASSURANCE

A. Variable frequency drives shall comply with applicable requirements of the latest standards of ANSI, IEEE, NEMA, and NEC.

B. Each drive shall be UL Listed.

C. Drives used throughout a project site shall be provided by the same manufacturer for all applications (fans and pumps).

D. Audible motor drive noise shall be no more than 5 db louder than across line starter operation.

1.4 WARRANTY/TRAINING

A. Manufacturer shall warrant complete drive system for a period of 1 year.

B. A factory trained representative shall provide a minimum of 8 hours on-site training to Owner selected personnel on the operation and maintenance of each drive installed.

1.5 ELECTRONIC REQUIREMENTS

A. Each drive shall be microprocessor based, fully transistorized with 3 phase, full wave diode bridge input, and pulse-width-modulating sine-coded output waveform.

B. Output transistors shall be of the Insulated Gate Bipolar Transistor (IGBT) type.

C. Minimum 20 years MTBF required.

D. Maximum switching frequency of 15 KHZ.

E. Displacement power factor shall be 0.98 or better over the entire operating frequency and load range.

1.6 PROTECTIVE FEATURES

A. Drive enclosure shall be NEMA 1 and shall be wall-mount or free standing as indicated on the Drawings.

B. Controlled acceleration and deceleration shall be adjustable from 3 to 600 seconds. Current limits shall prevent overflow trips.

C. Minimum switching frequency shall be adjustable from 0 to 100 percent of base frequency.

D. Maximum switching frequency shall be adjustable from 110 to 0 percent of base frequency.

E. Automatic boost for 100 percent starting torque.

F. Hand-off-auto switch mounted in front door of mounting enclosure.

G. Fault contact for remote indication.

H. Contact closure for remote indication that drive is operating.

I. Automatic restart on fault that is programmable for 0 to 5 restarts.

J. Minimum of 2 critical frequency avoidance points with programmable deadband.

K. Output signal for motor speed shall be 0 to 10 vdc or 4-20 milliamp.

L. Output voltage regulation.

M. Continued operation of drive at 80 percent of last speed reference input if control command is lost.

1.7 OPERATION PROTECTION

A. Current limit control for protection against normal transients and surges from incoming power lines, grounding systems, or runaway incoming speed reference signal.

B. Protection from phase-to-phase and phase-to-ground faults.

C. Torque limit control.

D. Capabilities to start into a spinning load and windmilling operation.

E. Instantaneous overcurrent trip to monitor peak currents and provide shutdown without component failure.

F. Input line reactors with a minimum of 3 percent rating on all incoming phase lines.

G. DC link choke to reduce current and voltage harmonics reflected to the AC power supply.

1.8 OPERATING CONDITIONS

A. Unit shall comply to the following operating conditions:
   1. Line voltage: +10 percent, -10 percent of rating.
   2. Line frequency: + or - 5 percent
   3. Overload: 100 percent
   4. Ambient temperature: 0 degrees to 40 degrees C.
   5. Altitude: 3,300 feet or less
   6. Atmosphere: 95 percent relative humidity, noncondensing
   7. Efficiency: 97 percent at 100 percent load, 100 percent base speed. 80 percent at 12.5 percent load, 80 percent speed.
   8. Fundamental power factor shall be 0.98 at all speeds and loads.

B. Digital operator/keypad is required and shall include the following features:
   1. Motor speed indication, in RPM, percent speed, or frequency (Hz)
   2. Speed reference signal
   3. Alpha-numeric fault trip annunciation
   4. Output current
   5. Output power
   6. Output voltage
   7. Bus voltage

C. Indicator lights as follows:
   1. Power on light
   2. Run light
   3. VFD trip light
   4. External fault light

1.9 INSTALLATION

A. Install in accordance with manufacturers requirements.

B. A factory authorized and trained technician shall preform the initial startup on all drives.

END OF SECTION

SECTION 230519

THERMOMETERS AND GAUGES FOR HVAC EQUIPMENT

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for thermometers and fittings, as well as pressure gauges and fittings.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 COMPONENTS

A. Thermometers: 1-percent accuracy.
   1. Direct-Mounting Filled-System Dial Type: Vapor actuated, thermal bulb, precision brass gear.
   2. Remote-Reading, Filled-System Dial Type: Vapor actuated, thermal bulb; precision brass gear.
   3. Bimetal Dial Type: Direct mounting, bimetal coil.
   4. Insertion Dial Type: Bimetal coil.
   5. Non-toxic, organic filled liquid-in-glass, column type thermometer.

B. Pressure Gauges: Phosphor-bronze Bourdon-tube gages, 1-percent accuracy.
   1. Vacuum Range: 30 inches Hg of vacuum to 15 psig of pressure .
   2. Pressure Range: Two-times operating pressure.
   3. Liquid filled pressure gauge where appropriate. ***Liquid shall be non-toxic, organic type.***

1.4 INSTALLATION

A. Provide thermometers at the following locations:
   1. Inlet and outlet chilled water connection to chillers
   2. Inlet and outlet heating water connections to boilers.
   3. Heating water, heat pump condenser loop, and chilled water supply and return loop to and from the building if primary/secondary pumping is used or if a 3-way valve is used to reset the building heating water temperature.
   4. At all coil connections at main air handling units.
   5. Condenser water supply and return piping.
   6. Heat exchanger inlet and outlet piping.

B. Provide pressure gauges at the following locations:
   1. One pressure gauge with 2 independent needle valves piped to the suction and discharge piping of all pumps except coil recirculating pumps.
   2. Inlet and outlet piping of each chiller.
   3. Outlet piping of each boiler unless integral to the boiler.
   4. Domestic cold water fill connection to the HVAC hydronic loop downstream of the pressure reducing valve.

END OF SECTION

SECTION 230523

GENERAL DUTY VALVES FOR HVAC PIPING

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for valves.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting type materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. The following standards apply.
   1. ANSI B16.10, MSS SP-67-90 Butterfly Valves.
   2. MSS SP-70-90 Cast Iron Gate Valves, Flanged or Threaded Ends.
   3. MSS SP-78-92 Cast Iron Plug Valves Flanged and Threaded.
   4. MSS SP-80-87 Bronze Gate, Globe, and Check Valves.
   5. MSS SP-85-85 Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.
   6. MSS SP-110-92 Ball Valves Threaded, Socket-Welded, Solder Joint, Grooved and Flared Ends.

1.4 COMPONENTS

A. Gate Valves
   1. 2-1/2 Inch NPS and Smaller: Cast-iron body with threaded connections for steel piping systems. Bronze body with soldered or threaded connections for copper piping systems, solid-bronze wedge, Class 125 or 150, rising stem, and soldered or threaded connections.
   2. 3 Inch NPS and Larger: Cast-iron body and bonnet, Class 125, solid cast-iron wedge, outside screw and yoke, and flanged connections.

B. Ball Valves
   1. Bronze body and bonnet, two-piece construction, chrome-plated ball, standard port for 2-1/2 inch NPS and smaller and full port for 3 inch NPS valves, Class 150, with stem extensions for insulated piping and memory stops.

C. Globe Valves
   1. 2-1/2 Inch NPS and Smaller: Cast-bronze body and bonnet, Class 125 or 150, with threaded or soldered connections.
   2. 3 Inch NPS and Larger: Cast-bronze body and bonnet, Class 125, outside screw and yoke, with flanged connections.

D. Butterfly Valves: Cast-iron body and bonnet, Class 250, 200 psig working pressure, stainless-steel stem; lug, or grooved style connections. (For HVAC systems only)
   1. Disc Type: [Aluminum bronze] [stainless steel]
   2. Operator:
      a. Standard lever handle.
      b. Standard lever handle with memory stop.
      c. Lever handle with latch lock.
      d. Gear with position indicator.
      e. Gear with position indicator and chain wheel.
      f. Chain wheel.

E. Check Valves
   1. Swing Type, 2-1/2 Inch NPS and Smaller: Bronze body, Class 125 or 150, horizontal swing, with threaded or soldered connections.
   2. Swing Type, 3 Inch NPS and Larger: Cast-iron body, Class 125, horizontal swing, with flanged or grooved connections.
      a. Wafer Type: Class 125, cast-iron body, bronze disc, with stainless-steel pins and springs.
      b. Lift Type: Class 125, bronze body and cap, horizontal or vertical pattern, bronze disc, with threaded or soldered connections.

1.5 INSTALLATION

A. Install all threaded valves with a union joint on the downstream side of the valve.

B. Provide valves to isolate all equipment and coils.

C. Provide valves of like material as the piping systems.

D. Provide dielectric connections between all dissimilar metals.

END OF SECTION

SECTION 230525

ROOF CURBS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for roof curbs for equipment mounting and piping penetrations.

1.2 SUBMITTALS

A. Submittals are required and shall include material, quantities, and dimensions.

1.3 COMPONENTS

A. Roof Curbs

1. Roof curb shall be constructed of galvanized steel with welded corner beams and pressure treated 2 by 2 wood nailer.
2. Curbs shall be preinsulated with 1-1/2 inch rigid insulation.
3. Top of curb shall set dead level.
4. Base of curb shall match roof slope.
5. Provide 18 inches for kitchen hood exhaust fans.

B. Box Curb

1. Box section curbs shall be constructed of welded, heavy gauge galvanized steel with mitered and welded corners, integral base plate, and pressure treated wood nailer.
2. Curb shall be insulated with minimum 1-1/2 inch rigid insulation.

C. Equipment Support

1. Rails shall be 18 gauge welded galvanized steel with a welded galvanized counterflashing. Unit to have integral base plate, and 2 by 4 pressure treated wood nailer.
2. Rails to be of the length and strength required to support the specified equipment.
3. Equipment rails shall be internally reinforced to conform with manufacturers load bearing factors.

D. Pipe Roller Supports

1. Pipe support shall be constructed from heavy gauge galvanized steel with continuous welded corner seams, 2 by 4 treated wood nailer, galvanized steel counterflashing and galvanized steel channel track.

E. Pipe Curbs

1. Pipe curb shall consist of a heavy gauge galvanized steel roof curb of unitized construction, with integral base plate, 3 pound density insulation, and 2 by 2 nailer. Curb shall be covered with a thermoplastic cover, fastening screws, graduated step boots with stainless steel adjustable clamps.

1.4 INSTALLATION

A. Roof curbs and equipment rails shall be mounted with top dead level, properly anchored to the deck.

B. Roof curbs for metal roof systems shall be provided by the metal roof system manufacturer.

END OF SECTION

SECTION 230529

HANGERS AND SUPPORTS FOR HVAC

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for piping hangers and supports, and equipment hangers and supports.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and types.

1.3 COMPONENTS

A. Hangers, supports, and components shall be factory fabricated according to MSS SP-58, the latest edition.

B. Hangers for piping shall be of a compatible material or coating.

C. Continuous threaded rod shall be used wherever possible. ***An engineered cable support system is acceptable.*** Chain, wire, or perforated straps shall not be permitted.

D. Concrete inserts into poured concrete floor systems are permitted.

E. Beam clamps, trapeze hangers, and clevis hangers shall be permitted.

F. Supports from roof decking systems are not permitted.

G. Concrete inserts into precast concrete plank are permitted.

H. Powder activated fasteners are not allowed.

1.4 INSTALLATION

A. All hangers and supports shall be attached to the building structural steel system.

B. Support from steel joist panel point is required.

C. All hangers, supports, and fastening methods used shall be suitable for the weight of the components being supported.

END OF SECTION

SECTION 230548

VIBRATION and SEISMIC CONTROL for HVAC

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for vibration isolators, equipment bases, and flexible connectors.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting calculations, materials, sizes, and dimensions.

1.3 COMPONENTS

A. Vibration isolators as follows:
   1. Isolator Pads: Oil- and water-resistant [rubber] [fiberglass or cork].
   2. Rubber Isolator Mounts: Double-deflection type.
   3. Spring Isolators: Freestanding, laterally stable, open-spring type.
   4. Restrained Spring Isolators: Vertically restrained, freestanding, laterally stable, steel open-spring type.
   5. Rubber Hangers: Double-deflection type.
   6. Spring Hangers: Combination spring and elastomeric hangers with coil spring and elastomeric insert in compression.

B. Equipment bases as follows:
   1. Concrete filled, steel constructed inertia bases.
   2. Structural steel bases without inertia pad.

C. Flexible piping connectors as follows:
   1. Molded reinforced neoprene construction with steel flanges and control rods.
   2. Flexible steel braided construction with steel flanges.

1.4 INSTALLATION

A. Installation of vibration isolation, piping connections, and inertia bases shall be in accordance with the manufacturer's recommendation.

B. Rigid connections between vibrating equipment and the building shall not be permitted.

END OF SECTION

SECTION 230553

IDENTIFICATION FOR HVAC

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for HVAC identification methods, materials and devices.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and dimensions for identification systems.

B. Submittals are required of valve schedules.

1.3 QUALITY ASSURANCE

A. Identification requirements shall meet ASME A13.1.

1.4 COMPONENTS

A. Equipment Nameplates: Aluminum, permanently fastened to equipment, engraved or stamped.

B. Stencils: Standard stencils shall be black enamel on a white background or white enamel on a dark background.

C. Snap-on Plastic Pipe Markers: Preprinted, semi-rigid type, color-coded.

D. Pressure-Sensitive Pipe Markers: Preprinted, color-coded, vinyl type with permanent adhesive.

E. Pipe Markers: Full band type.

F. Plastic Duct Markers: Laminated plastic, color coded, and engraved with the service.

G. Plastic Tape: Color-coded, pressure-sensitive, self-adhesive vinyl.

H. Valve Tags: Polished tags with numbers and letters.

I. Access Panel Markers: Engraved plastic laminate.

J. Engraved Plastic-Laminate Signs: Sizes required to contain message.

K. Plastic Equipment Markers: Standard color-coded, laminated plastic.

L. Plasticize Tags: Preprinted, accident prevention.

M. Valve Location Tags: 3/4 inch diameter colored, pressure-sensitive adhesive paper circles.

1.5 VALVE CHARTS

A. Valve charts shall be furnished by each respective Contractor and shall include the following items:
   1. Valve identification
   2. Location
   3. Purpose

B. Valve charts shall be included in the Maintenance and Operating Manuals.

1.6 INSTALLATION

A. Piping, equipment and valve identification shall be completed prior to issuance of Substantial Completion.

END OF SECTION

SECTION 230593

TESTING, ADJUSTING, AND BALANCING FOR HVAC

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for the testing, adjusting, and balancing of the HVAC air and water systems; includes the performing contractor's certification requirements.

1.2 SUBMITTALS

A. Submittals are required and shall include the complete certified report for all air and water system pressure testing and balancing including all electrical performance of each piece of HVAC equipment.

B. Prior to commencement of the work described in this Section, the testing, adjusting, and balancing contractor shall submit verification of his AABC or NEBB certification to the Design Professional for acceptance.

1.3 QUALITY ASSURANCE

A. The testing, adjusting, and balancing contractor shall be either AABC or NEBB certified for the work described herein.

B. Project will be Commissioned. Refer to section 9101-01900 for additional information.

1.4 COMPONENTS

A. The Contractor shall provide his own properly calibrated equipment to pressure test, air balance, water balance and to measure electrical characteristics of each piece of HVAC equipment. ***Include a list of instruments to be used for procedures, along with Proof of Calibration.***

1.5 REQUIREMENTS

A. Testing, adjusting, and balancing plan.

B. Systems readiness checks.

C. Testing, Adjusting, and Balancing Procedures: AABC's National Standards or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems".

D. Equipment settings marked to show final settings.

E. Balancing shall be performed to meet the requirements of ASHRAE Standard 90.1.

F. Pumps with variable speed drives shall be balanced with all valves 100% open (not including balancing valves at coils).

G. For variable speed fans, fan and motor pulleys shall be replaced (or adjusted, when applicable) so that motor is fully loaded at 100% speed. Balance to design air flow by adjusting maximum variable speed drive output below 100%.

1.6 HVAC SYSTEMS AIRFLOW AND WATER FLOW RATE TOLERANCES

A. Supply, Return, and Exhaust Fans: Plus 5 percent to plus 10 percent.

B. Air Outlets and Inlets: 0 to minus 10 percent.

C. Heating Water Flow Rate: 0 to minus 10 percent.

D. Cooling Water Flow Rate: 0 to minus 5 percent.

1.7 REPORTING

A. Initial Construction Phase Report: Based on examination of Contract Documents, on adequacy of design for systems balancing devices.

B. Status Reports: As Work progresses.

C. Draft "Pencil Copy" Report: Provide draft air balance report when the balancing is complete to the Engineer and Commissioning Authority for review before final report.

D. Commissioning Verification Report: Commissioning Authority will randomly verify TAB work and produce report. TAB Contractor shall make corrections based on this report.

E. Final Report: Certification sheet, with content and format according to AABC or NEBB standard forms.

F. Seasonal Testing: If initial TAB procedures were not performed during near peak summer and winter conditions, perform additional testing, inspecting, and adjusting during near peak summer or winter conditions.

G. 11 month Warranty Walk: TAB to perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to report unusual conditions with recommendation of adjustments. TAB Contractor shall allow two (2) days for this work.

END OF SECTION

SECTION 230719

HVAC INSULATION

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for interior and exterior pipe insulation, jackets, and accessories.

B. Qualitative requirements for field-applied insulation on hot and cold equipment surfaces.

C. Qualitative requirements for exterior and interior duct and plenum insulation and accessories.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, thickness for each service or piece of equipment, aged thermal qualities, and accessories.

1.3 QUALITY ASSURANCE

A. Fire performance characteristics in accordance with ASTM E 84 for flame spread of 25 and smoke developed of 50.

B. Materials and installation in accordance with NFPA 255 and UL 723.

C. Insulation thickness shall meet the requirements of ASHRAE Standard 90.1.

1.4 MATERIALS

A. Glass Fiber: All-purpose jacket and vapor-barrier coated.

1.	Preformed:	ASTM C 547, Class I, rigid, jacketed, and vapor-coated.
2.	Board:	ASTM C 612, Type 2, rigid and semi-rigid.
3.	Blanket:	ASTM C 553, Type II, Class F-1.
4.	Adhesive:	UL classification; nonflammable.
5.	Maximum “K” Value:	0.23 at 75 degrees F.

B. Cellular Glass: Insulation with factory-applied, laminated-foil, flame-retardant, vinyl facing.

1.	Piping:	Preformed foamed or cellulated glass, jacketed pipe insulation.
2.	Facing:	ASTM C 921, Type 1.
3.	Blocks:	ASTM C 552, Type I.
4.	Boards:	ASTM C 552, Type IV.
5.	Special Shapes:	ASTM C 552, Type III.
6.	Maximum “K” Value:	0.35 at 75 degrees F.

C. Flexible Elastomeric Cellular: Flexible cellular elastomeric material, molded or sheet.
1. Preformed: ASTM C534, Type II ***for sheet materal and Type I for tubular material.***
2. Adhesive: Waterproof vapor retarder.
3. Maximum "K" Value: ***0.25*** at 75 degrees F.

D. Calcium Silicate
1. Piping: Rigid molded block insulation, asbestos free ASTM C553, Type I.
2. Maximum "K" Value: 0.40 at 300 degrees F.

E. Duct Liner Insulation
1. Material: Flexible blanket, ASTM C518 ***or elastomeric linear per ASTM C534.***
2. Coating: ASTM C1071. Microbial growth resistant.
3. Adhesive: UL listed waterproof.
4. Fasteners: Galvanized steel pins (welded or mechanically fastened) ***with adhesive.***
5. Maximum "K" Value: 0.25 at 75 degrees F.
6. Standards: NFPA 90A, NFPA 90B and 25/50 flame and smoke spread.

F. Insulating Cements
1. Mineral fiber, hydraulic-setting insulating and finishing cement.
2. Expanded or exfoliated vermiculite.

G. Adhesives: MIL-A-3316C, Classes 1 and 2, Grade A ***for fiberglass. MIL-A-24179A, Type II, Class 1 for elastomerics.***

H. Jackets shall be adjusted for the application.
1. Piping: PVC or aluminum
2. Equipment: Foil and paper.
3. Ductwork: Foil and paper.

I. Polyisocyanurate: Rigid closed cell polyisocyanurate thermal insulation, fabricated into shapes required to insulate pipes, valves, fittings, vessels, and/or special shapes as required.
1. Density: 2 lb/cf
2. Permeance: Less than or equal to 3 perm-inch
3. Provide with a vapor retardant cross laminated high density polyvinylidene chloride polymer film.
4. Material shall not contain or be produced with any of the U.S. EPA regulated CFC compounds listed in the Montreal Protocol of the United Nations Environmental Program.

1.5 APPLICATIONS
A. Exposed Interior Piping Systems
1. Hydronic heating water
2. Hydronic chilled water
3. Hydronic heat pump condenser loop water
4. Condensate drain
5. Refrigerant suction and hot gas bypass

B. Concealed Interior Piping Systems
   1. Hydronic heating water
   2. Hydronic chilled water
   3. Hydronic heat pump condenser loop water
   4. Condensate drain
   5. Refrigerant suction and hot gas bypass

C. Exposed Exterior Piping Systems
   1. Refrigerant suction and hot gas bypass
   2. Hydronic chilled water
   3. Hydronic heating water

D. Concealed Exterior Piping Systems
   1. Refrigerant suction and hot gas bypass
   2. Hydronic chilled water
   3. Hydronic heating water

E. Concealed Piping Systems in Crawl Spaces or Other Moist Environments:
   1. Polyisocyanurate insulation required for cold services (chilled water) where 25/50 smoke/flame rating is not required, unless specific product is rated for such.

F. Indoor Equipment
   1. Chilled water equipment, tanks, pumps, and heat exchangers.
   2. Following items are not insulated:
      a. Factory-insulated plenums, casings, terminal boxes, and filter boxes and sections.
      b. Flexible connectors.
      c. Vibration control devices.
      d. Testing laboratory labels and stamps.
      e. Nameplates and data plates.
      f. Access panels and doors in air distribution systems.
      g. Factory insulated equipment such as boilers.

G. Ductwork Systems
   1. Interior concealed supply, return, and outside air ductwork.
   2. Interior exposed supply, return, and outside air ductwork.
   3. Exterior exposed supply and return ductwork.
   4. Kitchen range hood supply air ductwork.
   5. Items not insulated as a part of the Specification Section
      a. Metal ducts with duct liner.
      b. Factory-insulated flexible ducts.
      c. Factory-insulated plenums, casings, terminal boxes, and filter boxes and sections.
      d. Flexible connectors.
      e. Vibration control devices.
      f. Testing laboratory labels and stamps.
      g. Nameplates and data plates.
      h. Access panels and doors in air distribution systems.

H. Insulation Jacketing Systems
   1. Provide protective jacketing for all exposed pipe systems located in mechanical rooms, boiler rooms, and storage rooms.
   2. Provide protective jacketing for all exterior pipe systems.
   3. Provide protective jacketing for all exposed ductwork installations.

1.6 EXAMINATION AND PREPARATION

A. Leak test piping and ductwork system before installing insulation systems.

1.7 INSTALLATION

A. Install material in accordance with manufacturer's recommendations and in conformance with building codes and industry standards.

B. A continuous vapor barrier is required.

C. Provide proper support at piping hanger systems.

D. Insulate valves and fittings in cold water systems.

E. Ductwork insulation shall be wrapped in lieu of liner for all applications except for specific sound attenuation means.

F. All insulation shall be applied so that there is no fiberglass exposed to the air stream without filters downstream. All fiberglass insulation, including all exposed edges, shall be coated, or mylar or other suitable material shall be provided between fiberglass and the air stream. ***Elastomeric duct liner does not require coating or mylar.***

END OF SECTION

SECTION 230923

HVAC DIRECT DIGITAL CONTROLS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for control equipment for HVAC systems and components, software requirements, and installation requirements for a complete HVAC direct digital control (DDC) electronic temperature control system.

1.2 SUBMITTALS

A. Submittals are required and shall include product descriptive literature demonstrating compliance with written specification and, at a minimum, shall include the following:
   1. Equipment and component specifications.
   2. Software capabilities and operation.
   3. Graphics capabilities and proposed solutions.

1.3 QUALITY ASSURANCE

A. Electric components shall be UL Listed.

B. Damper components shall comply with AMCA 500.

C. Energy management components shall comply with NEMA EMCI.

D. Enclosures shall comply with NEMA 250.

E. Electrical requirements shall meet NFPA 70.

F. Installation as a part of the HVAC system shall comply with NFPA 90A.

G. System installation shall allow ***for application*** of the "BACnet" protocol to meet requirements of ASHRAE 135 or "Lonworks" protocol.

H. Control systems shall meet the requirements of ASHRAE Standard 90.1.

1.4 DAMPERS

A. Dampers shall be low-leakage type, as required to meet the requirements of ASHRAE Standard 90.1., not less than 22 gauge galvanized steel frames.

B. Modulating dampers shall be opposed blade type.

C. Dampers shall be sized for 1000 to 1500 FPM air velocity.

1.5 VALVES

A. Factory fabricated of type, body material, pressure class, and at a maximum 5 psi pressure drop.
   1. 2-way valves shall have equal percentage characteristics.
   2. 3-way valves shall have linear characteristics

B. Globe Valves
   1. Up to 2 inches: Bronze body, bronze trim, rising stem, renewable composition disc, screwed ends with back seating capacity repackable under pressure.
   2. Over 2 inches: Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and disc.
   3. Service at 125 psi WSP and 250 deg F.
   4. Internal construction shall be replaceable plugs and seats of stainless steel or brass.

C. Butterfly Valves
   1. Iron body, bronze, aluminum-bronze or stainless steel disc, resilient, replaceable seat for service to 200 deg F., lug ends, and extended neck.
   2. Service at 125 psi WSP and 250 deg F.

D. Terminal Unit Control Valves
   1. Bronze body, bronze trim, 2 or 3 port as indicated, replaceable plugs and seats, union and threaded ends.
   2. Service at 125 psi WSP and 250 deg F.

1.6 VALVE AND DAMPERS ACTUATORS

A. Damper actuators shall be electronic, low voltage. Actuator response shall be linear in response to sensed load.
   1. Dampers on outside air intakes/exhaust shall be spring return closed.

B. Valve operators shall be electronic, low voltage and properly selected for the valve body and service.
   1. Actuators shall be fully proportioning unless otherwise indicated.
   2. Heating water valve actuators in the path of outside air shall be spring return open.
   3. Cabinet heater and radiant ceiling panel valves shall be 2-position.

1.7 RELAYS

A. Relays shall be UL Listed and sized for not less than 140 percent of the connected amperage load.

1.8 SENSING DEVICES

A. Electronic Temperature Sensors.

B. Electronic Room Temperature Sensors.

C. Electronic Duct Temperature Sensors.

D. Electric Thermostats.

E. Sensor Guards.

F. Safety Low Limit Thermostats.

G. Electronic Pressure Sensors.

H. Humidity Sensors.

I. Current Sensing Status Switch.

J. Photo Sensitive Resistor.

K. Carbon Dioxide Sensors.

1.9 CONTROL CABINET/ENCLOSURES

A. Shall be constructed of extruded aluminum, galvanized steel, or factory-hardened plastic.

B. Enclosures for electrical devices shall be constructed of code gauge steel with a UL Label.

C. Panels shall be labeled with nameplates and legends as required.

D. Each major control cabinet/enclosure (minimum one per mechanical room) shall be equipped with a fold-out laptop shelf at an appropriate height. Provide a DDC connection port at each.

1.10 BUILDING AUTOMATION SYSTEM

A. The entire system shall utilize electric/electronic DDC technology and actuation. Pneumatics is not permitted.

B. Personal operator workstation complete with color monitor, internal modem, keyboard, and printer.

C. Host Computer Software
   1. Energy management report generation.
   2. Trend logs setup and storage.
   3. Alarm generation, status, and prioritization.
   4. User interface with English language applications.
   5. Dynamic graphics applications.

1.11 BUILDING AUTOMATION EQUIPMENT

A. Global Control Panel
   1. Central, microprocessor host controller

B. Software functions
   1. English language terminal mode interface
   2. Customized report generation
   3. Time and event based trending
   4. Maximum predictive algorithms
   5. Central system optimization
   6. Functional library of operations and applications

C. On-board modem of the latest Kbaud rate for external monitoring and serial connection.

D. AHU Controllers

E. Boiler Plant Unitary Controllers

F. VAV Terminal Controllers

G. Packaged Terminal Equipment Controllers

1.12 TEMPERATURE CONTROL WIRING

A. Where control wiring is installed in conduit, conduit shall be 2 inch minimum size.

B. Wiring in air plenums shall be open wired UL Listed plenum cable or it shall be installed in conduit.

C. Open wiring shall be secured with plastic tie wraps to permanent building structure.

D. Final wiring terminations shall be made by the Temperature Control Contractor.

1.13 INSTALLATION

A. Install in accordance with manufacturers requirements.

1.14 SEQUENCE OF OPERATION

A. Refer to Specification Section 230993 for all equipment sequences.

1.15 DAY/NIGHT ZONE CONTROL

A. Building zone control shall be through the DDC computer.

B. General exhaust fans shall be operated through zone control.

1.16 WARRANTY

A. All equipment shall be warranted for a period of ***two (2)*** years after issuance of Substantial Completion.

B. Temperature Control Contractor shall provide support for operation of the system and improvements to energy usage to the Owner throughout the first ***fifteen months*** of operation.

1.17 TRAINING

A. The system manufacturer shall provide on-site training on the operation of the complete DDC system.

B. All training shall be video-taped by the HVAC contractor. Two copies shall be turned over to the Owner's maintenance staff.

1.18 FINAL CHECK-TEST-START OF SYSTEM

A. Check and/or oil all electric motors furnished under control system.

B. Lubricate all damper bearings.

C. Check damper travel, adjust and tighten all set screws.

D. Lubricate valve stems, check packing.

E. Calibrate all instruments.

F. Check and verify all circuitry.

G. Calibrate and check all controllers, fusing, and electrical connections.

H. Run software through program diagnostics and debug as required.

I. Startup and test operation of variable frequency drive with factory authorized personnel.

END OF SECTION

SECTION 230993

SEQUENCE OF OPERATION FOR HVAC

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for the Sequences of Operation for HVAC systems and terminal units.

1.2 SUBMITTALS

A. Submittals are required and shall include detailed descriptions of the proposed sequence of operations for all systems specific to the project.

B. The following information shall be submitted as a very minimum to the Engineer:
1. System diagrams denoting the operation of each individual system, folded to an equivalent 8-1/2 inch by 11 inch bound packet.
2. DDC logic diagrams.
3. Written sequences of operation with each specific diagram.

1.3 SYSTEM DESCRIPTION

A. Specific system sequences of operation shall be denoted as subsections to this section.

B. Sequences of operation shall meet the requirements of ASHRAE Standard 90.1.

1.4 The following control sequences are examples only. It is the responsibility of the design professional to provide the appropriate custom control sequences for each individual project. Any setpoints listed in these sequences are arbitrary and do not reflect specific requirements of OFCC.

A. Two Boiler System
1. Boiler System - Run Conditions:
a. The boiler system shall be enabled to run whenever outside air temperature is less than ***the unoccupied/occupied reset schedule.***
b. To prevent short cycling, each boiler shall run for and be off for minimum adjustable times (both user definable), unless shutdown on safeties or outside air conditions.
c. Each boiler shall run subject to its own internal safeties and controls.
d. The boiler system shall also run for freeze protection whenever the outside air temperature is less than 38°F (adj.).
2. Boiler 1 Safeties:
a. The following safeties shall be monitored:
1) Boiler alarm.
2) Low water level.
b. Alarms shall be provided as follows:
1) Boiler alarm.
2) Low water level alarm.
3. Boiler 2 Safeties:
a. The following safeties shall be monitored:
1) Boiler alarm.
2) Low water level.

b. Alarms shall be provided as follows:
   1) Boiler alarm.
   2) Low water level.

4. ***Primary*** Hot Water Pump Lead/Standby Operation:
   a. The two ***primary*** hot water pumps shall operate in a lead/standby fashion.
      1) The lead ***primary*** pump shall run first.
      2) On failure of the lead ***primary*** pump, the standby ***primary*** pump shall run and the lead ***primary*** pump shall turn off.
   b. The designated lead ***primary*** pump shall rotate upon one of the following conditions (user selectable):
      1) manually through a software switch
      2) weekly
      3) monthly
   c. Alarms shall be provided as follows:
      1) ***Primary*** Hot Water Pump 1
         a. Failure: Commanded on, but the status is off.
         b. Running in Hand: Commanded off, but the status is on.
      2) ***Primary*** Hot Water Pump 2
         a. Failure: Commanded on, but the status is off.
         b. Running in Hand: Commanded off, but the status is on.
5. ***Boiler*** Circulation Pump 1:
   a. ***Boiler*** Circulation Pump 1 shall run anytime Boiler 1 is called to run and shall have a user definable delay (adj.) on stop.
   b. Alarms shall be provided as follows:
      1) ***Boiler*** Circulation Pump 1 Failure: Commanded on, but the status is off.
      2) ***Boiler*** Circulation Pump 1 Running in Hand: Commanded off, but the status is on.
6. ***Boiler*** Circulation Pump 2:
   a. ***Boiler*** Circulation Pump 2 shall run anytime Boiler 2 is called to run and shall have a user definable delay (adj.) on stop.
   b. Alarms shall be provided as follows:
      1) ***Boiler*** Circulation Pump 2 Failure: Commanded on, but the status is off.
      2) ***Boiler*** Circulation Pump 2 Running in Hand: Commanded off, but the status is on.
7. Boiler Lead/Standby Operation:
   a. The two boilers shall operate in a lead/standby fashion when called to run and flow is proven.
      1) The lead boiler shall run first.
      2) On failure of the lead boiler, the standby boiler shall run and the lead boiler shall turn off.
   b. The designated lead boiler shall rotate upon one of the following conditions: (user selectable):
      1) manually through a software switch
      2) weekly
      3) monthly

c. Alarms shall be provided as follows:
   1) Boiler 1
      a. Failure: Commanded on but the status is off.
      b. Running in Hand: Commanded off but the status is on.
   2) Boiler 2
      a. Failure: Commanded on but the status is off.
      b. Running in Hand: Commanded off but the status is on.
      c. Lead Boiler Failure: The lead boiler is in failure and the standby boiler is on.

8. Hot Water Supply Temperature Setpoint Reset:
   a. The hot water supply temperature setpoint shall reset only after the variable flow secondary hot water pumps are operating at minimum speed. Hot water supply temperature reset shall be a continuation of the control loop for the pump speed. Hot water supply and return temperatures shall be maintained above minimums per boiler manufacturer's recommendations. Further consideration should be given to high efficiency boiler systems to optimize system efficiency (reset water temp starting at higher pump speed to allow boiler to operate at optimum efficiency).
9. Primary Hot Water Temperature Monitoring:
   a. The following temperatures shall be monitored:
      1) Primary hot water supply.
      2) Primary hot water return.
   b. Alarms shall be provided as follows:
      1) High Primary Hot Water Supply Temp: If greater than 200°F (adj.).
      2) Low Primary Hot Water Supply Temp: If less than 100°F (adj.).
10. Boiler 1 Hot Water Temperature Monitoring:
   a. The following temperatures shall be monitored:
      1) Boiler 1 hot water supply.
      2) Boiler 1 hot water return.
   b. Alarms shall be provided as follows:
      1) High Hot Water Supply Temp: If greater than 200°F (adj.).
      2) Low Hot Water Supply Temp: If less than 100°F (adj.).
11. Boiler 2 Hot Water Temperature Monitoring:
   a. The following temperatures shall be monitored:
      1) Boiler 2 hot water supply.
      2) Boiler 2 hot water return.
   b. Alarms shall be provided as follows:
      1) High Hot Water Supply Temp: If greater than 200°F (adj.).
      2) Low Hot Water Supply Temp: If less than 100°F (adj.).

B. Secondary Hot Water Pumps
   1. Secondary Hot Water Pump Run Conditions:
      a. The secondary hot water pumps shall be enabled whenever outside air temperature is less than ***the unoccupied/occupied reset schedule.***
      b. The secondary pumps shall run for freeze protection anytime outside air temperature is less than 38°F (adj.).

c. To prevent short cycling, the secondary pumps shall run for and be off for minimum adjustable times (both user definable).

2. Secondary Hot Water Pump Lead/Standby Operation:
   a. The two secondary hot water pumps shall operate in a lead/standby fashion.
      1) The lead secondary pump shall run first.
      2) On failure of the lead secondary pump, the standby secondary pump shall run and the lead pump shall turn off.
   b. The designated lead secondary pump shall rotate upon one of the following conditions (user selectable):
      1) manually through a software switch
      2) weekly
      3) monthly
   c. Alarms shall be provided as follows:
      1) Secondary Hot Water Pump 1
         a) Failure: Commanded on, but the status is off.
         b) Running in Hand: Commanded off, but the status is on.
      2) Secondary Hot Water Pump 2
         a) Failure: Commanded on, but the status is off.
         b) Running in Hand: Commanded off, but the status is on.
3. Secondary Hot Water Pump Volume Control:
   a. A differential pressure sensor installed near the most remote heat exchanger shall monitor hot water system differential pressure.
   b. The hot water system differential pressure shall be reset based on heating valve position.
   c. The secondary hot water pump variable frequency drives shall be modulated to maintain hot water system differential pressure.

C. Single Air Cooled Chiller System
1. Chiller - Run Conditions:
   a. The chiller shall be enabled to run whenever the outside air temperature is greater than ***the unoccupied/occupied reset schedule.***
   b. To prevent short cycling, the chiller shall run for and be off for minimum adjustable times (both user definable), unless shutdown on safeties or outside air conditions.
   c. The chiller shall run subject to its own internal safeties and controls.
2. Chilled Water Pump:
   a. The chilled water pump shall run anytime the chiller is called to run. The chilled water pump shall also run for freeze protection whenever the outside air temperature is less than a user definable setpoint (adj.).
   b. The chilled water pump shall start prior to the chiller being enabled and shall stop only after the chiller is disabled. The chilled water pump shall therefore have:
      1) A user adjustable delay on start.
      2) AND a user adjustable delay on stop.
   c. The delay times shall be set appropriately to allow for orderly chilled water system start-up, shutdown and sequencing.

d. Alarms shall be provided as follows:
   1) Chilled Water Pump Failure: Commanded on, but the status is off.
   2) Chilled Water Pump Running in Hand: Commanded off, but the status is on.

3. Chiller:
   a. The chiller shall be enabled a ***after a*** user-adjustable time after pump statuses are proven on. The chiller shall therefore have a user adjustable delay on start.
   b. The delay time shall be set appropriately to allow for orderly chilled water system start-up, shutdown and sequencing.
   c. The chiller shall run subject to its own internal safeties and controls.
   d. Alarms shall be provided as follows:
      1) Chiller Failure: Commanded on, but the status is off.
      2) Chiller Running in Hand: Commanded off, but the status is on.

4. Chiller Chilled Water Supply Setpoint:
   a. The chiller shall maintain a chilled water supply temperature setpoint as determined by its own internal controls (provided by others).

5. Chilled Water Temperature Monitoring:
   a. The following temperatures shall be monitored:
      1) Chilled water supply.
      2) Chilled water return.
   b. Alarms shall be provided as follows:
      1) High Chilled Water Supply Temp: If the chilled water supply temperature is greater than 55°F (adj.).
      2) Low Chilled Water Supply Temp: If the chilled water supply temperature is less than 38°F (adj.).

D. Single Water Cooled Chiller System

1. Chiller - Run Conditions:
   a. The chiller shall be enabled to run whenever the outside air temperature is greater than the unoccupied/occupied reset schedule.
   b. To prevent short cycling, the chiller shall run for and be off for minimum adjustable times (both user definable), unless shutdown on safeties or outside air conditions.
   c. The chiller shall run subject to its own internal safeties and controls.

2. Refrigerant Detection:
   a. The chiller shall shut down and an alarm generated upon receiving a refrigerant leak detection status.

3. Chilled Water Pump:
   a. The chilled water pump shall run anytime the chiller is called to run. The chilled water pump shall also run for freeze protection whenever the outside air temperature is less than a user definable setpoint (adj.).
   b. The chilled water pump shall start prior to the chiller being enabled and shall stop only after the chiller is disabled. The chilled water pump shall therefore have:
      1) A user adjustable delay on start.
      2) AND a user adjustable delay on stop.
   c. The delay times shall be set appropriately to allow for orderly chilled water system start-up, shutdown and sequencing.

d. Alarms shall be provided as follows:
   1) Chilled Water Pump Failure: Commanded on, but the status is off.
   2) Chilled Water Pump Running in Hand: Commanded off, but the status is on.

4. Condenser Water Pump:
   a. The condenser water pump shall run anytime the chiller is called to run.
   b. The condenser water pump shall start prior to the chiller being enabled and shall stop only after the chiller is disabled. The condenser water pump shall therefore have:
      1) A user adjustable delay on start.
      2) AND a user adjustable delay on stop.
   c. The delay times shall be set appropriately to allow for orderly chilled water system start-up, shutdown and sequencing.
   d. Alarms shall be provided as follows:
      1) Condenser Water Pump Failure: Commanded on, but the status is off.
      2) Condenser Water Pump Running in Hand: Commanded off, but the status is on.

5. Chiller:
   a. The chiller shall be enabled a user adjustable time after pump statuses are proven on. The chiller shall therefore have a user adjustable delay on start.
   b. The delay time shall be set appropriately to allow for orderly chilled water system start-up, shutdown and sequencing.
   c. The chiller shall run subject to its own internal safeties and controls.
   d. Alarms shall be provided as follows:
      1) Chiller Failure: Commanded on, but the status is off.
      2) Chiller Running in Hand: Commanded off, but the status is on.

6. Chiller Chilled Water Supply Setpoint:
   a. The chiller shall maintain a chilled water supply temperature setpoint as determined by its own internal controls (provided by others).

7. Cooling Tower VFD Fan - Condenser Water Temperature Control:
   a. The controller shall measure the cooling tower condenser water supply (basin) temperature and modulate the bypass valve and fan VFD in sequence to maintain setpoints.
   b. The following setpoints are recommended values. All setpoints shall be field adjusted during the commissioning period to meet the requirements of actual field conditions.
   c. On rising supply temperature, the controller shall modulate the bypass valve to maintain setpoint of 78°F (adj.) and the fan VFD to maintain setpoint of 82°F (adj.).
   d. Alarms shall be provided as follows:
      1) Fan
         a) Failure: Commanded on, but the status is off.
         b) Running in Hand: Commanded off, but the status is on.
         c) VFD fault.
      2) High Cooling Tower Supply (Basin) Temp: If greater than 86°F (adj.).
      3) Low Cooling Tower Supply (Basin) Temp: If less than 38°F (adj.).

8. Chilled Water Temperature Monitoring:
   a. The following temperatures shall be monitored:
      1) Chilled water supply.
      2) Chilled water return.
   b. Alarms shall be provided as follows:
      1) High Chilled Water Supply Temp: If the chilled water supply temperature is greater than 55°F (adj.).
      2) Low Chilled Water Supply Temp: If the chilled water supply temperature is less than 38°F (adj.).
9. Condenser Water Temperature Monitoring:
   a. The following temperatures shall be monitored:
      1) Condenser water supply temperature.
      2) Condenser water return temperature.
   b. Alarms shall be provided as follows:
      1) High Condenser Water Supply Temp: If the condenser water supply temperature is greater than 86°F (adj.).
      2) Low Condenser Water Supply Temp: If the condenser water supply temperature is less than 65°F (adj.).
      3) High Condenser Water Return Temp: If the condenser water return temperature is greater than 100°F (adj.).
      4) Low Condenser Water Return Temp: If the condenser water return temperature is less than 75°F (adj.).

E. Cabinet Heater
1. Run Conditions - Continuous:
   a. The unit shall run continuously and shall maintain a heating setpoint of 70°F (adj.).
   b. Alarms shall be provided as follows:
      1) Low Zone Temp: If the zone temperature is less than the heating setpoint by a user definable amount (adj.).
2. Zone Setpoint Adjust:
   a. The occupant shall be able to adjust the zone temperature heating and cooling setpoints at the zone sensor.
3. Fan:
   a. The fan shall run anytime the zone temperature is below heating setpoint, unless shutdown on safeties.
4. Heating Coil Valve:
   a. The controller shall measure the zone temperature and modulate the heating coil valve to maintain its heating setpoint.
   b. The heating shall be enabled whenever:
      1) Outside air temperature is less than ***the unoccupied/ occupied reset schedule.***
      2) AND the zone temperature is below heating setpoint.
      3) AND the fan is on.

F. Unit Heater
1. Run Conditions - Continuous:
   a. The unit shall run continuously and shall maintain a heating setpoint of 70°F (adj.).
   b. Alarms shall be provided as follows:
      1) Low Zone Temp: If the zone temperature is less than the heating setpoint by a user definable amount (adj.).

2. Zone Setpoint Adjust:
   a. The occupant shall be able to adjust the zone temperature heating and cooling setpoints at the zone sensor.
3. Fan:
   a. The fan shall run anytime the zone temperature drops below heating setpoint, unless shutdown on safeties.
4. Heating Coil Valve:
   a. The controller shall measure the zone temperature and modulate the heating coil valve to maintain its heating setpoint.
   b. The heating shall be enabled whenever:
      1) Outside air temperature is less than ***the unoccupied/ occupied reset schedule.***
      2) AND the zone temperature is below heating setpoint.
      3) AND the fan is on.

G. Convective / Fin Tube Heater
1. Run Conditions - Continuous:
   a. The unit shall run continuously and shall maintain a heating setpoint of 70°F (adj.).
   b. Alarms shall be provided as follows:
      1) Low Zone Temp: If the zone temperature is less than the heating setpoint by a user definable amount (adj.).
2. Heating Coil Valve:
   a. The controller shall measure the zone temperature and modulate the heating coil valve to maintain its heating setpoint.
   b. The heating shall be enabled whenever:
      1) Outside air temperature is less than ***the unoccupied/ occupied reset schedule.***
      2) AND the zone temperature is below heating setpoint.

H. Exhaust Fan - Building Static
1. Run Conditions - Interlocked:
   a. The unit(s) EF --- shall be interlocked to run whenever Air Handling Unit ---- runs unless shutdown on safeties.
2. Control - Building Static Pressure:
   a. The controller shall measure building static pressure and stage the exhaust fan on and off to maintain a building static pressure setpoint of 0.05in H_2O (adj.). The fan shall have a user definable (adj.) minimum runtime.
   b. Alarms shall be provided as follows:
      1) High Building Static Pressure: If the building static pressure is 25% (adj.) greater than setpoint.
      2) Low Building Static Pressure: If the building static pressure is 25% (adj.) less than setpoint.
3. Exhaust Air Damper:
   a. The exhaust air damper shall open anytime the unit runs and shall close anytime the unit stops. The exhaust air damper shall close 30 sec(adj.) after the fan stops.
4. Fan Status:
   a. The controller shall monitor the fan status.
   b. Alarms shall be provided as follows:

1) Fan Failure: Commanded on, but the status is off.
2) Fan in Hand: Commanded off, but the status is on.

I. Variable Air Volume - AHU

1. Run Conditions - Scheduled:
   a. The unit shall run based upon an operator adjustable schedule.
2. Freeze Protection:
   a. The unit shall shut down and generate an alarm upon receiving a freezestat status.
3. High Static Shutdown:
   a. The unit shall shut down and generate an alarm upon receiving an high static shutdown signal.
4. Supply Air Smoke Detection:
   a. The unit shall shut down and generate an alarm upon receiving a supply air smoke detector status.
5. Supply Fan:
   a. The supply fan shall run anytime the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a user definable (adj.) minimum runtime.
   b. Alarms shall be provided as follows:
      1) Supply Fan Failure: Commanded on, but the status is off.
      2) Supply Fan in Hand: Commanded off, but the status is on.
      3) Supply Fan Runtime Exceeded: Status runtime exceeds a user definable limit (adj.).
6. Supply Air Duct Static Pressure Control:
   a. The controller shall measure duct static pressure and shall modulate the supply fan VFD speed to maintain a duct static pressure setpoint of 1.5in H_2O (adj.). The supply fan VFD speed shall not drop below 30% (adj.).
   b. Alarms shall be provided as follows:
      1) High Supply Air Static Pressure: If the supply air static pressure is 25% (adj.) greater than setpoint.
      2) Low Supply Air Static Pressure: If the supply air static pressure is 25% (adj.) less than setpoint.
      3) Supply Fan VFD Fault.
7. Return Fan:
   a. The return fan shall run whenever the supply fan runs.
   b. Alarms shall be provided as follows:
      1) Return Fan Failure: Commanded on, but the status is off.
      2) Return Fan in Hand: Commanded off, but the status is on.
      3) Return Fan Runtime Exceeded: Status runtime exceeds a user definable limit (adj.).
      4) Return Fan VFD Fault.
8. Building Static Pressure Control:
   a. The controller shall measure building static pressure and modulate the return fan VFD speed to maintain a building static pressure setpoint of 0.05in H_2O (adj.). The return fan VFD speed shall not drop below 20% (adj.).
   b. Alarms shall be provided as follows:
      1) High Building Static Pressure: If the building air static pressure is 25% (adj.) greater than setpoint.

2) Low Building Static Pressure: If the building air static pressure is 25% (adj.) less than setpoint.

9. Heat Recovery Wheel - Constant Speed:
   a. The controller shall run the heat recovery wheel for energy recovery as follows.
      1) Cooling Recovery Mode: The controller shall measure the heat wheel discharge air temperature and run the heat wheel to maintain a setpoint 2°F (adj.) less than the unit supply air temperature setpoint. The heat wheel shall run for cool recovery whenever:
         a) The unit return air temperature is 5°F (adj.) or more below the outside air temperature.
         b) AND the unit is in a cooling mode.
         c) AND the economizer (if present) is off.
         d) AND the supply fan is on.
      2) Heating Recovery Mode: The controller shall measure the heat wheel discharge air temperature and run the heat wheel to maintain a setpoint 2°F (adj.) greater than the unit supply air temperature setpoint. The heat wheel shall run for heat recovery whenever:
         a) The unit return air temperature is 5°F (adj.) or more above the outside air temperature.
         b) AND the unit is in a heating mode.
         c) AND the economizer (if present) is off.
         d) AND the supply fan is on.
   b. Periodic Self-Cleaning:
      1) The heat wheel shall run for 10sec (adj.) every 4hr (adj.) the unit runs.
   c. Frost Protection:
      1) The heat wheel shall run for 10sec (adj.) every 600sec (adj.) whenever:
         a) Outside air temperature drops below 15°F (adj.)
         b) OR the exhaust air temperature drops below 20°F (adj.).
   d. The heat wheel bypass dampers will open whenever the heat wheel is disabled.
   e. Alarms shall be provided as follows:
      1) Heat Wheel Rotation Failure: Commanded on, but the status is off.
      2) Heat Wheel in Hand: Commanded off, but the status is on.
      3) Heat Wheel Runtime Exceeded: Status runtime exceeds a user definable limit (adj.).

10. Preheating Coil Valve:
   a. The controller shall measure the mixed air temperature and modulate the preheating coil valve to maintain its setpoint 5°F (adj.) less than the supply air temperature setpoint.
   b. The preheating shall be enabled whenever:
      1) Outside air temperature is less than 60°F (adj.).
      2) AND the economizer (if present) is disabled.
      3) AND the supply fan status is on.

c. The preheating coil valve shall open for freeze protection whenever:
   1) Mixed air temperature drops from 40°F to 35°F (adj.).
   2) OR the freezestat (if present) is on.

11. Supply Air Temperature Setpoint - Optimized:
   a. The controller shall monitor the supply air temperature and shall maintain a supply air temperature setpoint reset based on zone cooling and heating requirements
   b. The supply air temperature setpoint shall be reset for cooling based on zone cooling requirements as follows:
      1) The initial supply air temperature setpoint shall be 55°F (adj.).
      2) As cooling demand increases, the setpoint shall incrementally reset down to a minimum of 53°F (adj.).
      3) As cooling demand decreases, the setpoint shall incrementally reset up to a maximum of 72°F (adj.).
   c. If more zones need heating than cooling, then the supply air temperature setpoint shall be reset for heating as follows:
      1) The initial supply air temperature setpoint shall be 82°F (adj.).
      2) As heating demand increases, the setpoint shall incrementally reset up to a maximum of 85°F (adj.).
      3) As heating demand decreases, the setpoint shall incrementally reset down to a minimum of 72°F (adj.).

12. Cooling Coil Valve:
   a. The controller shall measure the supply air temperature and modulate the cooling coil valve to maintain its cooling setpoint.
   b. The cooling shall be enabled whenever:
      1) Outside air temperature is greater than ***the unoccupied/ occupied reset schedule.***
      2) AND the economizer (if present) is disabled or fully open.
      3) AND the supply fan status is on.
      4) AND the heating (if present) is not active.
   c. The cooling coil valve shall open to 50% (adj.) whenever the freezestat (if present) is on.
   d. Alarms shall be provided as follows:
      1) High Supply Air Temp: If the supply air temperature is 5°F (adj.) greater than setpoint.

13. Heating Coil Valve:
   a. The controller shall measure the supply air temperature and modulate the heating coil valve to maintain its heating setpoint.
   b. The heating shall be enabled whenever:
      1) Outside air temperature is less than ***the unoccupied/ occupied reset schedule.***
      2) AND the supply fan status is on.
      3) AND the cooling (if present) is not active.
   c. The heating coil valve shall open whenever:
      1) Supply air temperature drops from 40°F to 35°F (adj.).
      2) OR the freezestat (if present) is on.
   d. Alarms shall be provided as follows:
      1) Low Supply Air Temp: If the supply air temperature is 5°F (adj.) less than setpoint.

14. Preheating Coil Pump:
   a. The recirculation pump shall run whenever:

1) The preheating coil valve is enabled.
2) OR the freezestat (if present) is on.

b. Alarms shall be provided as follows:
1) Preheating Coil Pump Failure: Commanded on, but the status is off.
2) Preheating Coil Pump in Hand: Commanded off, but the status is on.
3) Preheating Coil Pump Runtime Exceeded: Status runtime exceeds a user definable limit.

15. Economizer:

a. The controller shall measure the mixed air temperature and modulate the economizer dampers in sequence to maintain a setpoint 2°F(adj.) less than the supply air temperature setpoint. The outside air dampers shall maintain a minimum adjustable position of 20% (adj.) open whenever occupied.

b. The economizer shall be enabled whenever:
1) Outside air temperature is less than 65°F (adj.).
2) AND the outside air enthalpy is less than 22Btu/lb (adj.)
3) AND the outside air temperature is less than the return air temperature.
4) AND the outside air enthalpy is less than the return air enthalpy.
5) AND the supply fan status is on.

c. The economizer shall close whenever:
1) Mixed air temperature drops from 40°F to 35°F (adj.)
2) OR the freezestat (if present) is on.
3) OR on loss of supply fan status.

d. The outside and exhaust air dampers shall close and the return air damper shall open when the unit is off. If Optimal Start Up is available the mixed air damper shall operate as described in the occupied mode except that the outside air damper shall modulate to fully closed.

16. Minimum Outside Air Ventilation:

a. When in the occupied mode, the controller shall measure the outside airflow and modulate the outside air dampers to maintain the proper minimum outside air ventilation, overriding normal damper control. On dropping outside airflow, the controller shall modulate the outside air dampers open to maintain the outside airflow setpoint (adj.).

17. Dehumidification:

a. The controller shall measure the return air humidity and override the cooling sequence to maintain return air humidity at or below 60% rh (adj.). Dehumidification shall be enabled whenever the supply fan status is on.

18. Prefilter Status:

a. The controller shall monitor the prefilter status.

b. Alarms shall be provided as follows:
1) Prefilter Change Required: Prefilter differential pressure exceeds a user definable limit (adj.).

19. Final Filter Status:

a. The controller shall monitor the final filter status.

b. Alarms shall be provided as follows:
1) Final Filter Change Required: Final filter differential pressure exceeds a user definable limit (adj.).

20. Mixed Air Temperature:
a. The controller shall monitor the mixed air temperature and use as required for economizer control (if present) or preheating control (if present).
b. Alarms shall be provided as follows:
1) High Mixed Air Temp: If the mixed air temperature is greater than 90°F (adj.).
2) Low Mixed Air Temp: If the mixed air temperature is less than 45°F (adj.).

21. Return Air Humidity:
a. The controller shall monitor the return air humidity and use as required for economizer control (if present) or humidity control (if present).
b. Alarms shall be provided as follows:
1) High Return Air Humidity: If the return air humidity is greater than 70% (adj.).
2) Low Return Air Humidity: If the return air humidity is less than 35% (adj.).

22. Return Air Temperature:
a. The controller shall monitor the return air temperature and use as required for setpoint control or economizer control (if present).
b. Alarms shall be provided as follows:
1. High Return Air Temp: If the return air temperature is greater than 90°F (adj.).
2. Low Return Air Temp: If the return air temperature is less than 45°F (adj.).

23. Supply Air Temperature:
a. The controller shall monitor the supply air temperature.
b. Alarms shall be provided as follows:
1) High Supply Air Temp: If the supply air temperature is greater than 120°F (adj.).
2) Low Supply Air Temp: If the supply air temperature is less than 45°F (adj.).

24. Zone Optimal Start:
a. The unit shall use an optimal start algorithm for morning startup. This algorithm shall minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period.

J. Variable Air Volume - Terminal Unit
1. Run Conditions - Scheduled:
a. The unit shall run according to a user definable time schedule in the following modes:
1) Occupied Mode: The unit shall maintain
a) A 75°F (adj.) cooling setpoint
b) A 70°F (adj.) heating setpoint.
2) Unoccupied Mode (night setback): The unit shall maintain
a) A 85°F (adj.) cooling setpoint.

b) A 55°F (adj.) heating setpoint.

b. Alarms shall be provided as follows:

1) High Zone Temp: If the zone temperature is greater than the cooling setpoint by a user definable amount (adj.).

2) Low Zone Temp: If the zone temperature is less than the heating setpoint by a user definable amount (adj.).

2. Zone Setpoint Adjust:

a. The occupant shall be able to adjust the zone temperature heating and cooling setpoints at the zone sensor.

3. Zone Unoccupied Override:

a. A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for an adjustable period of time. At the expiration of this time, control of the unit shall automatically return to the schedule.

4. Reversing Variable Volume Terminal Unit - Flow Control:

a. The unit shall maintain zone setpoints by controlling the airflow through one of the following:

1) Occupied:

a) When zone temperature is greater than its cooling setpoint, the zone damper shall modulate between the minimum occupied airflow (adj.) and the maximum cooling airflow (adj.) until the zone is satisfied.

b) When the zone temperature is between the cooling setpoint and the heating setpoint, the zone damper shall maintain the minimum required zone ventilation (adj.).

c) When zone temperature is less than its heating setpoint, the controller shall enable heating to maintain the zone temperature at its heating setpoint. Additionally, if warm air is available from the AHU, the zone damper shall modulate between the minimum occupied airflow (adj.) and the maximum heating airflow (adj.) until the zone is satisfied.

2) Unoccupied:

a) When the zone is unoccupied the zone damper shall control to its minimum unoccupied airflow (adj.).

b) When the zone temperature is greater than its cooling setpoint, the zone damper shall modulate between the minimum unoccupied airflow (adj.) and the maximum cooling airflow (adj.) until the zone is satisfied.

c) When zone temperature is less than its unoccupied heating setpoint, the controller shall enable heating to maintain the zone temperature at the setpoint. Additionally, if warm air is available from the AHU, the zone damper shall modulate between the minimum unoccupied airflow (adj.) and the auxiliary heating airflow (adj.) until the zone is satisfied.

5. Reheating Coil Valve:

a. The controller shall measure the zone temperature and modulate the reheating coil valve open on dropping temperature to maintain its heating setpoint.

6. Discharge Air Temperature:

a. The controller shall monitor the discharge air temperature.

b. Alarms shall be provided as follows:
   1) High Discharge Air Temp: If the discharge air temperature is greater than 120°F (adj.).
   2) Low Discharge Air Temp: If the discharge air temperature is less than 40°F (adj.).

K. Fan Powered Variable Air Volume - Terminal Unit
1. Run Conditions - Scheduled:
   a. The unit shall run according to a user definable time schedule in the following modes:
      1) Occupied Mode: The unit shall maintain
         a) A 75°F (adj.) cooling setpoint
         b) A 70°F (adj.) heating setpoint.
      2) Unoccupied Mode (night setback): The unit shall maintain
         a) A 85°F (adj.) cooling setpoint.
         b) A 55°F (adj.) heating setpoint.
   b. Alarms shall be provided as follows:
      1) High Zone Temp: If the zone temperature is greater than the cooling setpoint by a user definable amount (adj.).
      2) Low Zone Temp: If the zone temperature is less than the heating setpoint by a user definable amount (adj.).
2. Zone Setpoint Adjust:
   a. The occupant shall be able to adjust the zone temperature heating and cooling setpoints at the zone sensor.
3. Zone Unoccupied Override:
   a. A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for an adjustable period of time. At the expiration of this time, control of the unit shall automatically return to the schedule.
4. Reversing Variable Volume Terminal Unit - Flow Control:
   a. The unit shall maintain zone setpoints by controlling the airflow through one of the following:
      1) Occupied:
         a) When zone temperature is greater than its cooling setpoint, the zone damper shall modulate between the minimum occupied airflow (adj.) and the maximum cooling airflow (adj.) until the zone is satisfied.
         b) When the zone temperature is between the cooling setpoint and the heating setpoint, the zone damper shall maintain the minimum required zone ventilation (adj.).
         c) When zone temperature is less than its heating setpoint, the controller shall enable heating to maintain the zone temperature at its heating setpoint. Additionally, if warm air is available from the AHU, the zone damper shall modulate between the minimum occupied airflow (adj.) and the maximum heating airflow (adj.) until the zone is satisfied.
      2) Unoccupied:
         a) When the zone is unoccupied the zone damper shall control to its minimum unoccupied airflow (adj.).

b) When the zone temperature is greater than its cooling setpoint, the zone damper shall modulate between the minimum unoccupied airflow (adj.) and the maximum cooling airflow (adj.) until the zone is satisfied.

c) When zone temperature is less than its unoccupied heating setpoint, the controller shall enable heating to maintain the zone temperature at the setpoint. Additionally, if warm air is available from the AHU, the zone damper shall modulate between the minimum unoccupied airflow (adj.) and the auxiliary heating airflow (adj.) until the zone is satisfied.

5. Fan Control - Parallel:
   a. The fan shall run whenever the zone controller calls for heat. The fan shall run for a minimum user definable time (adj.).
6. Fan Control – Series:
   a. The fan shall run whenever the system is in the occupied mode.
7. Reheating Coil Valve:
   a. The controller shall measure the zone temperature and modulate the reheating coil valve open on dropping temperature to maintain its heating setpoint.
8. Discharge Air Temperature:
   a. The controller shall monitor the discharge air temperature.
   b. Alarms shall be provided as follows:
      1) High Discharge Air Temp: If the discharge air temperature is greater than 120°F (adj.).
      2) Low Discharge Air Temp: If the discharge air temperature is less than 40°F (adj.).

L. Single Zone Unit
1. Run Conditions - Scheduled:
   a. The unit shall run according to a user definable time schedule in the following modes:
      1) Occupied Mode: The unit shall maintain
         a) A 75°F (adj.) cooling setpoint
         b) A 70°F (adj.) heating setpoint.
      2) Unoccupied Mode (night setback): The unit shall maintain
         a) A 85°F (adj.) cooling setpoint.
         b) A 55°F (adj.) heating setpoint.
   b. Alarms shall be provided as follows:
      1) High Zone Temp: If the zone temperature is greater than the cooling setpoint by a user definable amount (adj.).
      2) Low Zone Temp: If the zone temperature is less than the heating setpoint by a user definable amount (adj.).
2. Zone Setpoint Adjust:
   a. The occupant shall be able to adjust the zone temperature heating and cooling setpoints at the zone sensor.
3. Zone Optimal Start:
   a. The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period.

4. Zone Unoccupied Override:
   a. A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for an adjustable period of time. At the expiration of this time, control of the unit shall automatically return to the schedule.
5. Freeze Protection:
   a. The unit shall shut down and generate an alarm upon receiving a freezestat status.
6. Supply Air Smoke Detection:
   a. The unit shall shut down and generate an alarm upon receiving a supply air smoke detector status.
7. Supply Fan:
   a. The supply fan shall run anytime the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a user definable (adj.) minimum runtime.
   b. Alarms shall be provided as follows:
      1) Supply Fan Failure: Commanded on, but the status is off.
      2) Supply Fan in Hand: Commanded off, but the status is on.
8. Heat Recovery Wheel - Constant Speed:
   a. The controller shall run the heat recovery wheel for energy recovery as follows.
      1) Cooling Recovery Mode: The controller shall measure the zone temperature and run the heat recovery wheel to maintain a setpoint 2°F (adj.) less than the zone cooling setpoint. The heat wheel shall run for cool recovery whenever:
         a) Return air temperature is 5°F (adj.) or more below the outside air temperature.
         b) AND the zone temperature is above cooling setpoint.
         c) AND the economizer (if present) is off.
         d) AND the supply fan is on.
      2) Heating Recovery Mode: The controller shall measure the zone temperature and run the heat recovery wheel to maintain a setpoint 2°F (adj.) greater than the zone heating setpoint. The heat wheel shall run for heat recovery whenever:
         a) Return air temperature is 5°F (adj.) or more above the outside air temperature.
         b) AND the zone temperature is below heating setpoint.
         c) AND the economizer (if present) is off.
         d) AND the supply fan is on.
   b. Periodic Self-Cleaning:
      1) The heat wheel shall run for 10sec (adj.) every 4hr (adj.) the unit runs.
   c. Frost Protection:
      1) The heat wheel shall run for 10sec (adj.) every 600sec (adj.) whenever:
         a) Outside air temperature drops below 15°F (adj.)
         b) OR the exhaust air temperature drops below 20°F (adj.).
   d. The heat wheel bypass dampers will open whenever the heat wheel is disabled.

e. Alarms shall be provided as follows:
   1) Heat Wheel Rotation Failure: Commanded on, but the status is off.
   2) Heat Wheel in Hand: Commanded off, but the status is on.
   3) Heat Wheel Runtime Exceeded: Status runtime exceeds a user definable limit (adj.).

9. Preheating Coil Valve:
   a. The controller shall measure the mixed air temperature and modulate the preheating coil valve to maintain its setpoint 10°F (adj.) less than the zone heating setpoint.
   b. The preheating shall be enabled whenever:
      1) Outside air temperature is less than 55°F (adj.).
      2) AND the economizer (if present) is disabled.
      3) AND the heating is active.
      4) AND cooling is not active.
      5) AND the supply fan status is on.
   c. The preheating coil valve shall open for freeze protection whenever:
      1) Mixed air temperature drops from 40°F to 35°F (adj.).
      2) OR the freezestat (if present) is on.

10. Cooling Coil Valve:
   a. The controller shall measure the zone temperature and modulate the cooling coil valve to maintain its cooling setpoint.
   b. The cooling shall be enabled whenever:
      1) Outside air temperature is greater than ***the unoccupied/ occupied reset schedule.***
      2) AND the economizer (if present) is disabled or fully open.
      3) AND the zone temperature is above cooling setpoint.
      4) AND the supply fan status is on.
      5) AND the heating is not active.
   c. The cooling coil valve shall open to 50% (adj.) whenever the freezestat (if present) is on.

11. Heating Coil Valve:
   a. The controller shall measure the zone temperature and modulate the heating coil valve to maintain its heating setpoint.
   b. The heating shall be enabled whenever:
      1) Outside air temperature is less than ***the unoccupied/ occupied reset schedule.***
      2) AND the zone temperature is below heating setpoint.
      3) AND the supply fan status is on.
      4) AND the cooling is not active.
      c. The heating coil valve shall open whenever the freezestat (if present) is on.

12. Economizer:
   a. The controller shall measure the zone temperature and modulate the economizer dampers in sequence to maintain a setpoint 2°F less than the zone cooling setpoint. The outside air dampers shall maintain a minimum adjustable position of 20Btu/lb (adj.) open whenever occupied.
   b. The economizer shall be enabled whenever:
      1) Outside air temperature is less than 65°F (adj.).
      2) AND the outside air enthalpy is less than 22Btu/lb (adj.).

3) AND the outside air temperature is less than the return air temperature.
4) AND the outside air enthalpy is less than the return air enthalpy.
5) AND the supply fan status is on.

c. The economizer shall close whenever:
1) Mixed air temperature drops from 45°F to 40°F (adj.).
2) OR on loss of supply fan status.
3) OR freezestat (if present) is on.

d. The outside and exhaust air dampers shall close and the return air damper shall open when the unit is off. If Optimal Start Up is available, the mixed air damper shall operate as described in the occupied mode except that the outside air damper shall modulate to fully closed.

13. Minimum Outside Air Ventilation - Fixed Percentage:
a. The outside air dampers shall maintain a minimum position (adj.) during building occupied hours and be closed during unoccupied hours.

14. Dehumidification:
a. The controller shall measure the return air humidity and override the cooling sequence to maintain return air humidity at or below 60% rh (adj.). Dehumidification shall be enabled whenever the supply fan status is on.

15. Prefilter Status:
a. The controller shall monitor the prefilter status.
b. Alarms shall be provided as follows:
1) Prefilter Change Required: Prefilter differential pressure exceeds a user definable limit (adj.).

16. Final Filter Status:
a. The controller shall monitor the final filter status.
b. Alarms shall be provided as follows:
1) Final Filter Change Required: Final filter differential pressure exceeds a user definable limit (adj.).

17. Mixed Air Temperature:
a. The controller shall monitor the mixed air temperature and use as required for economizer control (if present) or preheating control (if present).
b. Alarms shall be provided as follows:
1) High Mixed Air Temp: If the mixed air temperature is greater than 90°F (adj.).
2) Low Mixed Air Temp: If the mixed air temperature is less than 45°F (adj.).

18. Return Air Humidity:
a. The controller shall monitor the return air humidity and use as required for economizer control (if present) or humidity control (if present).
b. Alarms shall be provided as follows:
1) High Return Air Humidity: If the return air humidity is greater than 70% (adj.).
2) Low Return Air Humidity: If the return air humidity is less than 35% (adj.).

19. Return Air Temperature:
    a. The controller shall monitor the return air temperature and use as required for economizer control (if present).
    b. Alarms shall be provided as follows:
        1) High Return Air Temp: If the return air temperature is greater than 90°F (adj.).
        2) Low Return Air Temp: If the return air temperature is less than 45°F (adj.).
20. Supply Air Temperature:
    a. The controller shall monitor the supply air temperature.
    b. Alarms shall be provided as follows:
        1) High Supply Air Temp: If the supply air temperature is greater than 120°F (adj.).
        2) Low Supply Air Temp: If the supply air temperature is less than 45°F (adj.).

M. Makeup Air Unit - Supply Air Temp
1. Run Conditions - Interlocked:
    a. The unit MAU --- shall be interlocked to run whenever Air Handling Unit ---- runs unless shutdown on safeties.
2. Freeze Protection:
    a. The unit shall shut down and generate an alarm upon receiving a freezestat status.
3. Outside Air Damper:
    a. The outside air damper shall open anytime the unit runs and shall close anytime the unit stops. The supply fan shall start only after the damper status has proven the damper is open. The outside air damper shall close 4sec (adj.) after the supply fan stops.
    b. Alarms shall be provided as follows:
        1) Outside Air Damper Failure: Commanded open, but the status is closed.
        2) Outside Air Damper in Hand: Commanded closed, but the status is open.
4. Supply Fan:
    a. The supply fan shall run anytime the unit is commanded to run. To prevent short cycling, the supply fan shall have a user definable (adj.) minimum runtime, unless shutdown on safeties.
    b. Alarms shall be provided as follows:
        1) Supply Fan Failure: Commanded on, but the status is off.
        2) Supply Fan in Hand: Commanded off, but the status is on.
5. Exhaust Fan:
    a. The exhaust fan shall run whenever the supply fan runs, unless shutdown on safeties.
    b. Alarms shall be provided as follows:
        1) Exhaust Fan Failure: Commanded on, but the status is off.
        2) Exhaust Fan in Hand: Commanded off, but the status is on.
6. Supply Air Temperature Setpoint - Fixed:
    a. The controller shall monitor the supply air temperature and shall maintain a supply air temperature setpoint ***based on a reset schedule.***
7. Cooling Coil Valve:
    a. The controller shall measure the supply air temperature and

modulate the cooling coil valve to maintain its cooling setpoint.

b. The cooling shall be enabled whenever:
   1) Outside air temperature is greater than ***the unoccupied/ occupied reset schedule.***
   2) AND the supply air temperature is above cooling setpoint.
   3) AND the fan status is on.

c. The cooling coil valve shall open to 50% (adj.) whenever the freezestat is on.

8. Heating Coil Valve:
   a. The controller shall measure the supply air temperature and modulate the heating coil valve to maintain its heating setpoint.
   b. The heating shall be enabled whenever:
      1) Outside air temperature is less than ***the unoccupied/ occupied reset schedule.***
      2) AND the supply air temperature is below heating setpoint.
      3) AND the fan status is on.
   c. The heating coil valve shall open to 100% (adj.) whenever the freezestat is on.

9. Prefilter Status:
   a. The controller shall monitor the prefilter status.
   b. Alarms shall be provided as follows:
      1) Prefilter Change Required: Prefilter differential pressure exceeds a user definable limit (adj.).

10. Supply Air Temperature:
   a. The controller shall monitor the supply air temperature.
   b. Alarms shall be provided as follows:
      1) High Supply Air Temp: If the supply air temperature is greater than 120°F (adj.).
      2) Low Supply Air Temp: If the supply air temperature is less than 45°F (adj.).

N. Water Source Heat Pump (typical of 1)
1. Run Conditions - Scheduled:
   a. The unit shall run according to a user definable time schedule in the following modes:
      1) Occupied Mode: The unit shall maintain
         a) A 75°F (adj.) cooling setpoint
         b) A 72°F (adj.) heating setpoint
      2) Unoccupied Mode (night setback): The unit shall maintain
         a) A 85°F (adj.) cooling setpoint.
         b) A 55°F (adj.) heating setpoint.
         c) 60 – 65% RH zone space humidity
   b. Alarms shall be provided as follows:
      1) High Zone Temp: If the zone temperature is greater than the cooling setpoint by a user definable amount (adj.).
      2) Low Zone Temp: If the zone temperature is less than the heating setpoint by a user definable amount (adj.).

2. Freeze Protection:
   a. The unit shall shut down and generate an alarm upon receiving a freezestat status.

3. Smoke Detection:
   a. The unit shall shut down and generate an alarm upon receiving a smoke detector status.
4. Zone Setpoint Adjust:
   a. The occupant shall be able to adjust the zone temperature heating and cooling setpoints at the zone sensor.
5. Zone Optimal Start:
   a. The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period.
6. Zone Unoccupied Override:
   a. A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for an adjustable period of time. At the expiration of this time, control of the unit shall automatically return to the schedule.
7. Fan:
   a. The fan shall run anytime the unit is commanded to run, unless shutdown on safeties.
8. Heating and Cooling - 1 Compressor Stage:
   a. The controller shall receive a signal from the loop water source monitor indicating that there is water flow and that the water temperature is within acceptable limits.
   b. The controller shall measure the zone temperature and cycle the compressor to maintain its setpoint. To prevent short cycling, the stage shall have a user definable (adj.) minimum runtime. The compressor shall run subject to its own internal safeties and controls.
   c. The heating shall be enabled whenever:
      1) Outside air temperature is less than ***the unoccupied/ occupied reset schedule.***
      2) AND the fan is on.
      3) AND the reversing valve is in heat mode.
   d. The cooling shall be enabled whenever:
      1) Outside air temperature is greater than ***the unoccupied/ occupied reset schedule.***
      2) the fan is on.
      3) AND the reversing valve is in cool mode.
   e. The compressor shall be disabled and remain off for 30sec (adj.) after the reversing valve has changed position.
   f. Alarms shall be provided as follows:
      1) Compressor Runtime Exceeded: The compressor runtime exceeds a user definable limit (adj.).
9. Outside Air Dampers:
   a. The outside air damper shall open to provide a fixed percentage outside air ventilation anytime the unit runs and shall close anytime the unit stops. The damper open position shall be set during testing and balancing. The outside air damper shall close 1sec (adj.) after the fan stops.
   b. If Optimal Start Up is available the outside air damper shall close and the return air damper shall open.
10. Filter Status:
   a. The controller shall monitor the filter status.

b. Alarms shall be provided as follows:
1) Filter Change Required: Filter differential pressure exceeds a user definable limit (adj.).

11. Discharge Air Temperature:
a. The controller shall monitor the discharge air temperature.
Alarms shall be provided as follows:
1) High Discharge Air Temp: If the discharge air temperature is greater than 120°F (adj.).
2) Low Discharge Air Temp: If the discharge air temperature is less than 40°F (adj.).

12. Fan Status:
a. The controller shall monitor the fan status.
b. Alarms shall be provided as follows:
1) Fan Failure: Commanded on, but the status is off.
2) Fan in Hand: Commanded off, but the status is on.

O. Loop Monitor and Pumps (typical of 1)
1. Water Source Heat Pump Loop Monitor - Run Conditions:
a. The loop monitor shall run whenever:
1) Any zone is occupied.
2) OR a definable number of unoccupied zones need heating or cooling.
b. The following loop water conditions shall be monitored:
1) Flow status.
2) Supply temperature.
3) Return temperature.
c. Alarms and a heat pump shutdown signal shall be generated upon any of the following loop water conditions:
1) No Loop Flow.
2) High Loop Water Supply Temp Shutdown: If the loop water supply temperature is greater than 92°F (adj.).
3) Low Loop Water Supply Temp Shutdown: If the loop water supply temperature is less than 58°F (adj.).
d. Alarms shall be provided as follows:
1) High Loop Water Supply Temp: If the loop water supply temperature is greater than 90°F (adj.).
2) Low Loop Water Supply Temp: If the loop water supply temperature is less than 60°F (adj.).

2. Loop Water Pump Lead/Standby Operation:
a. The two loop water pumps shall operate in a lead/standby fashion.
1) The lead pump shall run first.
2) On failure of the lead pump, the standby pump shall run and the lead pump shall turn off.
b. The designated lead pump shall rotate upon one of the following conditions (user selectable):
1) manually through a software switch
2) weekly
c. Alarms shall be provided as follows:
1) Loop Water Pump 1
a) Failure: Commanded on, but the status is off.
b) Running in Hand: Commanded off, but the status is on.

2) Loop Water Pump 2
   a) Failure: Commanded on, but the status is off.
   b) Running in Hand: Commanded off, but the status is on.

P. Loop Cooling (typical of 1)

1. Water Source Heat Pump Cooling Tower System - Run Conditions:
   a. The cooling tower system shall be enabled to run whenever:
      1) The loop control is enabled by zone requirements.
2. Closed System Cooling Tower Loop Water Temperature Control:
   a. The controller shall measure the loop water supply temperature and stage the damper, spray pump and fans on in sequence to maintain setpoints. The following setpoints are recommended values. All setpoints shall be field adjusted during the commissioning period to meet the requirements of actual field conditions.
   b. On rising loop water supply temperature, the damper, pump and fan speeds shall stage on at the setpoints given below. When the loop water supply temperature drops back below the setpoints by the differentials listed, the fan speeds, pump and damper shall stage off. To prevent short cycling and back-emf in the fan motors, there shall be a minimum delay (adj.) between each stage.

Tower Damper	Spray Pump	Low Speed Fan	High Speed Fan
Stage ON: If loop temp rises above setpoint of:			
80°F	83°F	85°F	88°F
Stage OFF: If loop temp drops below setpoint by:			
4°F	5°F	5°F	5°F

   c. Alarms shall be provided as follows:
      1) Damper
         a) Failure: Commanded open, but the status indicates closed.
         b) Open in Hand: Commanded closed, but the status indicates open.
      2) Spray Pump
         a) Failure: Commanded on, but the status is off.
         b) Running in Hand: Commanded off, but the status is on.
      3) Fan Low Speed
         a) Failure: Commanded on, but the status is off.
         b) in Hand: Commanded off, but the status is on.
      4) Fan High Speed
         a) Failure: Commanded on, but the status is off.
         b) in Hand: Commanded off, but the status is on
      5) High Condenser Water Supply Temp: If the condenser water supply temperature is greater than 90°F (adj.).

Q. Loop Heating (typical of 1)

1. Water Source Heat Pump Boiler System - Run Conditions:
   a. The boiler system shall run subject to its own internal safeties and controls. The boiler system shall be enabled to run whenever:
      1. The loop control is enabled by zone requirements.
      2. AND outside air temperature is less than ***the unoccupied/ occupied reset schedule.***

b. The boiler system shall also run for freeze protection whenever outside air temperature is less than 38°F (adj.).

2. Two Stage Boiler Loop Water Temperature Control:
   a. The controller shall measure the loop water supply temperature and stage the boiler, its circulation pump and heating stages on in sequence to maintain setpoints. The boiler system shall run subject to its own internal safeties and controls.
   b. On dropping loop water supply temperature, the boiler and its circulation pump shall stage on at the setpoints given below. When the loop water supply temperature rises back above the setpoints by the differentials listed, the boiler shall then stage off. To prevent short cycling, there shall be a user definable (adj.) delay between stages, and each stage shall have a user definable (adj.) minimum runtime.
   c. The following setpoints are recommended values. All setpoints shall be field adjusted during the commissioning period to meet the requirements of actual field conditions.
   d. The boiler and circulation pump shall stage to maintain setpoints as follows:

	Boiler & Pump	Stage 1	Stage 2
Stage ON: If loop temp drops below setpoint of:	70°F	68°F	66°F
Stage OFF: If loop temp rises above setpoint by:	4°F	4°F	4°F

   e. Alarms shall be provided as follows:
      1) Boiler
         a) Failure: Commanded on, but the status is off.
         b) Running in Hand: Commanded off, but the status is on.
      2) Low Boiler Supply Temp: If the boiler supply temperature is less than 120°F (adj.).

R. Makeup Air Unit - Supply Air Temp (typical of 1)
1. Run Conditions - Interlocked:
   a. The unit MAU --- shall be interlocked to run whenever Air Handling Unit ---- runs unless shutdown on safeties.
2. Freeze Protection:
   a. The unit shall shut down and generate an alarm upon receiving a freezestat status.
3. Outside Air Damper:
   a. The outside air damper shall open anytime the unit runs and shall close anytime the unit stops. The supply fan shall start only after the damper status has proven the damper is open. The outside air damper shall close 4sec (adj.) after the supply fan stops.
   b. Alarms shall be provided as follows:
      1) Outside Air Damper Failure: Commanded open, but the status is closed.
      2) Outside Air Damper in Hand: Commanded closed, but the status is open.

4. Heat Recovery Wheel - Constant Speed:
   a. The controller shall run the heat wheel for energy recovery as follows.
      1) Cooling Recovery Mode: The controller shall measure the heat wheel discharge air temperature and run the heat wheel to maintain a setpoint 2°F (adj.) less than the unit supply air temperature setpoint. The heat wheel shall run for cool recovery whenever:
         a) The unit return air temperature is 5°F (adj.) or more below the outside air temperature.
         b) AND the unit is in a cooling mode.
         c) AND the supply fan is on.
      2) Heating Recovery Mode: The controller shall measure the heat wheel discharge air temperature and run the wheel to maintain a setpoint 2°F (adj.) greater than the unit supply air temperature setpoint. The heat wheel shall run for heat recovery whenever:
         a) Unit return air temperature is 5°F (adj.) or more above the outside air temperature.
         b) AND the unit is in a heating mode.
         c) AND the supply fan is on.
   b. Periodic Self-Cleaning:
      1) The heat wheel shall run for 10sec (adj.) every 4hrs (adj.) the unit runs.
   c. Frost Protection:
      1) The heat wheel shall run for 10sec (adj.) every 600sec (adj.) whenever:
         a) Outside air temperature drops below 15°F (adj.)
         b) OR whenever exhaust air temperature drops below 20°F (adj.).
   d. The bypass dampers will open whenever the heat wheel is disabled.
   e. Alarms shall be provided as follows:
      1) Heat Wheel Rotation Failure: Commanded on, but the status is off.
      2) Heat Wheel in Hand: Commanded off, but the status is on.
5. Supply Fan:
   a. The supply fan shall run anytime the unit is commanded to run. To prevent short cycling, the supply fan shall have a user definable (adj.) minimum runtime, unless shutdown on safeties.
   b. Alarms shall be provided as follows:
      1) Supply Fan Failure: Commanded on, but the status is off.
      2) Supply Fan in Hand: Commanded off, but the status is on.
6. Supply Air Temperature Setpoint - Fixed:
   a. The controller shall monitor the supply air temperature and shall maintain a fixed supply air temperature setpoint of 55°F (adj.) cooling, 70 °F (adj.) heating.
7. Cooling Coil Valve:
   a. The controller shall measure the supply air temperature and modulate the cooling coil valve to maintain its cooling setpoint.
   b. The cooling shall be enabled whenever:

1) Outside air temperature is greater than ***the unoccupied/ occupied reset schedule.***

2) AND the supply air temperature is above cooling setpoint.

3) AND the fan status is on.

c. The cooling coil valve shall open to 50% (adj.) whenever the freezestat is on.

8. Heating Coil Valve:

a. The controller shall measure the supply air temperature and modulate the heating coil valve to maintain its heating setpoint.

b. The heating shall be enabled whenever:

1) Outside air temperature is less than ***the unoccupied/ occupied reset schedule.***

2) AND the supply air temperature is below heating setpoint.

3) AND the fan status is on.

c. The heating coil valve shall open to 100% (adj.) whenever the freezestat is on.

9. Prefilter Status:

a. The controller shall monitor the prefilter status.

b. Alarms shall be provided as follows:

1) Prefilter Change Required: Prefilter differential pressure exceeds a user definable limit (adj.).

10. Final Filter Status:

a. The controller shall monitor the final filter status.

b. Alarms shall be provided as follows:

1) Final Filter Change Required: Final filter differential pressure exceeds a user definable limit (adj.).

11. Supply Air Temperature:

a. The controller shall monitor the supply air temperature.

b. Alarms shall be provided as follows:

1) High Supply Air Temp: If the supply air temperature is greater than 120°F (adj.).

2) Low Supply Air Temp: If the supply air temperature is less than 45°F (adj.).

END OF SECTION

SECTION 231101

LIQUID PETROLEUM GAS PIPING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for interior LP gas piping, exterior LP gas piping, gas valves, gas regulators, LP gas tanks, and vaporizers.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, performance ratings, and installation instructions.

1.3 QUALITY ASSURANCE

A. Material and installation requirements shall follow NFPA 58, state and local gas company codes.

B. Material and installation requirements shall follow OBC-Plumbing Code 4101:2-67 and 4101:8-1 thru 19 of the Ohio Pressure Piping Systems Rules.

C. Conformance to National Fuel Gas Code.

1.4 GAS PIPING

A. Interior gas piping shall be schedule 40 black steel piping.

B. Exterior gas piping shall be schedule 40 black steel piping with bituminous coating. Provide grounding anode(s). Review type of piping and depth of bury with local L.P. tank company.

C. Option to 2.01,A: Gas piping for ½ to 2 inch shall be corrugated stainless steel tubing. Covering must meet ASTM 84 (25/50) requirements and ANSI/AGA LCI B2005.

D. Copper tubing must meet ASTM B88 and NFPA 58.

E. Copper press fittings may be used as an option to wrought copper fittings. Fitting must be specifically made for natural gas and LP gas.

1.5 GAS VALVES

A. Gas valves 2 inches and smaller shall be full port all brass screwed gas service stops with lever handles and check.

B. Gas valves 2-1/2 inches and larger shall be semi-steel, straightway flanged, 125 lbs. swp, square head wrench operated, lubricated plug valve.

C. Kitchen Hood – Spring loaded (N.C.) gas valve.

D. In the science and art rooms, provide the following:
   1. A manual reset, solenoid operated shut-off valve with 120v operation with remote push button operation and fire alarm system activation.

1.6 GAS REGULATORS

A. Gas regulators shall limit the pressure of gas from the inlet to the outlet feeding a gas appliance.

1.7 LP GAS TANK

A. Tank shall be supplied by the local LP gas company, sized to match the gas usage of the school.

1.8 LP GAS VAPORIZER

A. Provide vaporizer for delivery of gas to the building if a liquid LP source is used, sized for the total building load.

1.9 INSTALLATION

A. Unions and valves are not permitted in the gas piping in a return air plenum.

B. Piping 1-1/2 inch and smaller shall have threaded joints.

C. Piping 2 inches and larger shall have welded joints.

D. All regulators shall be separately vented full size to the exterior, with a turndown elbow and insect screen. Vent outlet shall not terminate next to a combustion or fresh air intake.

E. Provide a valve, union and dirt leg at each appliance. Lubricate all valves before putting the valves into service.

F. Provide 1/2 inch elastomeric insulation around all piping through walls and floors.

G. Test all piping for 24 hours at 100 psi.

H. All interior piping shall be exposed. Exposed piping shall not be located where students could hang from the piping.

I. All exterior gas piping shall be buried a minimum of 30 inches.

J. Provide 6 foot high fence around tank(s).

K. Provide regulator on exterior wall of building, connected to the interior piping. Provide inlet and outlet shutoff valve.

L. Provide vaporizer within LP tank fence.

M. Science room auto shut-off valves can be located in teacher's demo unit, under sink, or exposed in storage room.

END OF SECTION

SECTION 232113

HVAC PIPING SPECIALITIES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for piping expansion joints and piping guides, pressure reducing valves, ASME safety relief valves, manual and automatic air vents, ASME compression and expansion tanks, air separators with automatic air vent, and strainers.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. Pressure piping shall meet ASME B31.9 Code.

B. Safety relief valve requirements shall meet ASME Boiler and Pressure Vessel Code.

1.4 COMPONENTS

A. Expansion Joint: Housed stainless steel bellows type. Provide with piping expansion guides.

B. Pressure-Reducing Valves. Bronze or cast iron body with inlet strainer and noncorrosive valve seat and stem. Preset at 12 psig (adjustable).

C. ASME Safety-Relief Valves: Brass or bronze body with brass and rubber wetted internal working parts. Size for the pressure and capacity of the system.

D. Manual Air Vents: Provide 1/2 inch diameter piping loop with ball valve and standard hose end connection.

E. Automatic Air Vents: High capacity with float operation. Constructed of cast iron body with stainless steel, brass and EPDM internal parts. Rated for 250 degrees F at 150 psig. Unit shall be designed not to allow air into the vent in ***case*** of system pressure dropping below atmospheric pressure. Use for relieving air from the system at the air separator only.

F. ASME expansion tanks with air-control tanks fittings, gauge glass and tank drain fittings.

G. ASME diaphragm-type compression tanks.

H. Air separators with high capacity automatic air vent.

I. Y-Pattern Strainers: 125 psig working pressure cast iron or bronze body ASTM A126 Class B.

J. Duplex basket strainers for open condenser water systems. Cast iron body with stainless steel basket strainer. Provide with isolation valves for cleaning each strainer while remaining in service.

K. Corrosion coupons with associated holders in piping.

1.5 INSTALLATION

A. Provide piping expansion joints with piping control guides to control the expansion of the heating water piping systems where piping expansion loops cannot be used because of space restrictions.

B. Provide pressure reducing valves at the domestic cold water make-up connection to the closed loop heating water, chilled water piping systems, and heat pump.

C. Provide ASME safety relief valve in all closed hydronic loop systems. Relief valves shall be sized for the proper relief capacity to protect each system.

D. Provide manual air vent valves at all coils and at the high points of each system.

E. Provide automatic air vent valves on the air separator for each system. Pipe this air relief discharge to the nearest floor drain.

F. Provide either an ASME compression tank or an ASME bladder type expansion tank for each closed loop system.

G. Provide a full size (same size as the main piping system) centrifugal air separator on the suction side of the closed loop pumping system. The capacity shall meet or exceed the flow requirements of the system.

H. Provide basket strainer for all open loop condenser water systems.

I. Provide corrosion coupons and holders for all open loop condenser water systems.

J. Provide Y-pattern strainer at all coils including VAV reheat coils at inlet side of control valve and automatic flow controller.

END OF SECTION

SECTION 232117

GLYCOL HEAT TRANSFER FLUID

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for pre-mixed [ethylene] [propylene] glycol solution for the closed loop heating water systems and chilled water systems.

1.2 SUBMITTALS

A. Submittals are required and shall include product data, system capacity adjustments, MSDS sheets, and requirements for installation.

1.3 QUALITY ASSURANCE

A. Chemical shall meet all state and local pollution control regulations.

B. Heat transfer solution shall be inhibited and specifically for use in commercial HVAC systems.

C. System shall have a minimum 8 inch by 10 inch metal system nameplate denoting the following:

1. Date of original HTF charge.
2. Description of heat transfer fluid.
3. Manufacturer's name, address, and telephone.
4. Percent ***glycol.***
5. Freeze point and burst point.
6. Total system gallons.
7. Reference to material safety sheet.
8. Instruction for sampling of fluid.
9. Month for annual sampling.
10. Mailing instructions.

1.4 ETHYLENE GLYCOL-BASED PRODUCT

A. Inhibited ethylene glycol containing inhibitors, buffers, and anti-foaming agents.

B. Minimum 25 percent solution of heat transfer fluid and deionized water.

1.5 PROPYLENE GLYCOL-BASED PRODUCT

A. Inhibited propylene glycol containing inhibitors, buffers, and anti-foaming agents.

B. Minimum 30 percent solution of heat transfer fluid and deionized water. A 20 percent solution shall be acceptable in geothermal, ground-coupled systems where required for protection of equipment - not for freeze (burst) protection for exterior piping.

1.6 INSTALLATION

A. Install fluid on suction side of system pump.

1.7 HYDRONIC SYSTEMS FLUSHING

A. Hydronic systems shall be throughly flushed with approved pre-cleaning agent prior to being placed into service.

END OF SECTION

SECTION 232119

HVAC FLOW CONTROL

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for calibrated plug valves for manual system flow balancing and automatic flow balancing valves.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 COMPONENTS

A. Calibrated plug valves
1. 125 psig maximum working pressure 250 degrees Fahrenheit maximum operating temperature, bronze construction with calibrated orifice. Provide with pressure temperature taps. Two inches diameter and smaller shall have threaded connections. Two and one-half inches diameter and larger shall be flanged connections.

B. Automatic flow balancing valves:
1. 150 psig maximum working pressure, 250 degrees F maximum operating temperature. Brass or bronze housing for one and one-half inches diameter piping size and smaller and cast iron for two inches diameter and larger piping size with all stainless steel operating parts. Flow shall be controlled to plus or minus 5 percent of the required flow. Provide with threaded connections for two inches diameter and smaller. Provide flanged or grooved connections for two inches diameter and larger. Provide with pressure temperature taps on each side of the flow control cartridge. Provide the proper pressure control range for the system.

1.4 INSTALLATION

A. Provide (calibrated manual) (automatic) flow control valves at each coil, heat pump, boiler or each chiller of a multiple chiller installation to properly balance the flow to each device.

END OF SECTION

SECTION 232123

HVAC HYDRONIC PUMPS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for in-line circulators, vertical in-line pumps, base-mount end-suction pumps, close-coupled end-suction pumps, coil circulating pumps, and double-suction, vertical split-case pumps.

1.2 SYSTEM DESCRIPTION

A. Impellers shall be sized for a maximum diameter not to exceed 85 percent of the selected pump's largest diameter.

B. Each pump shall be selected for non-overloading operation throughout its curve.

C. Each pump shall be provided with high efficiency motors.

D. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

1.3 SUBMITTALS

A. Submittals are required and shall include pump performance curves.

1.4 HORIZONTAL IN-LINE CIRCULATORS

A. Each pump will be horizontal, centrifugal, single stage, design with cast iron casings and bronze impellers.

B. Mechanical seals.

C. Resiliently mounted motor.

1.5 VERTICAL IN-LINE PUMPS

A. Each pump will be vertical, centrifugal, single stage, design with cast iron casings and bronze impellers.

B. Mechanical seals.

C. Direct-mounted motor with lifting and supporting lugs.

1.6 BASE-MOUNT END-SUCTION PUMPS

A. Each pump will be single stage, base-mounted, end-suction design with cast iron casing, cast-bronze impeller, and bronze fitted construction.

B. Mechanical seals.

C. The pump and motor shall be mounted on a common baseplate of heavy structural steel.

1.7 CLOSE-COUPLED END SUCTION PUMPS

A. Each pump shall be closed-coupled, single-stage, end suction design with cast iron casing, cast-bronze impeller, and bronze-fitted construction.

B. Mechanical seals.

C. Direct-mounted motor.

1.8 COIL CIRCULATING PUMPS

A. Each pump will be horizontal, centrifugal, single stage, design with cast iron casings and nonmetallic impellers.

B. Mechanical seals.

C. Resiliently mounted motor.

1.9 DOUBLE-SUCTION, VERTICAL SPLIT-CASE PUMPS

A. Each pump will be single stage, double-suction, vertical split case design with cast iron casing, bronze impeller, and bronze fitted construction.

B. Mechanical seals.

C. The pump and motor shall be mounted on a common baseplate of heavy structural steel.

1.10 INSTALLATION

A. Install all pumps in accordance with manufacturer's requirements.

B. Base mounted pumps shall be mounted on a concrete housekeeping pad. In-line pumps shall be supported from the structure or floor. Pumps may be provided as part of a packaged pumping system. Base mounted pumps shall be set on concrete inertia base when provided as part of packaged pumping systems.

END OF SECTION

SECTION 232300

REFRIGERANT PIPING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for refrigerant piping and accessories.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacities at the specified conditions, materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. ASME B31.5 Refrigeration Piping latest edition.

B. UL 207 Refrigerant Containing Components and Accessories.

1.4 COMPONENTS

A. Piping: Type ACR hard copper tubing with wrought copper fittings and brazed joints.

B. Valves
1. Packed angle valve.
2. Solenoid valve.
3. Refrigerant check valve.
4. Thermal expansion valve.
5. Pressure relief valve.
6. Pressure regulating valve.
7. Hot gas bypass valve.
8. Suction accumulator.

C. Moisture indicators.

D. Replaceable type filter/dryer assemblies with three valve by-pass.

E. Flexible piping connectors.

1.5 INSTALLATION

A. Provide filter/dryer assemblies, moisture indicators, thermal expansion valve and solenoid valves for each refrigeration circuit.

B. Pressure test refrigerant piping system at 300 psi for high side and 150 psi for low side. Maintain pressure for a minimum of 24 hours.

C. Leak test piping and joints with an electronic or halide leak detector.

D. Evacuate entire system with an approved high vacuum pump system to 500 microns.

END OF SECTION

SECTION 232500

HVAC WATER TREATMENT

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for closed water treatment system for heating hot water, chilled water, geothermal, and heat pump condenser water systems.

B. Qualitative requirements for open water treatment system for cooling tower condenser water systems.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting catalog data, specification data, dimensional and operational data, wiring requirements with diagram, chemical specification data, and warranty data.

1.3 QUALITY ASSURANCE

A. Chemical shall meet all state and local pollution control regulations.

B. Water chemistry and makeup must meet the installed equipment's operational and warranty requirements.

1.4 WARRANTY

A. Provide a 1 year ***service program including testing and required materials and maintenance.***

1. Chemical feed systems shall include all chemicals and additives.

B. Filter media is to be provided as necessary to maintain the required water quality over the installation, start-up, and ***warranty*** periods.

1.5 Applicable System Types

A. Closed Water Treatment Systems

1. Manual bypass chemical feeder.

2. Automatic glycol feeder pump.

B. Open Water Treatment Systems

1. Automatic chemical injection system.

2. Chemical-free Magnetic Field with alternating and reversing polarity field orientation.

3. Chemical-free Pulsed Electric Field.

4. Chemical-free Hydrodynamic Cavitation.

C. Open systems employing a chemical-free water treatment system shall also include a side stream filter and manual bypass chemical feeder for use with initial flushing, cleaning and cooling tower passivation. Bypass feeder shall also be utilized for additional biocide treatment if required by evidence of sampling and testing.

1.6 Performance Requirements

A. Water quality for HVAC systems shall minimize corrosion, scale buildup, and biological growth for optimum efficiency of HVAC equipment without creating a hazard to operating personnel or the environment.

B. Closed Hydronic Systems shall maintain the following water qualities:
1. pH: Maintain a value within 9.0 to 10.5 .
2. "P" Alkalinity: Maintain a value within 100 to 500 ppm.
3. Conductivity: Maintain a value within 300 to 5,000 S/cm.
4. Deleted
5. Free Caustic Alkalinity: Maintain a maximum value of 20 ppm.
6. Microbiological Limits:
a. Total Aerobic Plate Count: Maintain a maximum value of 1000 CFU's/ml.
b. Total Anaerobic Plate Count: Maintain a maximum value of 100 CFU's/ml.
c. Iron Bacteria: Maintain a maximum value of 0 CFU's/ml.

C. Open Hydronic Systems shall maintain the following water qualities:
1. pH: Maintain a value within 7.2 to 9.4 .
2. "P" Alkalinity: Maintain a maximum value of 100 ppm.
3. Conductivity: Maintain a value within 300 to 5,000 S/cm.
4. Chemical Oxygen Demand: Maintain a maximum value of 100 ppm.
5. Deleted
6. Free "OH" Alkalinity: Maintain a maximum value of 0 ppm
7. Microbiological Limits:
a. Total Aerobic Plate Count: Maintain a maximum value of 10,000 CFU's/ml.
b. Total Anaerobic Plate Count: Maintain a maximum value of 1000 CFU's/ml.
c. Iron Bacteria: Maintain a maximum value of 0 CFU's/ml.
8. Polymer Testable: Maintain a minimum value within 10 to 40.

D. Passivation for Galvanized Steel: For the first 60 days of operation.
1. pH: Maintain a value within 7 to 8 .
2. Calcium Carbonate Hardness: Maintain a value within 100 to 300 ppm.
3. Calcium Carbonate Alkalinity: Maintain a value within 100 to 300 ppm.

1.7 SYSTEM COMPONENTS

A. Side Stream Filters and Chemical Feeder: Cast iron or steel, [2 gallon][5 gallon][10 gallon] capacity, 300 psi at 200 degrees F, support legs, 20 micron filter, epoxy-coated, drain valve, spare filter, and spare lid gasket.

B. Conductivity Probe: Provide complete with probe and flow switch and dual flat switch surface carbon elements. Maximum pressure shall not exceed 150 psi and maximum temperature shall not exceed 140 degrees F.

C. Positive-displacement [diaphragm] [piston] pumps: Provide with ball type check valves, foot valves, and injection fittings.

D. Chemical Solution Tanks: [30 gallon] [50 gallon].

E. Packaged conductivity controller: Electronic operation with bleed and feed relays, feed timer, and digital display for control setting and adjustments.

F. Cold-water meter: Provide complete with contacting register sized to meter twice the volume of maximum makeup water rate for system.

G. Solenoid valves: Provide and wire as required.

H. Electronic timers: Provide a biocide control timer and lockout control timer.

I. Condenser water treatment control panel: Provide enclosed in a NEMA 4X, IP-65 rated enclosure with hinged lockable cover.

J. ***Water*** treatment test equipment
1. Water test kit with spare reagents.
2. Conductivity meter that compensates for differences in temperatures and analog meter.
3. Corrosion test coupon assembly (open systems)

K. Chemicals
1. Provide a minimum of 1 years supply.
2. Include all MSDS sheets for chemicals provided.

L. Pre-cleaning and flushing materials: Provide chemicals produced specifically for use in cleaning piping systems after installation and prior to being placed into operation.

1.8 INSTALLATION

A. Install side stream filter and chemical feeder with 2 valve bypass and drain.

B. Install make-up water meter with 3-valve bypass, strainer, and unions.

C. Mount conductivity monitor, chemical feed pumps, and biocide timer on 304 stainless steel shelf.

D. Hydronic systems shall not be operated for any reason prior to complete flushing and charging with appropriate chemicals.

1.9 HYDRONIC SYSTEMS FLUSHING AND PRE-CLEANING

A. The following procedures is for flushing and pre-cleaning
1. Determine the metallurgy of the system
2. By-pass all HVAC equipment
3. Determine the exact system volume. This may be accomplished by filling the system through a water meter or salt test.
4. With all areas open to flow, add system cleaner through the By-Pass Filter Feeder or pump per manufacturer's recommendations.
5. Cleaning and flush rates must be at a minimum of 6 ft/sec through the piping or maximum flow rate of the system.
6. First flush the system to remove as much suspended material as possible with clear water.
7. Second, cleaning shall maintain total alkalinity of 3000 ppm for twenty-four (24) to thirty-six (36) hours.
8. Third, flush system until pH and Alkalinity return to make-up water levels and drain.

9. Fourth, fill system with OSDM-compliant clean water with a water chemistry (pH, alkalinity, etc.) and make-up that meets equipment water quality requirements.
   a. If the system is drained of water and a heat transfer solution added, a quality corrosion inhibitor shall be added to the system to protect against flash rust while the system is drained. Please consult your water treatment professional for recommendations.

10. Simply draining the loop and refilling with fresh water is not permitted. The loop needs to be flushed by adding fresh water and draining dirty water continuously. This procedure will help prevent foulants from dropping out on the pipe surfaces.

B. ADDITIONAL PROCEDURE FOR GEOTHERMAL SYSTEM FLUSHING AND CLEANING
   1. It is imperative that the geothermal piping is sealed and capped during installation to keep debris out. Geothermal systems must be flushed after each stage of the installation.

   2. Vertical well piping shall be flushed with high pressure water once they are installed and grouted to remove any debris in the pipe. Piping shall be recapped to prevent sand and dirt from entering the piping before they are connected to the header.

   3. Main horizontal header shall be flushed with high pressure water once they are installed to remove any debris in the piping. Piping shall be recapped to prevent sand and dirt from entering the piping until they are connected to the vertical well piping.

   4. The entire geothermal piping system shall be cleaned and flushed as indicated above in item A.

   5. Architect, Engineer or CM shall signoff on pipe cleaning before system can be started.

1.10 WATER SERVICE PROGRAM
   A. The ***water*** treatment contractor shall provide ***maintenance*** and consulting services for 1 year from date of acceptance of system by the Owner. Minimum service requirements shall include:
      1. ***Monthly*** sample and testing
      2. Additional chemical if needed
      3. Side stream filter change
      4. Testing of: PH, alkalinity, conductance, inhibitor, microbiological dip slide, and % glycol
      5. Visual check of system
      6. Written report documenting all of the items above.

1.11 TRAINING
   A. Provide training for Owner's maintenance staff on testing of water samples.

END OF SECTION

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SECTION 233113

LOW-PRESSURE DUCTWORK

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for low pressure supply (***3-inch wg and below*** pressure class) sheetmetal ductwork; and low pressure return, relief and exhaust (2-inch wg pressure class negative) sheetmetal ductwork.

C. Qualitative requirements for duct insulation liner. Application shall be limited; external wrapped insulation is preferred.

1.2 SUBMITTALS

A. Submittals are required and shall include 1/4 inch scale layout shop drawings showing duct location sizes, elevations and air flow quantities for each air terminal device. Electronic drawing files of floor plans and structural plans are available from the Architect/Engineer upon request.

1.3 QUALITY ASSURANCE

A. SMACNA HVAC Duct Construction Standards-Metal and Flexible.
B. UL181.
C. NAIMA AH124-94: Fibrous Glass Duct Liner Standard.
D. NFPA 90A and 90B.
E. ASHRAE Handbook, HVAC Systems and Equipment.
F. ***Ductwork shall be sealed as required*** by ASHRAE Standard 90.1.

1.4 COMPONENTS

A. Supply air, return air, relief air and exhaust air (except shower rooms, kitchen exhaust hoods, dishwasher exhaust and fume hood exhaust) shall be galvanized steel lock-forming quality ASTM A 653/A 653/M, G90 (Z275) coating designation; milli-phosphatized finish for surfaces of ducts exposed to view. Gauges shall be per the latest issue of SMACNA for listed pressure requirements.
   1. Provide Class B seals for all joints.
   2. Bolted-flange style duct connections shall be acceptable.

B. Fume hood exhaust shall be Type 304 stainless steel or PVC -coated galvanized steel lock forming quality meeting UL 181, ASTM A 653/A 653/M, G90 (Z275) coating designation. Provide 4-mil PVC coating on the interior of the duct and fittings. Gauges shall be per the latest issue of SMACNA for listed pressure requirements.
   1. Provide Class A seals for all joints.

C. Shower exhaust ductwork shall be aluminum construction conforming to ASTM B 209 Alloy 3003, Temper H14, Gauges shall be per the latest issue of SMACNA for listed pressure requirements. Seal all joints liquid-tight. Pitch ductwork back toward grille.

D. Kitchen exhaust hood exhaust ductwork shall be 16 gauge steel with weld joints as required by the Ohio Basic Mechanical Code. All joints shall be welded liquid tight.

E. Dishwasher exhaust ductwork shall be 16 gauge type 304 stainless steel with liquid tight welded joints all the way to the fan. Pitch ductwork back toward dishwasher.

F. Flexible duct liner shall be a minimum of 1 inch thick and shall be applied in accordance with the latest addition of the SMACNA's Duct Liner Application Standard. All dimension shown on the plans are inside duct dimension and do not include the dimension of the duct liner.

END OF SECTION

SECTION 233115

MEDIUM-PRESSURE DUCTWORK

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for medium-pressure round or flat oval supply ***(4-inch wg and higher pressure class, including all ductwork in VAV systems between the air handling units and VAV terminals).***

1.2 SUBMITTALS

A. Submittals are required and shall include 1/4 inch scale layout shop drawings showing duct location sizes, elevations and air flow quantities for each air terminal device. Electronic drawing files of floor plans and structural plans are available from the Architect/Engineer upon request.

1.3 QUALITY ASSURANCE

A. SMACNA HVAC Duct Construction Standards-Metal and Flexible.

B. UL181.

C. NFPA 90A and 90B.

D. ASHRAE Handbook, HVAC Systems and Equipment.

E. Ductwork shall be sealed and leak tested as required by ASHRAE Standard 90.1.

1.4 COMPONENTS

A. Supply air shall be spiral seam round or flat oval duct work constructed of galvanized steel lock-forming quality ASTM A 653/A 653/M, G90 (Z275) coating designation; milli-phosphatized finish for surfaces of ducts exposed to view. Gauges shall be per the latest issue of SMACNA for listed pressure requirements.

B. Minimum round duct sheet metal gauge shall be as follows:

Duct Diameter	Spiral Seam Gauge	Longitudinal Seam Gauge
3 through 14 inches	26	24
15 through 26 inches	24	22
27 through 36 inches	22	20
37 through 50 inches	20	20
51 through 60 inches	18	18
61 through 84 inches	18	16

C. Minimum flat oval duct gauges shall be as follows:

Major Dimension Duct Width	Spiral Seam Gauge	Longitudinal Seam Gauge
Up through 24 inches	24	20
25 through 36 inches	22	20
37 through 48 inches	22	18
49 through 60 inches	20	18
61 through 70 inches	20	16
70 inches and up	18	16

D. Fittings for duct construction shall be of sheet metal gauges as follows:

Duct Diameter/ Major Dimension	Round Fittings	Flat Oval Fittings
3 through 14 inches	24	20
15 through 26 inches	22	20
27 through 36 inches	20	20
37 through 50 inches	20	18
51 through 60 inches	18	18
61 through 84 inches	16	16

E. Provide with Class A seals for all duct joints.

END OF SECTION

SECTION 233117

FLEXIBLE DUCTWORK

GENERAL GUIDELINES

1.1 SECTION INCLUDES
- A. Qualitative requirements for flexible insulated HVAC ductwork and flexible ductwork joint connections.

1.2 SUBMITTALS
- A. Submittals are required and shall include material pressure ratings and dimensions.

1.3 QUALITY ASSURANCE
- A. SMACNA HVAC Duct Construction Standards-Metal and Flexible.
- B. UL181 .
- C. NFPA 90A and 90B.
- D. ASHRAE Handbook, HVAC Systems and Equipment.
- E. UL 191.
- F. ***Ductwork shall be sealed as required*** by ASHRAE Standard 90.1.

1.4 COMPONENTS
- A. Low Pressure Flexible Duct
  1. Inner Core: Reinforced 3-ply aluminum foil with mechanically lock helix.
  2. Outer Covering: 1 inch thick, 3/4 pound density fiberglass with fire retardant jacket.
  3. Pressure Rating: 5 inches positive or negative.
- B. High Pressure Flexible Duct
  1. Inner Core: All metal, bend 3-ply laminated aluminum.
  2. Outer Covering: 1 inch thick, 3/4 pound density fiberglass with fire retardant jacket.
  3. Pressure Rating: 10 inch positive.
- C. Flexible Joints
  1. Minimum 30 ounce neoprene coated fabric secured by bolted angles or band iron.
  2. Metal to metal contact shall not be permitted.

1.5 INSTALLATION
- A. Provide the flexible connections at ductwork connections to vibrating or rotating equipment, including fans.

END OF SECTION

SECTION 233300

DUCTWORK ACCESSORIES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for backdraft dampers, manual volume dampers, fire dampers, smoke dampers, duct silencers, turning vanes and duct access doors.

1.2 SUBMITTALS

A. Submittals are required and shall include material, sizes, quantities, and dimensions.

1.3 QUALITY ASSURANCE

A. SMACNA HVAC Duct Construction Standards-Metal and Flexible.

B. UL181 .

C. NFPA 90A and 90B.

D. ASHRAE Handbook, HVAC Systems and Equipment.

E. Dampers shall meet the requirements of ASHRAE Standard 90.1.

1.4 COMPONENTS

A. Backdraft Dampers
1. Frames: Galvanized steel.
2. Blades: Extruded aluminum.
3. Blade Seals: Neoprene.
4. Blade Axles: Galvanized steel.
5. Tie Bars and Brackets: Aluminum.
6. Return Spring: Adjustable tension for motor operated dampers only.
7. Dampers: Counter-balanced for building pressure activation.

B. Manual Volume Dampers
1. Frames: Galvanized steel.
2. Blades: Galvanized steel or Extruded aluminum.
3. Tie Bars and Brackets: Galvanized steel.
4. Blade Seals: Neoprene.
5. Dampers: Multiple, opposed blade design with linkage outside airstream.

C. Fire Dampers
1. UL listed and labeled for 1-1/2 hour or 3 hour.
2. Frame: Galvanized steel.
3. Blades: Mounted out of airstream.
4. Fusible Link: Replaceable 165 degrees F.

D. Smoke Dampers
   1. Actuators: Two-position with spring-return motors.

E. Duct Silencers: Factory-fabricated and -tested, 25/50 flame-spread/smoke-developed rating, with performance ratings determined by ASTM E 477.
   1. Fill Material: fiberglass.

F. Turning Vanes
   1. Installer fabricated or manufactured.

G. Duct-Mounted Access Panels and Doors
   1. Frame: Galvanized steel
   2. Door: Double wall galvanized steel with 1 inch insulation fill and neoprene seal.
   3. Access panels shall be rated to seal at air pressure of associated duct.

1.5 INSTALLATION

A. Provide backdraft dampers on all relief air and exhaust air outlets (except kitchen exhaust and fume hood exhaust).

B. Provide manual volume dampers at each supply air outlet, exhaust air inlet, ducted relief air, and return air inlet.

C. Provide fire dampers in all ducted and non-ducted openings in fire rated assemblies as required by the Ohio Basic Building.

D. Provide smoke dampers in smoke barriers where required by the Ohio Basic Building Code.

E. Provide duct silencers to control the air handling system discharge sound pressure level to acceptable levels.

F. Provide turning vanes in all mitered ductwork 90 degree elbows.

G. Provide duct mounted access doors and panels to all fire dampers, control damper, plenum housings.

END OF SECTION

SECTION 233313

EXTERIOR WALL LOUVERS

GENERAL GUIDELINES

1.1 SECTION INCLUDES
- A. Qualitative requirements for exterior wall louvers and soffit louvers.

1.2 SUBMITTALS
- A. Submittals are required and shall include scheduled material, sizes, quantities, and finish.

1.3 QUALITY ASSURANCE
- A. AMCA Standard 511.

1.4 COMPONENTS
- A. Rectangular Drainable Wall Louvers
  1. Stormproof, aluminum construction.
  2. Aluminum bird screen suitably braced to prevent sagging.
  3. Frame shall be constructed of 6063T5 extruded aluminum.
  4. Blades shall be constructed of 6063T5 extruded aluminum. Blades shall be the drainable type, positioned at a minimum 35 degree angle.
  5. Finish shall be factory applied baked enamel.

- B. Specialty Louvers-Polygon
  1. Stormproof, aluminum construction.
  2. Aluminum bird screen suitably braced to prevent sagging.
  3. Frame shall be constructed of 6063T5 extruded aluminum.
  4. Blades shall be constructed of 6063T5 extruded aluminum. Blades shall be the drainable type, positioned at a minimum 35 degree angle.
  5. Finish shall be factory applied baked enamel.

- C. Specialty Louvers Semi-Round or Round
  1. Stormproof, aluminum construction.
  2. Aluminum bird screen suitably braced to prevent sagging.
  3. Frame shall be constructed of 6063T5 extruded aluminum.
  4. Blades shall be constructed of 6063T5 extruded aluminum. Blades shall be the drainable type, positioned at a minimum 35 degree angle.
  5. Finish shall be factory applied baked enamel.

- D. Horizontal Soffit Louvers
  1. Horizontal soffit louvers shall be of aluminum construction.
  2. Frame to be of 6063T5 extruded aluminum.
  3. Blades to be of 6063T5 extruded aluminum.
  4. Aluminum bird screen suitably braced to prevent sagging.
  5. Finish shall be factory applied baked enamel.

1.5 INSTALLATION
- A. Install wall louvers of the sizes and quantities as required.

END OF SECTION

SECTION 233400

HVAC FANS

GENERAL GUIDELINES

1.1 SECTION INCLUDES
- A. Qualitative requirements for roof exhaust fans, in-line exhaust fans, utility fan sets, and ceiling exhaust fans.

1.2 SUBMITTALS
- A. Submittals are required and shall include material capacities, quantities, and accessories.

1.3 QUALITY ASSURANCE
- A. Sound Power Level Rating: AMCA 301.
- B. Performance Requirements: AMCA 210.
- C. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

1.4 COMPONENTS
- A. Utility Set Fans
  1. Drive: Belt driven.
  2. Housing: Steel, adjustable.
  3. Fan Wheel: Centrifugal, single inlet, steel [backward inclined] [forward curved].
  4. Fan Shaft: Steel.
  5. Shaft Bearings: Prelubricated, self-aligning, pillow block type ball bearings with 200,000 hour rated life.
  6. Belt Drives: Factory mounted, 1.4 service factor, adjustable pitch motor pulleys, oil-resistant non-sparking belts, and belt guards.
  7. Motors: Heavy duty, ball bearing type with overload protection.
  8. Accessories: [Gravity-actuated backdraft dampers] [Access doors] [Scroll dampers] [Spark-resistant construction] [Inlet screens] [Drain connection] [Weathershield hoods].
- B. Centrifugal Roof Ventilators
  1. Drive: [Belt] [Direct].
  2. Housing: Spun aluminum.
  3. Fan Wheel: Aluminum hub and wheel, backward-inclined blades.
  4. Belt Drive Assembly: Steel shaft, permanently lubricated ball bearings, cast iron adjustable pitch pulley, and fan motor isolated from airstream.
  5. Motor: Heavy duty, ball bearing type with overload protection.
  6. Accessories: [Variable speed controller] [Disconnect switch] [Bird screens] [Backdraft dampers].
  7. Roof Curb Configuration: [Self-flashing without cant strip and with mounting flange] [Built-in cant and mounting flange] [Built-in raised cant and mounting flange].
  8. Roof Curb Height: 12 inches standard above finished roof.

C. Upblast Centrifugal Roof Exhaust Fans

Spec Writer Note: Accessories not to be used on greese duct exhaust system.

1. Drive: Belt driven.
2. Wind Band, Fan Housing, and Base: Reinforced and braced aluminum.
3. Housing: Spun aluminum.
4. Fan Wheel: Aluminum construction, backward inclined centrifugal.
5. Belt Drive Assembly: Steel shaft, permanently lubricated ball bearings, cast iron adjustable pitch pulley with motor mounted outside the airstream.
6. Motor: Heavy duty, ball bearing type with overload protection.
7. ***Accessories: [Variable speed controller][Disconnect switch][Bird screen][Back draft dampers]***
8. Roof Curb Configuration: [Self-flashing without cant strip and with mounting flange] [Built-in cant and mounting flange] [Built-in raised cant and mounting flange].
9. Roof Curb Height: 18 inches.

D. Propeller Wall Ventilators

1. Drive: [Belt] [Direct].
2. Housing: [Spun aluminum] [Painted steel].
3. Fan Blade: Steel hub with steel propeller blades.
4. Belt Drive Assembly: Steel shaft, permanently lubricated ball bearings, cast iron adjustable pitch pulley, and fan motor isolated from airstream.
5. Motors: Shall be permanently lubricated, heavy duty type with overload protection.
6. Accessories: [Variable speed controller] [Disconnect switch] [Bird screens] [Backdraft dampers].

E. Ceiling Mounted Exhaust Fans

1. Drive: Direct.
2. Housing: Galvanized steel.
3. Fan Wheel: Centrifugal.
4. Grilles: Plastic, louvered.
5. Roof jack or wall cap and transition fittings.
6. Provide with backdraft dampers.
7. Provide with integral disconnect switch.

F. In-Line Centrifugal Fans.

1. Drive: [Direct] [Belt].
2. Housing: Galvanized sheet metal.
3. Fan Wheel: Centrifugal, aluminum.
4. Belt Drive Assembly: Steel shaft, permanently lubricated ball bearings, adjustable pitch motor pulleys, motor insulated from airstream, belt guards.
5. Motors: Heavy duty, ball bearing type with overload protection.
6. Accessories: [Variable speed controller] [Disconnect switch] [Backdraft dampers].

1.5 INSTALLATION

A. Install per manufacturers requirements.

END OF SECTION

SECTION 233423

ROOFTOP INTAKE, EXHAUST, AND RELIEF VENTILATORS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for rooftop intake and exhaust gravity ventilators.

1.2 SUBMITTALS

A. Submittals are required and shall include material and dimensions.

1.3 COMPONENTS

A. Low Silhouette Roof Ventilators
   1. Shall be constructed of heavy gauge aluminum.
   2. Support members shall be constructed of galvanized steel.
   3. Hood shall be removable from base or hinged.
   4. Shall include 2 inch galvanized steel bird screens.
   5. Underside of hood shall be insulated to reduce condensation.
   6. Exterior finish shall be baked enamel.

B. Louvered Penthouse Units
   1. Shall be constructed of heavy gauge aluminum.
   2. Support members shall be constructed of galvanized steel.
   3. Hood shall be removable from base or hinged.
   4. Shall include 2 inch galvanized steel bird screens.
   5. Underside of hood shall be insulated to reduce condensation.
   6. Exterior finish shall be baked enamel.

1.4 INSTALLATION

A. Provide the number and type of ventilators as required.

B. Mount units on roof curbs.

END OF SECTION

SECTION 233513

DUST COLLECTION SYSTEM

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for woodworking shop dust collection cyclone separator, after-filter, ductwork, equipment hoods, floor sweeps, blast gates, and accessories.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacity, materials, controls, dimensions, and accessories and detailed ductwork layouts specific to each system.

1.3 QUALITY ASSURANCE

A. Design and installation shall be in accordance with the Industrial Ventilation Manual of the American Conference of Governmental Industrial Hygienists and the American National Standard for Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems (ANSI/AIHA Standard Z9.2 – 2006).

B. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

1.4 DUST COLLECTOR

A. Primary collector shall be cyclone type for exterior installation.

B. Dust shall be precipitated into 55 gallon drums, (one or two as required).

C. Unit shall be constructed of heavy-gauge, cold rolled steel.

D. Final finish of primer and enamel paint.

E. Unit shall be factory assembled for final field assembly of major subassemblies.

1.5 AFTER-FILTER UNIT

A. After-filter shall be cloth tube type.

B. Dust removal shall be 100 percent down to 0.5 microns.

C. Unit shall be provided with a manually operated, motorized shaker.

D. Bottom of unit shall form a storage bin not less than 14 cubic feet for dust.

E. Unit shall be factory assembled for placement in field.

1.6 DUCTWORK AND ACCESSORIES

A. Ductwork shall be comprised of galvanized steel spiral pipe of not less than 22 gauge material.

B. Elbows used in installation shall be a minimum of 2 gauges heavier construction than the straight pipe of equal diameter.

C. Hoods shall be constructed of not less than 18 gauge galvanized steel material.

D. Flexible duct connections shall be noncollapsible, flexible metallic hose.

E. Blast gates shall allow for locking the gate in an open position or for removal of gate. Butterfly dampers are not permitted.

F. Cleanouts shall include a piano hinged door with spring clamps, locking latches, and edge felting to prevent air leaks.

1.7 INSTALLATION

A. Install in accordance with manufacturers requirements.

B. Secure all duct and elbow joints with self-tapping screws and caulk or hardcast type sealer. Duct tape is not acceptable.

C. Position cleanouts with hinged side at bottom center of ductwork.

D. Blast gates shall be positioned within ***easy*** reach of equipment operator.

E. Manufacturer's service representative shall provide compete check, test, and start-up on the system.

F. Construct hoods to suit actual equipment and site conditions.

END OF SECTION

SECTION 233515

WELDING EXHAUST SYSTEM

GENERAL GUIDELINES

1.1 SECTION INCLUDES
- A. Qualitative requirements for source capture devices, ductwork, flexible hoses and accessories.

1.2 SUBMITTALS
- A. Submittals are required and shall include product data noting capacity, materials, controls, dimensions, and accessories and detailed ductwork layouts.

1.3 QUALITY ASSURANCE
- A. Design and installation shall be in accordance with 1) ANSI/AIHA Standard Z9.2 – 2006: American National Standard for Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems and 2) Industrial Ventilation: A Manual of Recommended Practice, 4th Edition, Amercan Conference of Governmental Industrial Hygienists (ACGIH).
- B. Flexible hoses shall meet UL-94 fire retardant requirements.

1.4 SOURCE CAPTURE DEVICES
- A. Constructed of reinforced fiberglass for fire retardance.
- B. Minimum 24 inches by 18 inches open face with an 8 inch diameter connection.
- C. Vertical support rail that allows for adjustment of capture device height, designed for wall mounting.
- D. Safety screen in throat.

1.5 DUCTWORK
- A. Round ductwork shall be manufactured of heavy gauge galvanized steel with a spiral lockseam.
- B. Fittings and couplings shall be constructed of 20 gauge galvanized steel.

1.6 FLEXIBLE HOSES
- A. Manufactured of polyvinyl chloride reinforced with a hard drawn steel spiral bead wire.
- B. Operating pressure of -7 psi to +5 psi.
- C. Operating temperature of -10 degrees Fahrenheit to +180 degrees Fahrenheit.

1.7 INSTALLATION
- A. Exhaust fans shall be as specified by Specification Section 233400 – HVAC Fans.
- B. Install in accordance with manufacturers requirements.
- C. Manufacturer's service representative shall provide compete check, test, and start-up on the system.

END OF SECTION

SECTION 233600

VARIABLE AIR VOLUME TERMINALS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for variable air volume reheat terminals and fan-powered variable air volume reheat terminals.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting the following:
   1. Product data indicating dimensions, weights, capacities, and materials.
   2. Static pressure requirements.
   3. Sound performance levels.
   4. Accessories.

1.3 QUALITY ASSURANCE

A. Construction standard shall meet NFPA 90A.

B. Product certification shall comply with ARI 880.

C. Sound power level rating shall comply with AMCA 300, ASHRAE 68, and AMCA 301.

D. Coil performance shall comply with ARI 410.

E. Insulation standard shall comply with UL 181.

1.4 COMPONENTS

A. Single-Duct Reheat Terminal Units
   1. Configuration: Volume-damper assembly inside unit casing.
   2. Casing: Zinc-coated steel
   3. Casing Lining: 1-inch thick, 1-1/2 pound density fiberglass insulation with erosion-resistant coating or 0.75 inch thick, 1-1/2 pound density closed cell foam insulation (fiber free).
   4. Air Inlets: Round or flat oval with air velocity sensor.
   5. Volume Damper: [Galvanized steel] [extruded aluminum] [cylindrical flow control device] with maximum airflow leakage of [2 percent at 1-inch wg] [2 percent at 3-inch wg] [3 percent at 3-inch wg] [3 percent at 6-inch wg].
   6. Damper Position: [Normally open] [Normally closed].
   7. Multi-outlet Discharge Section: Insulated plenum with ductwork discharge collars and locking balancing damper.
   8. Hot-Water Heating Coil: Copper tube and aluminum finned coil.
   9. Velocity sensor: multi-point averaging type.
   10. Controls: Electronic DDC controls.
   11. Each unit shall include the following control accessories:
      a. Control transformer and disconnect switch.
      b. Mount controls in NEMA 250 Type 1 enclosure.

B. Fan-Powered Reheat Terminal Units
   1. Configuration: Volume-damper assembly inside unit casing.
   2. Casing: Zinc-coated steel
   3. Casing Lining: 1-inch thick, 1-1/2 pound density insulation with erosion-resistant coating.
   4. Air Inlets: Round or flat oval with air velocity sensor.
   5. Access: Removable panels with cam-lock fasteners.
   6. Volume Damper: [Galvanized steel] [extruded aluminum] [cylindrical flow control device] with maximum airflow leakage of [2 percent at 1-inch wg] [2 percent at 3-inch wg] [3 percent at 3-inch wg] [3 percent at 6-inch wg].
   7. Damper Position: [Normally open] [Normally closed].
   8. Fan: Series or parallel type unit located in acoustically lined plenum housing a direct-drive, forward-curved fan, and thermally protected PSC motor.
   9. Multi-outlet Discharge Section: Insulated plenum with ductwork discharge collars and locking balancing damper.
   10. Hot-Water Heating Coil: Copper tube and aluminum finned coil.
   11. Velocity sensor: multi-point averaging type.
   12. Filter: Attenuating air inlet section complete with 1 inch filter rack.
   13. Controls: Electronic DDC controls.
   14. Each unit shall include the following control accessories:
      a. Control transformer and fused disconnect switch.
      b. Fan solid state speed controller.
      c. Fan relay switch.
      d. Mount controls in NEMA 250 Type 1 enclosure.

1.5 INSTALLATION

A. Install in accordance with manufacturers requirements.
B. Startup and training to be provided by a factory-trained service technician.
C. Parallel fan-powered terminal units shall not be installed in classrooms or other acoustically sensitive spaces.

END OF SECTION

SECTION 233713

AIR OUTLETS AND INLETS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for supply air linear slot diffusers; return air linear diffusers; return air, exhaust air, and transfer air, grilles and registers; supply air registers; supply air diffusers; wall linear diffuser; egg crate return air or transfer air grilles; heavy duty wall return air grille or register; and above floor displacement type air devices.

1.2 SUBMITTALS

A. Submittals are required and shall be scheduled by room number to include material, sizes, quantities, finishes, and accessories.

1.3 QUALITY ASSURANCE

A. ASHRAE Standard 70 for performance testing.

B. NFPA 90A for installation.

1.4 COMPONENTS

A. Supply Air Linear Slot Diffusers
1. 22 gauge aluminum or heavy gauge steel diffusers assembly with factory baked white enamel finish or powder paint white finish.
2. 26 gauge zinc-coated steel inlet boot, maximum 12 inches high.
3. Single/multiple slots with extruded or stamped vanes.
4. Maximum 50 CFM/lineal ft./slot.
5. Third band SPL 40 DB without room credit.
6. 1/2 inch glass fiber acoustically insulated inlet plenum/boot.

B. Return Slot Diffusers
1. 22 gauge aluminum or heavy gauge steel diffuser assembly with factory baked white enamel finish or powder paint white finish.
2. 26 gauge zinc-coated steel inlet boot, maximum 12 inches high.
3. Single/multiple slots.
4. Maximum 100 cfm/lineal ft./slot.
5. 1/2 inch glass fiber insulated plenum/boot.

C. Return Air, Exhaust and Air Transfer Grilles and Registers
1. All aluminum construction.
2. Angled louvers spaced 1/2 inch on center.
3. One set of fixed louvers parallel to long dimension.
4. Baked white enamel finish or powder paint white finish.

D. Supply Air Registers
   1. All aluminum construction.
   2. Double deflection louvers.
   3. Front and rear louvers individually adjustable, horizontal to the front.
   4. Baked white enamel finish or powder paint white finish.

E. Supply Air Diffuser
   1. All 18 gauge steel diffuser.
   2. Solid face panel with curved back pan designed for VAV usage.
   3. Opposed blade volume damper in unaccessible locations.
   4. Baked white enamel finish or powder paint white finish.
   5. Provide with equalizing grid.

F. Wall Linear Diffuser
   1. All aluminum construction.
   2. Fixed bar type louvers.
   3. Provide with selected factory finish.

G. Eggcrate Grille Return Air Grille or Transfer Grille
   1. 1/2 inch by 1/2 inch by 1/2 inch aluminum grid.
   2. Aluminum border if required.
   3. Provide frame for appropriate ceiling mounting.
   4. Baked white enamel finish or powder paint white finish.

H. Heavy Duty Wall Return Air Grille (for use in gymnasiums and locker rooms)
   1. Heavy gauge steel construction.
   2. Angled louvers spaced 1/2 inch on center.
   3. Baked aluminum enamel or powder paint aluminum finish.

I. Displacement Type Air Devices
   1. Heavy duty galvanized steel construction
   2. Powder coated finish
   3. Rubber lip seal

1.5 INSTALLATION

A. Provide the number and type of air devices as required.

END OF SECTION

SECTION 233716

FABRIC AIR DISTRIBUTION DEVICES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for fabric ductwork/air distribution devices and its suspension.

1.2 SUBMITTALS

A. The fabric duct manufacturer shall study the floor plans and application and the design data noted on the floor plans, and shall provide engineered to scale drawings showing the supports layout, duct runs, orifice layout and performance data, including throws.

B. Manufacturer shall have documented design support information including duct sizing, vent and orifice location, vent and orifice sizing, length and suspension. Parameters for design, including maximum air temperature, velocity, pressure and fabric permeability, shall be considered and documented in the shop drawing submittal.

1.3 QUALITY ASSURANCE

A. Fabric ducts shall be classified by Underwriter's Laboratories in accordance with the 25/50 flame spread / smoke developed requirements of NFPA 90-A. All sections must be labeled with the logo and classification marking of Underwriter's Laboratories.

B. Fabric ducts shall be treated with an EPA registered antimicrobial agent.

C. Manufacturer shall provide a 10-year warranty for products supplied for the fabric portion of this system.

D. Installation shall be in strict accordance with the manufacturer's instructions.

1.4 CONSTRUCTION

A. Fabric ducts shall be constructed of woven fire retardant fabric complying with the following physical characteristics:
   1. Fabric Construction: 100% Flame Retardant and treated with a machine wash-able anti-microbial agent from the manufacturer.
   2. Weight: 6.75 oz./yd^2 per ASTM D3776
   3. Air Permeability: 2 (+2/-1)cfm/ft^2 per ASTM D737, Frazier
   4. Temperature Range: 0 degrees F to 180 degrees F
   5. Fire Retardancy: Classified by Underwriters Laboratories in accordance with the flame spread/smoke developed requirements of NFPA 90-A and ICC AC167.
   6. Antimicrobial agent shall be proven 99% effective after 10 laundry cycles per AATCC Test Method 100.

1.5 SYSTEMS FABRICATION REQUIREMENTS

A. Air dispersion accomplished by linear vent and permeable fabric, linear vent to consist of many 3/16" diameter open orifices rather than a mesh style vent to reduce maintenance requirements of mesh style vents.

B. Size of and location of linear vents to be specified and approved by manufacturer.

C. Inlet connection to metal duct via fabric draw band with anchor patches as supplied by manufacturer. Anchor patches to be secured to metal duct via. zip screw fastener – supplied by contractor.

D. Inlet connection includes zipper for easy removal / maintenance.

E. Lengths to include required zippers as specified by manufacturer.

F. System to include Adjustable Flow Devices to balance turbulence, airflow and distribution as needed. Flow restriction device shall include ability to adjust the airflow resistance from 0.06 – 0.60 in w.g. static pressure.

G. End cap includes zipper for easy maintenance.

H. Fabric system shall include connectors to accommodate suspension system listed below.

I. Any deviation from a straight run shall be made using a gored elbow or an efficiency tee. Normal 90 degree elbows are 5 gores and the radius of the elbow is 1.5 times the diameter of the Fabric ductwork.

1.6 DESIGN PARAMETERS

A. Fabric diffusers shall be designed from 0.25" water gage minimum to 3.0" maximum.

B. Fabric air diffusers shall be limited to design temperatures between 0 degrees F. and 180 degrees F.

C. Design CFM, static pressure and diffuser length shall be designed or approved by the manufacturer, in accordance with the plans and specs.

1.7 SUSPENSION HARDWARE

A. Tension Cable: System shall be installed using a tension cable system including double strands (2 Row) of heavy weight stainless steel cable located 3" above the 10 and 2 o'clock locations of the Fabric ductwork system. Hardware to include cable, eye bolts, cable clamps and turnbuckle(s) as required. System attachment shall be made using nylon snap clips spaced 24 inches.

B. Suspended H-Track: System shall include double (2 Row) runs of aluminum H-Track system located 1.5" above the 10 and 2 o'clock (2 Row) locations of Fabric ductwork system. Hardware to include 10' sections of track, splice connectors, track endcaps and vertical cable support kits – consisting of a length of cable with a locking stud end and quick cable connectors. Radius aluminum track must be included for all radius sections. Fabric / Track attachment shall be either a continuous supporting cord or snap tabs, a detachable sliding tab positioned every 24" along the length of the system.

C. Surface mount ("D" shape): System shall include aluminum Flush-Mount system located flush with the top of the fabric duct system. Width between mounting points shall be 2" wider than the specified diameter of the D-Shape fabric ductwork. Hardware to include 12' sections of track, splice connections and end caps as required. System attachment shall be made by cord sewn into top side flaps of fabric ductwork system supported entire length.

1.8 DELIVERY, STORAGE AND HANDLING

A. Protect fabric air dispersion systems from damage during shipping, storage and handling.

B. Where possible, store products inside and protect form weather. Where necessary to store outside, store above grade and enclose with a vented waterproof wrapping.

1.9 CLEANING AND PROTECTION

A. Clean air handling unit and ductwork prior to the fabric ductwork system unit-by-unit as it is installed. Clean external surfaces of foreign substances that may cause corrosive deterioration of facing.

B. Temporary Closure: At ends of ducts not connected to equipment or distribution devices at time of ductwork installation, cover with polyethylene film or other covering that will keep the system clean until installation is completed.

C. If fabric ductwork systems become soiled during installation, they should be removed and cleaned following the manufacturers standard terms of laundry.

END OF SECTION

SECTION 233718

UNDERFLOOR AIR DISTRIBUTION SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall furnish and install a complete access floor air terminal system as shown on the drawings. All wiring, controls and other accessories required for a complete system shall be included. Contractor shall provide submittals, samples, and operation and maintenance documentation. Specific equipment includes: (List each type of terminal required on the project.)
   1. Variable Volume Units
   2. Variable Volume Units with Duct Collar
   3. Perimeter Zone or Conference Room Heating/Cooling Units
   4. Fan-Powered Underfloor Hydronic Heating Units
   5. Power and Control Module for up to four (4) VAV units.
   6. Power and Control Module for up to fourteen (14) VAV units
   7. 25' Plug and Play Cable Set for Connection of VAV Actuators, power and control module, fan powered heating units, and/or cooling zones
   8. 50' Plug and Play Cable Set for Connection of Controller to Thermostat
   9. 25' Plug and Play Cable Set for Extension of Plug and Play Cable Sets
   10. 25' Plug and Play Cable Set for Connection of Auxiliary Sensor to heating zones
   11. PAP-E 5' Plug and Play Cable Set for Connection of fan powered heating units and heating zones
   12. PAP-F 10' Plug and Play Cable Set for Connection of Controller to Thermostat

1.02 RELATED WORK NOT INCLUDED

A. The floor holes required for installation of floor air terminals shall be coordinated with the Access Floor Contractor. All floor openings shall be prepared by the Access Floor Contractor, as shown on the floor plan drawings. Required plenum barriers, sealing of plenum, structural supports, carpet cutouts and any other floor related appurtenances shall be prepared by the Access Floor Contractor as shown on the drawings.

B. All electrical power needed for terminal operation shall be coordinated with the Electrical Contractor. The electrical power shall be furnished by the Electrical Contractor and installed as shown on the drawings.

C. Control interfaces and/or integration with the Building Automation System (BAS) or other control system shall be furnished by the Controls Contractor.

1.03 QUALITY ASSURANCE

A. All equipment and components shall be suitable for use in an environmental air plenum.

B. All components within the air stream including under-floor terminals shall conform to the NFPA 90A Standard for Flame/Smoke/Fire contribution of 25/50/0.

C. All units shall be the product of a manufacturer regularly engaged in the production of terminal units and all supplied units shall be from the same manufacturer.

D. Units shall be specifically designed for an access floor installation and complete with all necessary controls and wiring as required to provide operation according to manufacturer's recommendations.

E. Terminal operation shall be coordinated with air handling system and control system to assure complete compatibility.

F. Equipment shall be listed under and conform to appropriate sections of U.L., CSA, E.T.L. and other testing laboratory requirements.

1.04 SUBMITTALS

A. Submit dimensioned drawings, performance and product data for approval. Include listing of discharge and radiated sound power level for each of second through sixth octave for fan-powered terminals. Data shall include all wiring diagrams, control sequences and power requirements as applicable to the product and coordination with other systems.

1.05 OPERATION AND MAINTENANCE DATA

A. Quantity: 3

B. Content:
   1. Maintenance and Service Contracts: Provide a list, with each product, name, address and telephone number of:
      a. Subcontractor or installer.
      b. Maintenance contractor, as appropriate. Identify area of responsibility of each.
      c. Local source of supply for parts and replacement.
   2. Table of Contents: List all products in the order in which they appear in the specifications and label accordingly.
   3. Sections: All sections shall be separated with an appropriate tabbed section divider with the appropriate specification section number. Provide the manufacturer's written installation and maintenance instructions for all items required.
   4. Routine Maintenance: Provide a list indicating all routine maintenance procedures based on recommended intervals.
   5. Contents: Include copies of approved submittal data, installation instructions, operation and maintenance instructions and parts lists.

1.06 WARRANTY

A. The air terminal materials and workmanship shall be guaranteed to be free from defects for a period of one year after Owner acceptance.

B. Contractor and/or vendor shall maintain availability of replacement parts compatible with the terminals for no less than ten years after acceptance.

2.01 GENERAL DESCRIPTION

A. The Contractor shall furnish a pre-engineered, prefabricated, access floor air terminal system that includes all necessary components from a single source of responsibility/manufacturer. All components including any controls and wiring shall be furnished as a “plug-and-play” system of modular and interchangeable components that are factory prepared to operate as a complete system. (Because some owners may want special controls this section may need to be modified to address this issue.)

2.02 FABRICATION

A. VAV Terminal Units
1. Unit chassis shall be minimum 18-gauge galvanized steel that shall enclose and support all components. Chassis construction shall admit plenum air from only one direction to provide a method of adjusting delivery volume for floor velocity pressure.
2. Unit shall have a die cast aluminum trim ring that shall engage with the chassis and floor to provide complete support for the air grilles. Die cast aluminum ring color shall be as shown on the finish schedule or manufacturer’s standard color to be selected from submittal data. Trim ring shall be attached to chassis and floor panel by means of concealed removable screws. (A round trim ring option is available at no additional cost. Special colors are available at additional cost.)
3. Unit shall have one or more removable grilles made of die cast aluminum material that matches the trim ring in color. Grilles shall include a means for adjusting air throw and pattern and shall fit securely within the trim ring and chassis without mechanical fasteners. Grilles shall be capable of supporting a load of 1250 pounds (565 kg) without permanent damage. No openings in the grilles shall be larger than .30 inches (7.6 mm) for shoe heal penetration protection.
4. Unit shall include an integral damper and damper operator. Damper shall be made of 20-gauge galvanized steel and be sealed with felt or foam type gasket material. Damper operation shall provide a throttling of the airflow that produces a nominal constant velocity, variable volume flow from full shut-off to full open condition. The damper shall vary the active outlet area of the grilles while maintaining velocity of the supply air through the grille. Damper operator shall operate on 24VAC and use no more than 6 volt-amperes per unit. Damper motor electrical connection shall be by means of a modular connector, polarized to prevent incorrect connection. Noise produced by damper motor shall not exceed 35 dB-A at a distance of 1 meter from the unit.

B. Ducted Collar; VAV Terminal Units (These units provide control of the air flow for a ducted system.)
1. Unit chassis shall be minimum 18-gauge galvanized steel that shall enclose and support all components. Chassis construction shall admit plenum air from only one direction to provide a method of adjusting delivery volume for floor velocity pressure.

2. Unit shall have a die cast aluminum trim ring that shall engage with the chassis and floor to provide complete support for the air grilles. Die cast aluminum ring color shall be as shown on the finish schedule or manufacturer's standard color to be selected from submittal data. Trim ring shall attached to chassis and floor panel by means of concealed removable screws. (A round trim ring option is available at no additional cost. Special colors are available at additional cost.)
3. Unit shall have one or more removable grilles made of die cast aluminum material that matches the trim ring in color. Grilles shall include a means for adjusting air throw and pattern and shall fit securely within the trim ring and chassis without mechanical fasteners. Grilles shall be capable of supporting a load of 1250 pounds (565 kg) without permanent damage. No openings in the grilles shall be larger than .30 inches (7.6 mm) for shoe heal penetration protection.
4. Unit shall include an integral damper and damper operator. Damper shall be made of 20-gauge galvanized steel and be sealed with felt or foam type gasket material. Damper operation shall provide a throttling of the airflow that produces a nominal constant velocity, variable volume flow from full shut-off to full open condition. The damper shall vary the active outlet area of the grilles while maintaining velocity of the supply air through the grille. Damper operator shall operate on 24VAC and use no more than 6 volt-amperes per unit. Damper motor electrical connection shall be by means of a modular connector, polarized to prevent incorrect connection. Noise produced by damper motor shall not exceed 35 dB-A at a distance of 1 meter from the unit.
5. The chassis design shall include a removable end panel for attachment of a supply air duct using standard duct size of 6 inches (152 mm) round for a 10 inch deep unit and 5 inches (127 mm) round for a 7 inch deep unit.

C. Perimeter Zone Heating/Cooling VAV Terminal Units (These units provide control of the air flow from the plenum for cooling and from an attached duct for heating with a switchover mode of control.)
1. Unit chassis shall be minimum 18-gauge galvanized steel that shall enclose and support all components. The chassis design shall include an end panel for attachment of a supply air duct using standard duct size of 6 inches (152 mm) round for a 10 inch deep unit and 5 inches (127 mm) round for a 7 inch deep unit. Chassis construction shall admit plenum air from only one direction to provide a method of adjusting delivery volume for floor velocity pressure. Plenum air admittance openings shall be on opposite end of the chassis from the duct connection.
2. Unit shall have a die cast aluminum trim ring that shall engage with the chassis and floor to provide complete support for the air grilles. Die cast aluminum ring color shall be as shown on the finish schedule or manufacturer's standard color to be selected from submittal data. Trim ring shall be attached to chassis and floor panel by means of concealed removable screws. (A round trim ring option is available at no additional cost. Special colors are available at additional cost.)

3. Unit shall have one or more removable grilles made of die cast aluminum material that matches the trim ring in color. Grilles shall include a means for adjusting air throw and pattern and shall fit securely within the trim ring and chassis without mechanical fasteners. Grilles shall be capable of supporting a load of 1250 pounds (565 kg) without permanent damage. No openings in the grilles shall be larger than .30 inches (7.6 mm) for shoe heal penetration protection.
4. Unit shall include an integral damper and damper operator. Damper shall be made of die cast aluminum material and be sealed with felt or foam type gasket material. Damper operation shall provide a throttling of the airflow that produces a nominal constant velocity, variable volume flow from full shut-off to full open condition. The damper shall vary the active outlet area of the grilles while maintaining velocity of the supply air through the grille. Damper operator shall operate on 24VAC and use no more than 6 volt amperes per unit. Damper motor electrical connection shall be by means of a modular connector, polarized to prevent incorrect connection. Noise produced by damper motor shall not exceed 35 dB-A at a distance of 1 meter from the unit.
5. Unit damper shall be sequenced to admit heating air from duct connection and cooling air from the plenum. In switchover mode, unit shall also act as a return air grille to remove air from the space and deliver it through the duct connection to a heating terminal under the floor.

D. Fan Powered Underfloor Heating Terminal Unit – 150 CFM Nominal Size (These units are required when using terminals for perimeter heating. They include a power transformer to provide power to up to 14 VAV terminals and chaining ports for zones with up to 3 fan powered heating terminal units.)
1. Unit casing: 22-gauge minimum galvanized steel lined with 1/2 in. thick, 1-1/2 lb./ft.3 density, dual thermal/acoustical fiberglass insulation meeting NFPA 90A requirements and U.L. 181 erosion control requirements. Insulation shall be protected with continuous vapor barrier. Casing shall have a removable side or top panel suitable for equipment service. Leakage not to exceed 2% of design flow at 2.0" w.g. Enclosure to have Plug and Play connectors for attachment of thermostat inputs, thermostat outputs, and outputs to VAV terminals in the zone.
2. Fan assembly: Direct drive centrifugal with forward curved blades, internally suspended on rubber isolators. Motor to be permanent split capacitor with thermal overload protection and toggle disconnect.
3. Return air filter frame and 1" throw-away filter.
4. Discharge and radiated sound power levels shall not exceed those shown on the schedule.
5. Hydronic Heating Coil
   a. Heating coil shall be integral with the terminal unit, with coils having one row, same end connections. Tube-to-header joints shall be expanded and reinforced with brass bushing for pressure-tight joint. Maximum working ratings shall be 200 PSIG, 325°F. Plate-type aluminum fins with full fin collars for maximum fin-tube contact and accurate spacing, mechanically bonded to tubes for permanent fin-tube bond.
   b. Galvanized steel casing with flanged or drive and slip connection.

6. Control transformers rated for specified line voltage input and 24VAC output at 40VA for thermostat operation and 100 VA for VAV operation (adequate power for up to 14 VAV units in zone.)

E. Power and Control Module
1. 120 Volt, single-phase power input.
2. Integral Transformer, 24VAC, 40 volt-ampere output rating.
3. One modular output plug and play connector compatible with MIT Plug and Play wiring system.
4. Modular input connector for thermostat connection using Plug and Play wiring system.
5. Steel housing, minimum 24-gauge with knockouts.

F. Power and Control Module
1. 120 or 277 Volt, single-phase power input.
2. Integral Transformer, 24VAC, 90 volt-ampere rated output with 3-amp switching module.
3. Two modular output plug and play connectors compatible with Plug and Play wiring system.
4. One modular input connector for thermostat connection using Plug and Play wiring system (One is used for daisy-chaining zones larger than 14 terminals).
5. One modular output connector for daisy-chaining units (up to 3 total) using a single controller for use in zones larger than 14 boxes.
6. Steel housing, minimum 24-gauge with knockouts.

G. Plug and Play Cable Set for VAV connection
1. Plenum rated, 4 conductor, 16-gauge, 25 feet (8 m) long, with Plug and Play wiring connectors attached on each end.
2. Factory tested for continuity, shorts, opens and proper impedance.

H. Plug and Play Cable Set for Thermostat Connection
1. Plenum rated, 4 conductor, 16-gauge, 50 feet (16 m) long, with Plug and Play wiring connector attached on one end and pig tail on the other.
2. Factory tested for continuity, shorts, opens and proper impedance.

I. Plug and Play Extension Cable Set
1. Plenum rated, 4 conductor, 16-gauge, 25 feet (8 m) long, with male Plug and Play wiring connector attached on one end and female connection on the other end.
2. Factory tested for continuity, shorts, opens and proper impedance.

J. Plug and Play Cable Set for connection to auxiliary input sensor
1. Plenum rated, 2 conductor, 18-gauge, 25 feet (8 m) long, with Plug and Play wiring connector attached on one end and pig tail on the other.
2. Factory tested for continuity, shorts, opens and proper impedance.

K. Plug and Play Cable Set for connection to fan powered terminals
1. Plenum rated, 4 conductor, 16-gauge, 5 feet (2 m) long, with Plug and Play wiring connectors attached on each end.
2. Factory tested for continuity, shorts, opens and proper impedance.

L. Plug and Play Cable Set for Thermostat connection
   1. Plenum rated, 4 conductor, 16-gauge, 10 feet (2 m) long, with Plug and Play wiring connector attached on one end and pig tail on the other.
   2. Factory tested for continuity, shorts, opens and proper impedance.

M. Space Thermostat and DDC Controller (Required when using LON bus for local and remote setpoint adjustment and monitoring of a cooling only zone or cooling/heating zone with fan powered heating unit, 1 or 2 stage electric, or 2 position hot-water heat.)
   1. Plastic enclosure, UL 94-5V rated, suitable for wall mounting with control setpoint consisting of an adjustable setpoint knob. Size of enclosure shall be suitable for mounting on a single/double gang electrical box in either the horizontal orientation. Provide terminal block connection to wiring. Thermostat enclosure shall consist of a base and separate enclosure to permit attachment of wiring independently of the electronics.
   2. Device shall provide proportional-integral, PI, control and use an NTC thermistor with low drift and have compatible output/input with controller. Setpoint knob shall have optional range stops with maximum range of 55 to 90 degrees F. (12.8 to 32.2 C).
   3. Unit shall comply with FCC Part 15, NEC Class B, and be listed by UL.
   4. Device shall include an interface and jack for connection of LON bus.

N. Space Thermostat and DDC Controller (Required when using bus for local and remote setpoint adjustment and monitoring of a cooling only zone or cooling/heating zone with modulating heat.)
   1. Plastic enclosure, UL 94-5V rated, suitable for wall mounting with control setpoint consisting of an adjustable setpoint knob. Size of enclosure shall be suitable for mounting on a single/double gang electrical box in either the horizontal orientation. Provide terminal block connection to wiring. Thermostat enclosure shall consist of a base and separate enclosure to permit attachment of wiring independently of the electronics.
   2. Device shall provide proportional-integral, PI, control and use an NTC thermistor with low drift and have compatible output/input with VAV controller. Setpoint knob shall have optional range stops with maximum range of 55 to 90 degrees F. (12.8 to 32.2 C).
   3. Unit shall comply with FCC Part 15, NEC Class B, and be listed by UL.
   4. Device shall include an interface and jack for connection of LON bus.

3.01 INSTALLATION

A. Provide the number and type of components as required for complete and functional system.

END OF SECTION

SECTION 233800

KITCHEN HOOD VENTILATION SYSTEM

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for kitchen canopy hood exhaust and make-up air system complete with fans, heating equipment, roof curbs, ductwork, controls, fire suppression system, and related accessories.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacity, materials, controls, dimensions, and accessories and detailed ductwork and fire suppression layouts specific to each system.

1.3 QUALITY ASSURANCE

A. Canopies shall be labeled and listed in accordance with UL 710.
1. Listing shall be for installation without exhaust dampers.

B. Fabrication shall be in accordance with NFPA 96.

C. Assembly shall bear the National Sanitation Foundation (NSF) Seal of Approval.

D. Fan performance rating shall comply with AMCA 210.

E. Fan systems shall be UL listed and labeled for transfer of grease laddened vapors.

F. Canopies shall comply with the requirements approved by BOCA, SBCC, and ICBO.

G. Gas-fired system shall comply with AGA requirements.

H. Rooftop, gas-fired make-up air handling units shall have the ETL label.

I. Balance of air systems shall be by an independent air balancing firm certified as NEBB or AABC.

J. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

K. Kitchen hood systems shall meet the requirements of ASHRAE Standard 90.1.

1.4 CANOPY

A. Canopy interior and exterior exposed surfaces shall be constructed of 18 gauge, type 304 stainless steel.

B. Integral duct collars for exhaust without fire dampers.

C. Liquid tight external welds at all joints and seams.

D. Filter housing shall be constructed of 304 stainless steel complete with UL Classified aluminum baffle-type grease filters.

E. ***Fluorescent*** vapor-proof lights in quantity to provide a minimum of 50 footcandles on the lowest cooking surface.

F. Insulated supply air plenum with minimum 1 inch, 3 pounds per cubic foot material.

G. Integral supply air duct collar with 18 gauge steel fire damper having fusible link operation.

1.5 EXHAUST FAN

A. Upblast type arrangement and UL listed for operation in grease removal having built-in grease trough and isolated motor compartment.

B. Bird screens and dampers are not permitted.

C. Fan discharge shall be minimum 40 inches above roof surface.

D. Unit shall include a hinged base for access to duct and blower.

1.6 NO-HEAT SUPPLY AIR FAN

A. Fan shall be a forward-curved, double-width, belt-driven, double-inlet blower, roof-mounted in a downblast configuration, statically and dynamically balanced.

B. Fan motor shall include permanently lubricated ball bearings

C. Housing shall be constructed of heavy gauge, galvanized steel, primed and painted with removable top for service access.

D. Unit shall be provided with a minimum 12 inch high roof curb.

E. Filters shall be 1 inch thick aluminum mesh and UL Classified.

1.7 HEATED MAKE-UP AIR SYSTEM

A. Roof-mount makeup air system shall be factory assembled and tested.

B. Fan and motor assembly shall be mounted on vibration isolators.

C. Motors shall be permanently lubricated, heavy-duty, ball bearing-type.

D. Fan wheels shall be forward-curved, double-width, double-inlet type, statically and dynamically balanced.

E. Housing shall be constructed of heavy gauge, galvanized steel, primed and painted with removable panels for service access.

F. A pre-wired control center shall include master disconnect switch, fuse blocks, magnetic motors starters, control circuit transformer, distribution terminal control strip, all UL Listed.

G. Direct-fired gas heater section
1. Burner shall be constructed of stainless steel having a gas valve control with capillary type sensor, main and pilot gas valves and pressure regulators, main and pilot shut off valves, airflow switch, high limit control, flame safeguard control, flame rod and electronic ignition pilot.
2. Turndown range of 20 to 1.
3. Piping and controls housed within the galvanized housing of the make-up air unit.

H. Electric heater section
1. Heater terminal box and frame shall be constructed of heavy-gauge galvanized steel.
2. Heating elements shall be supported using ceramic insulators.
3. Heating element shall be a UL Listed open coil type electric heater.
4. Provide with a disc type automatic high limit switch and closed disc type manual reset switch.
5. Unit shall include modulating step controller, airflow switch, circuit fusing, and door interlocking disconnect switch.
6. Heater and controls housed within the galvanized housing of the make-up air unit.

I. Commercial kitchen Type I and Type II hood systems larger than 5,000 cfm shall have variable-speed control for exhaust and makeup air fans to reduce hood airflow rates at least 50 percent during those times when cooking is not occurring and the cooking appliances are up to temperature in a standby, ready to cook mode.

1.8 FIELD FABRICATED DUCTWORK AND ACCESSORIES

A. Exhaust ductwork shall be constructed of 16 gauge carbon steel, welded liquid tight.

B. Supply ductwork shall be constructed of 18 gauge galvanized steel and installed with external duct insulation and vapor barrier.

C. Cleanouts are required in changes of direction of exhaust ductwork.

1.9 ELECTRICAL

A. Motor control panel enclosing motor contactors, overload relays, interface terminals for fire protection system and remote switch panel shall be located in the kitchen storage room.

B. Remote switch panel shall be mounted on face of kitchen canopy and shall include the following:
1. Lights on-off switch
2. Exhaust/supply fan systems on-off switch with pilot light
3. [Temperature setting for heating make-up air system]

1.10 FIRE PROTECTION SYSTEM

A. Fire protection system shall be a wet chemical system and shall be installed to be in compliance with UL.

B. System to be activated by fusible links connected to an automan release.

C. Automan release shall trip 2 electric, double-pole, double-throw micro switches.

D. Piping shall be concealed wherever possible. Exposed piping, fittings, and nozzles shall be constructed of stainless steel with chrome plated elbows.

E. Supply fan shall shut down upon activation of fire suppression system. Exhaust fan shall remain running.

F. Provide automatic, non-electric; or manual reset, electric, gas appliance shut off valves.

G. Provide remote manual fire pull device.

H. Provide storage tank and mounting hardware.

1.11 INSTALLATION

A. Install in accordance with manufacturers requirements.

B. Manufacturer's service representative shall provide compete check, test, and start-up on the system.

C. Locate the manual pull station a minimum of 10'-0" from the kitchen canopy in the path of egress from the cooking area.

END OF SECTION

SECTION 234323

AIR CLEANING SYSTEM

Spec Writer Note: If the project is to be LEED Certified, the IAQ procedure is not permitted in LEED Prereq. EQp1.

GENERAL GUIDELINES

1.1 DESCRIPTION OF WORK

A. Qualitative requirements for the design, performance and installation of an air purification system intended for use as part of the air handling units. For the purpose of compliance with the ventilation code using the indoor air quality procedure.

1.2 RELATED WORK PERTAINING TO OTHER SPECIFICATIONS

A. Testing, balancing and inspection services

B. Duct work

C. Electrical Wiring

D. Control Wiring

1.3 SUBMITTALS: The following information shall be submitted to the design professional prior to the release of any equipment for fabrication.

A. Product performance data for filters, gauges and housings.

B. Product drawings detailing all physical, electrical, duct work and control requirements.

C. Manufacturer's Follow-up Service Program.

1.4 REFERENCE CODES AND STANDARDS

A. ASHRAE Standards 62 & 52

B. UL Standard 867

C. CFR 39-75 Title 21 April 17, 1974

D. National Electric Code NFPA 70, 1990

1.5 QUALITY ASSURANCE

A. The Air Purification System shall be a product of an established manufacturer with installations in successful operation for a minimum of 10 years.

B. A qualified representative from the manufacturer shall be available to inspect the installation of the air purification system to ensure installation in accordance with manufacturer's recommendation.

C. The complete Air Purification System complete with power and control wiring, safety switches, airflow switches, controls, housing and filters shall be listed by either UL or ETL.

D. Provide Indoor Air Quality calculations using the formulas within ASHRAE Standard 62-01 to validate acceptable indoor air quality at the quantity of outside air scheduled.

1.6 DESIGN AND PERFORMANCE CRITERIA: The operation of the air purification system shall be through a combination of Catalytic, and Association / Disassociation processes.

A. Each air handling unit shall contain an Air Purification System capable of:
1. Effectively controlling microorganisms (mold, bacteria, etc.).
2. Controlling gas phase contaminants generated from food, human occupants and the school building.
3. High efficiency particulate filtration.

B. The Air Purification System shall operate in such a manner so that agglomeration or precipitation of airborne particulate shall not be permitted to collect on occupants, walls, floor or furnishings by virtue of its operation.

C. Air Exchange Rate: Air exchange rates may vary through the full operating range of a VAV system. The quantity of air exchange shall not be increased due to requirements of the air purification system.

D. Velocity Profile: The air velocity through the plenum approaching the air purification system shall not exceed 1,000 fpm (5 m/s).

E. Humidity: Electrodes or gas phase filters shall not require preheat protection when the relative humidity of the entering air exceeds 85%. Relative humidity from 0 - 99% shall not cause damage, deterioration or dangerous conditions within the air purification system.

F. Ozone Generation: The operation of the electrodes unit shall conform to ASHRAE Standard 62-01 and CFR 39-75 with respect to ozone generation.

1.7 EQUIPMENT REQUIREMENTS

A. A schematic representation of the air purification system is indicated on the drawings. Each unit shall include mounting rack, electrodes, generator, safety switches, prefilters, primary filters, differential pressure gauge and accessories.

B. Electrode: Each unit shall include the required number of electrodes and power generators sized to the air handling unit capacity. Electrical power to the electrodes shall be interrupted when the airflow is less than 100 fpm or when access doors to the electrode plenum section are opened.

C. Plenum Specifications: Housings shall be of (horizontal / vertical) design with (single / double) wall construction. Refer to air handling unit specification for construction details.

D. Filter Gages: Differential pressure gages shall be provided to indicate filter status.

1.8 FILTRATION REQUIREMENTS

A. Provide particulate and gas phase filtration equipment in order to achieve the performance detailed within the IAQ Model described in paragraph 1.5 D. Performance of fibrous filters shall conform to ASHRAE Standard 52.2 unless specified otherwise. Provide a fully assembled and tested system from a single manufacturer.

1.9 ELECTRICAL REQUIREMENTS

A. Wiring, conduit and junction boxes shall be installed within housing plenums in accordance with NEC NFPA 70. Electrical service shall be 115/208/230 volts, 1 phase, 50/60 Hz. In the event line voltage varies 10% or greater from nominal or when electrical spikes or transients are present power conditioning shall be provided.

1.10 ASSEMBLY AND ERECTION

A. Assemble mounting racks within the air handling unit in accordance with manufacturer's recommendations and instructions.

B. The air purification system manufacturer shall complete all interconnecting control and power wiring. The electrical contractor shall complete single point power connections.

C. All equipment shall be assembled and installed in a workman like manner to the satisfaction of the owner, architect, and consulting engineer.

D. Any material damaged by water or moisture shall be replaced at no cost to the owner.

E. All equipment shall be protected from dust and damage on a daily basis throughout construction.

F. Clean all components prior to commissioning.

1.11 TESTING

A. Provide the manufacturer's recommended electrical and static pressure tests.

1.12 COMMISSIONING & TRAINING

A. A manufacturer's authorized representative shall provide start-up supervision and training of owner's personnel in the proper operation and maintenance of all equipment.

B. Service

1. A manufacturer's authorized service representative shall provide service support to insure satisfactory air purification system operation. The service program shall include at minimum, regular site visits, inspection of the air purification system and air handling unit, monitoring and validation, inspection of protected areas and the submission of a written report to the owner.
   a. Submit the Manufacturer’s Service Program with the shop drawing submittal.
2. Provide one (1) year Factory Follow-up Service including repairs to the gas phase equipment, replacement of electrodes or removal of disposable modules, installation of new modules with fresh media, administration of hauling and disposal of spent media modules through the owner’s normal channel of disposal and hauling.

3. Validate performance of the Air Purification System through accepted test procedures and independent testing.
4. Particulate filters are not covered by this service agreement and remain the responsibility of the Owner.

1.13 WARRANTY

A. The equipment shall be warranted against defects in material and workmanship for a period of 12 months from commissioning and acceptance.

END OF SECTION

SECTION 235100

BREECHING, CHIMNEYS, AND STACKS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for venting for fuel burning equipment.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and dimensions. Detailed shop drawings denoting layouts, specific to project for each vent is required.

1.3 QUALITY ASSURANCE

A. Products and installation shall be in accordance with NFPA 211 and UL Listed.

B. Each vent section/fitting shall be labeled for UL compliance.

C. Installation shall be in conformance with OBC.

1.4 COMPONENTS

A. Type B Gas Vents
1. Round double-wall, with aluminized steel inner pipe and galvanized-steel outer pipe. Use for negative pressure venting systems

B. Steel, Positive-Pressure, Double-Wall Vents
1. Construction: Inner and outer shells separated by at least 1-inch air space, with positive sealing joints. The inner piping shall be stainless steel. The outer piping shall be aluminized steel construction. Use for all positive pressure systems including forced draft boilers and water heaters.

C. Rain cap shall be of galvanized steel construction and attached firmly to stack top.

D. Roof penetrations shall include an insulating thimble complete with proper flashing.

E. Cleanouts shall be provided at all changes in direction.

1.5 INSTALLATION

A. Provide independent or combined flues for each piece of gas burning equipment directly to the outside of the building.

B. Each flue shall be support from the building structure, not from or on the equipment.

END OF SECTION

SECTION 235213

ELECTRIC BOILERS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for electric resistance boilers.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, capacity, accessories, and dimensions.

1.3 QUALITY ASSURANCE

A. Unit shall be constructed in accordance with ASME Boiler and Pressure Vessel Code Section VIII.

B. UL Listed.

C. Constructed in accordance to the National Electric Code.

D. Controls wired in accordance to ANSI/UL 834.

E. Boiler shall have a minimum thermal efficiency of 95 percent.

1.4 COMPONENTS

A. Pressure vessel: Constructed of carbon steel with ASME stamp.

B. Pressure Rating: 60 psig, water.

C. Heavy-steel mounting base frame.

D. Removable access panels and doors for inspection and cleaning.

E. Insulation and jacket.

F. Hot-Water Boiler Trim:
   1. Safety-Relief Valves: ASME rated.
   2. Water Connections: Internal thermal circulation to mix return water with boiler water.
   3. Dip tube.
   4. Low-water cutoff.
   5. Pressure and temperature gauges.
   6. Temperature controls.
   7. Boiler high-pressure-limit controller.

G. Heating Elements:
   1. Replaceable sheathed heating elements.
   2. Minimum 75 watts/sq. in. heat transfer.
   3. Wire with UL Listed conductors.

H. Power Panel:
   1. NEMA 1 enclosure with hinged door and key-locking handle.
   2. Mechanical lugs bolted to copper bus bars.
   3. NEMA Class J or K5 dual-element fuses.
   4. 3-pole magnetic contactors.
   5. Fused disconnect switch.

1.5 INSTALLATION

A. Install boilers and accessories in accordance with manufacturers requirements.

B. Startup shall be by a factory trained technician.

C. Set boilers on four inches thick reinforced concrete pad.

D. Boil out all boilers per the manufacturer's recommendations before using the boilers to heat the building in a temporary or permanent basis. The water shall be tested by the chemical treatment subcontractor for acceptability. The heating water system shall have the proper water treatment chemicals installed immediately after the system has been flushed, boiled-out and refilled and before the system is used for temporary or permanent heating of the building.

END OF SECTION

SECTION 235216

FLUE GAS CONDENSING BOILERS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for flue gas condensing boilers.

B. Qualitative requirements for gas fired, oil fired, or combination gas/oil burners.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, capacities, accessories, and dimensions.

1.3 QUALITY ASSURANCE

A. Gas trains shall comply with requirements of CSD-1.

B. Boilers shall be National Board listed.

C. Boiler shall have a minimum thermal efficiency of 88 percent at 120 degree Fahrenheit return water temperature.

D. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

E. Units must meet minimum efficiency requirements of ASHRAE Standard 90.1.

1.4 COMPONENTS

A. Heat Exchangers:
   1. Fire tube design that is self-supporting, baffle-free, and warranted to withstand thermal shock.
   2. Copper***, stainless steel, aluminum alloy, or cast iron*** finned tube design, gasket-free, and warranted to withstand thermal shock.

B. Pressure Rating: 160 psig, water.

C. Exhaust manifold shall include condensate drain.

D. Exhaust manifold shall be corrosion-resistant porcelain enameled cast iron or other corrosion resistant material.

E. Exhaust gas vent.

F. Insulation and jacket.

G. Hot Water Boiler Trim:
1. Safety-Relief Valves: ASME rated.
2. Low-water cutoff.
3. Pressure and temperature gauges.
4. Temperature controls.
5. Boiler high-pressure-limit controller.

H. Gas Burners: Power burner forced draft design.
1. Fuel: [Natural gas] [Propane gas].
2. Gas-pressure regulator.
3. Gas valves.
4. Manual shutoff.
5. Thermistor flame-sensing device.
6. Automatic 100 percent safety gas shutoff.
7. Burner Firing: Modulating.
8. Burner Ignition: Standing pilot or spark ignition.
9. Safety controls.
10. Flue-Gas Collector: Integral with boiler casing.
11. Gas Piping Train: Factory Mutual approved.

I. Factory-mounted control panel.
1. Dry contacts for DDC signal.
2. Alarm contacts for flame failure, low water cutoff, low temperature and high temperature alarms.

J. Motors: NEMA MG 1, general purpose, continuous duty, Design B, open-drip-proof type.

1.5 INSTALLATION

A. Set boilers on minimum 3-1/2 inch thick reinforced concrete pad.

B. Provide dual wall independent flues for each boiler.

C. Pipe all gas pressure regulator vents to the outside of the building

D. Boil out all boilers per the manufacturer's recommendations before using the boilers to heat the building in a temporary or permanent basis. The water shall be tested by the chemical treatment subcontractor for acceptability. The heating water system shall have the proper water treatment chemicals installed immediately after the system has been flushed, boiled-out and refilled and before the system is used for temporary or permanent heating of the building.

E. Combustion air shall be directly connected or the boiler controls shall be interlocked with the combustion air system to operate the combustion air make-up system when the boiler is firing. The boiler shall not operate without the combustion make-up air system operating.

END OF SECTION

SECTION 235223

CAST IRON BOILERS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for cast iron boilers.

B. Qualitative requirements for gas fired, oil fired, or combination gas/oil burners, power or atmospheric.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, capacity, accessories, and dimensions.

1.3 QUALITY ASSURANCE

A. Unit shall be constructed in accordance with the ASME Boiler and Pressure Vessel Code Section IV and shall be National Board listed.

B. Gas trains shall comply with requirements of CSD-1.

C. Boilers shall be UL 795 Listed.

D. Boiler shall have a minimum thermal efficiency of 80 percent.

E. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

F. Units must meet minimum efficiency requirements of ASHRAE Standard 90.1.

1.4 COMPONENTS

A. Heat Exchangers: Cast iron sectional bolted together.
B. Pressure Rating: 60 psig, water.
C. Heavy-steel mounting base frame.
D. Removable access panels and doors for inspection and cleaning.
E. Observation ports.
F. Exhaust gas vent.
G. Insulation and jacket.
H. Hot Water Boiler Trim:
    1. Safety-Relief Valves: ASME rated.
    2. Dip tube.
    3. Low-water cutoff and auxiliary low-water cutoff.
    4. Pressure and temperature gauges.
    5. Temperature controls.
    6. Boiler high-pressure-limit controller.

I. Gas Burners: Power burner, forced draft design.
   1. Fuel: [Natural gas] [Propane gas].
   2. Gas-pressure regulator.
   3. Gas valves.
   4. Manual shutoff.
   5. Thermistor flame-sensing device.
   6. Automatic 100 percent safety gas shutoff.
   7. Burner Firing: Modulating.
   8. Burner Ignition: Standing pilot
   9. Safety controls.
   10. Flue-Gas Collector and Draft Hood: Integral with boiler casing.
   11. Gas Piping Train: Factory Mutual approved.

J. Oil Burners: Pressure-atomizing type.
   1. Fuel: No. 2 fuel oil.
   2. Operation and combustion-air controls.
   3. Oil pump.
   4. Oil-piping train.

K. Combination Gas/Oil Burners: Power burner, forced draft design with pressure-atomizing burner.
   1. Fuel: [Natural gas] [Propane gas] and No. 2 fuel oil.
   2. Burner operation and combustion-air controls.
   3. Gas pilot.
   4. Gas piping train.
   5. Oil pump.
   6. Oil-piping train.

L. Gas Burners: Atmospheric Design
   1. Tubular alloy steel burners with natural draft.
   2. Electronic pilot and burner ignition.
   3. Gas pressure regulator.
   4. Gas valves.
   5. Manual shutoffs
   6. Automatic 100 percent safety gas shutoff.
   7. Safety controls.
   8. Flue-gas collector and draft hood.
   9. Factory Mutual approved gas train.

M. Factory-mounted control panel.
   1. Dry contacts for DDC signal.
   2. Alarm contacts for low water cutoff, low temperature and high temperature alarms.

N. Motors: NEMA MG 1, general purpose, continuous duty, Design B, open-drip-proof type.

1.5 INSTALLATION

A. Set boilers on minimum 3-1/2 inch thick reinforced concrete pad.

B. Provide dual wall independent flues for each boiler.

C. Pipe all gas pressure regulator vents to the outside of the building

D. Boil out all boilers per the manufacturer's recommendations before using the boilers to heat the building in a temporary or permanent basis. The water shall be tested by the chemical treatment subcontractor for acceptability. The heating water system shall have the proper water treatment chemicals installed immediately after the system has been flushed, boiled-out and refilled and before the system is used for temporary or permanent heating of the building.

E. The boiler controls shall be interlocked with the combustion air system to operate the combustion air make-up system when the boiler is firing. The boiler shall not operate without the combustion make-up air system operating.

END OF SECTION

SECTION 235225

STEEL FIREBOX BOILERS

GENERAL

1.01 SECTION INCLUDES

A. Qualitative requirements for steel firebox boilers.

B. Qualitative requirements for gas fired, oil fired, or combination gas/oil burners.

1.02 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, capacities, accessories, and dimensions.

1.03 QUALITY ASSURANCE

A. Gas trains shall comply with requirements of CSD-1.

B. Units shall be constructed in accordance with the ASME Pressure Vessel Code Section IV and shall be National Board listed.

C. Boiler shall have a minimum thermal efficiency of 80 percent.

D. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

E. Units must meet minimum efficiency requirements of ASHRAE Standard 90.1.

2.01 COMPONENTS

A. Heat Exchangers: 3 pass fire tube wet-back design with large fire box. 5 square feet of heating surface per boiler horsepower.

B. Pressure Rating: 60 psig, water.

C. Heavy-steel mounting base frame.

D. Removable access panels and doors for inspection and cleaning.

E. Observation ports.

F. Exhaust gas vent.

G. Insulation and jacket.

H. Hot Water Boiler Trim:

1. Safety-Relief Valves: ASME rated.
2. Water Connections: Internal thermal circulation to mix return water with boiler water.
3. Dip tube.
4. Low-water cutoff.
5. Pressure and temperature gauges.
6. Temperature controls.
7. Boiler high-pressure-limit controller.

I. Gas Burners: Power burner forced draft design.
   1. Fuel: [Natural gas] [Propane gas].
   2. Gas-pressure regulator.
   3. Gas valves.
   4. Manual shutoff.
   5. Thermistor flame-sensing device.
   6. Automatic 100 percent safety gas shutoff.
   7. Burner Firing: Modulating.
   8. Burner Ignition: Standing pilot
   9. Safety controls.
   10. Flue-Gas Collector: Integral with boiler casing.
   11. Gas Piping Train: Factory Mutual approved.

J. Oil Burners: Pressure-atomizing type.
   1. Fuel: No. 2 fuel oil.
   2. Operation and combustion-air controls.
   3. Oil pump.
   4. Oil-piping train.

K. Combination Gas/Oil Burners: Pressure-atomizing type.
   1. Fuel: [Natural gas] [Propane gas] and No. 2 fuel oil.
   2. Burner operation and combustion-air controls.
   3. Gas pilot.
   4. Gas piping train.
   5. Oil pump.
   6. Oil-piping train.

L. Factory-mounted control panel.
   1. Dry contacts for DDC signal.
   2. Alarm contacts for low water cutoff, low temperature and high temperature alarms.

M. Motors: NEMA MG 1, general purpose, continuous duty, Design B, open-drip-proof type.

3.01 INSTALLATION

A. Set boilers on minimum 3-1/2 inch thick reinforced concrete pad.

B. Provide dual wall independent flues for each boiler.

C. Pipe all gas pressure regulator vents to the outside of the building

D. Boil out all boilers per the manufacturer's recommendations before using the boilers to heat the building in a temporary or permanent basis. The water shall be tested by the chemical treatment subcontractor for acceptability. The heating water system shall have the proper water treatment chemicals installed immediately after the system has been flushed, boiled-out and refilled and before the system is used for temporary or permanent heating of the building.

E. The boiler controls shall be interlocked with the combustion air system to operate the combustion air make-up system when the boiler is firing. The boiler shall not operate without the combustion make-up air system operating.

END OF SECTION

SECTION 235233

FLEXIBLE WATER TUBE BOILERS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for flexible steel water tube boilers

B. Qualitative requirements for gas fired, oil fired, or combination gas/oil fired burners, power or atmospheric.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, capacity, accessories, and dimensions.

1.3 QUALITY ASSURANCE

A. Unit shall be constructed in accordance with the ASME Boiler and Pressure Vessel Code Section IV and shall be National Board listed.

B. Gas trains shall comply with requirements of CSD-1.

C. Boiler shall be UL 795 listed.

D. Boiler shall have a minimum thermal efficiency of 80 percent.

E. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

F. Units must meet minimum efficiency requirements of ASHRAE Standard 90.1.

1.4 COMPONENTS

A. Heat Exchangers: Flexible bent steel tubes wedged into steel headers
B. Pressure Rating: 160 psig, water.
C. Heavy-steel mounting base frame.
D. Removable access panels and doors for inspection and cleaning.
E. Observation ports.
F. Exhaust gas vent.
G. Insulation and jacket.
H. Hot Water Boiler Trim:
    1. Safety-Relief Valves: ASME rated.
    2. Water Connections: Internal thermal circulation to mix return water with boiler water.
    3. Dip tube.
    4. Low-water cutoff and auxiliary low water cutoff.
    5. Pressure and temperature gauges.
    6. Temperature controls.
    7. Boiler high-pressure-limit controller.

I. Gas Burners: Power burner, forced draft design.
   1. Fuel: [Natural gas] [Propane gas].
   2. Gas-pressure regulator.
   3. Gas valves.
   4. Manual shutoff.
   5. Thermistor flame-sensing device.
   6. Automatic 100 percent safety gas shutoff.
   7. Burner Firing: Modulating.
   8. Burner Ignition: Standing pilot
   9. Safety controls.
   10. Flue-Gas Collector and Draft Hood: Integral with boiler casing.
   11. Gas Piping Train: Factory Mutual approved.

J. Oil Burners: Pressure-atomizing type.
   1. Fuel: No. 2 fuel oil.
   2. Operation and combustion-air controls.
   3. Oil pump.
   4. Oil-piping train.

K. Combination Gas/Oil Burners: Power burner, forced draft design with pressure-atomizing oil burner.
   1. Fuel: [Natural gas] [Propane gas] and No. 2 fuel oil.
   2. Burner operation and combustion-air controls.
   3. Gas pilot.
   4. Gas piping train.
   5. Oil pump.
   6. Oil-piping train.

L. Gas Burners: Atmospheric Design
   1. Tubular alloy steel burners with natural draft.
   2. Electric pilot ignition.
   3. Gas pressure regulator.
   4. Gas valves.
   5. Manual shutoffs
   6. Automatic 100 percent safety gas shutoff.
   7. Safety controls.
   8. Flue-gas collector and draft hood.
   9. Factory Mutual approved gas train.

M. Factory-mounted control panel.
   1. Dry contacts for DDC signal.
   2. Alarm contacts for low water cutoff, low temperature and high temperature alarms.

N. Motors: NEMA MG 1, general purpose, continuous duty, Design B, open-drip-proof type.

1.5 INSTALLATION

A. Set boilers on minimum 3-1/2 inch thick reinforced concrete pad.

B. Provide dual wall independent flues for each boiler.

C. Pipe all gas pressure regulator vents to the outside of the building

D. Boil out all boilers per the manufacturer's recommendations before using the boilers to heat the building in a temporary or permanent basis. The water shall be tested by the chemical treatment subcontractor for acceptability. The heating water system shall have the proper water treatment chemicals installed immediately after the system has been flushed, boiled-out and refilled and before the system is used for temporary or permanent heating of the building.

E. The boiler controls shall be interlocked with the combustion air system to operate the combustion air make-up system when the boiler is firing. The boiler shall not operate without the combustion make-up air system operating.

END OF SECTION

SECTION 235239

PACKAGED FIRETUBE BOILERS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for package firetube boilers.

B. Qualitative requirements for gas fired, oil fired, or combination gas/oil burners.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, capacity, accessories, and dimensions.

1.3 QUALITY ASSURANCE

A. Unit shall be constructed in accordance with ASME Boiler and Pressure Vessel Code Section IV and shall be National Board listed.

B. Gas trains shall comply with Factory Mutual Insurance (FM) requirements.

C. Gas trains shall comply with the requirements of CSD-1.

D. Boiler shall be UL 715 listed.

E. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

F. Units must meet minimum efficiency requirements of ASHRAE Standard 90.1.

1.4 COMPONENTS

A. Heat Exchangers: Horizontal- fire tube, multi-pass, dry-back or wet-back design.

B. Pressure Rating: 125 psig, water.

C. Heavy-steel mounting base frame.

D. Removable access panels and doors for inspection and cleaning.

E. Observation ports.

F. Exhaust gas vent.

G. Insulation and jacket.

H. Hot Water Boiler Trim:
   1. Safety-Relief Valves: ASME rated.
   2. Water Connections: Internal thermal circulation to mix return water with boiler water.
   3. Dip tube.
   4. Low-water cutoff.
   5. Pressure and temperature gauges.
   6. Temperature controls.
   7. Boiler high-pressure-limit controller.

I. Gas Burners: Power burner, forced draft design.
   1. Fuel: [Natural gas] [Propane gas].
   2. Gas-pressure regulator.
   3. Gas valves.
   4. Manual shutoff.
   5. Thermistor flame-sensing device.
   6. Automatic 100 percent safety gas shutoff.
   7. Burner Firing: Modulating.
   8. Burner Ignition: Standing pilot
   9. Safety controls.
   10. Flue-Gas Collector: Integral with boiler casing.
   11. Gas Piping Train: Factory Mutual approved.

J. Oil Burners: Pressure-atomizing type.
   1. Fuel: No. 2 fuel oil.
   2. Operation and combustion-air controls.
   3. Oil pump.
   4. Oil-piping train.

K. Combination Gas/Oil Burners: Power burner, forced draft design with pressure-atomizing oil burner.
   1. Fuel: [Natural gas] [Propane gas] and No. 2 fuel oil.
   2. Burner operation and combustion-air controls.
   3. Gas pilot.
   4. Gas piping train.
   5. Oil pump.
   6. Oil-piping train.

L. Factory-mounted control panel.
   1. Dry contacts for DDC control.
   2. Alarm contacts for low water cutoff, low temperature and high temperature cutoffs.

M. Motors: NEMA MG 1, general purpose, continuous duty, Design B, open-drip-proof type.

1.5 INSTALLATION

A. Set boilers on minimum 3-1/2 inch thick reinforced concrete pad.

B. Provide dual wall independent flues for each boiler.

C. Pipe all gas pressure regulator vents to the outside of the building.

D. Boil out all boilers per the manufacturer's recommendations before using the boilers to heat the building in a temporary or permanent basis. The water shall be tested by the chemical treatment subcontractor for acceptability. The heating water system shall have the proper water treatment chemicals installed immediately after the system has been flushed, boiled-out and refilled and before the system is used for temporary or permanent heating of the building.

E. The boiler controls shall be interlocked with the combustion air system to operate the combustion air make-up system when the boiler is firing. The boiler shall not operate without the combustion make-up air system operating.

END OF SECTION

SECTION 235700

HEAT EXCHANGERS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for shell and tube design; and plate and frame.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacities at the specified conditions, materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. ASME Boiler and Pressure Vessel Code Section VIII, Division 1.

1.4 WARRANTY

A. Provide 1 year parts and labor warranty.

1.5 COMPONENTS

A. Shell and Tube Exchangers
   1. Shell shall be fabricated from steel, the head shall be cast iron.
   2. Tube shall be constructed of seamless copper tubing
   3. Piping connections shall be flanged or screwed connections.
   4. Tube sheets shall be constructed of copper sheets.

B. Plate and Frame Exchangers
   1. The plates shall be constructed of type 304 or 316 stainless steel.
   2. Gasket material shall be one of the following: Nitrile rubber, EPDM, Butyl or Viton.
   3. Piping connections shall be flanged or screwed connections.
   4. Unit shall include aluminum shroud.
   5. Frame shall be constructed of steel.

1.6 INSTALLATION

A. Install per the manufacturer's recommendations.

B. Provide a safety pressure relief valve on both water sides of each plate and frame heat exchanger. The relief valve shall be properly sized for the system application.

END OF SECTION

SECTION 236213

REFRIGERANT CONDENSING UNITS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for air-cooled refrigerant condensing units with single compressors.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacities at the specified conditions, materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. ASHRAE Standard 15.

B. Certified performance to ARI 210/270/340.

C. UL construction.

D. Units must meet minimum efficiency requirements of ASHRAE Standard 90.1.

1.4 WARRANTY

A. Compressors shall include an extended 5 year parts warranty.

1.5 COMPONENTS

A. Air-Cooled Units, single compressor 1 to 10 tons
   1. Compressor: Reciprocating or scroll type, hermetically sealed and isolated with single-speed or two-speed motor, crankcase heater, and internal temperature and motor overloads.
   2. Condenser: Copper-tube, aluminum-fin coil with integral liquid subcooler.
   3. Condenser Fan: Vertical discharge, direct-drive, propeller.
   4. Accessories: Suction and liquid line service valves with gauge ports, replaceable core filter driers, sightglass/moisture indicator, thermal expansion valve, automatic reset timer, and relief solder joints.
   5. Casing: Heavy-gauge, zinc-coated galvanized steel with baked enamel finish.
   6. Provide condenser coil protection.
   7. Refrigerant: ***Must comply with the requirements of the U.S. EPA Clean Air Act***
   8. Provide all required safeties including: overcurrent, thermal overload, and single-phasing motor protection.

1.6 INSTALLATION

A. Install the unit per the manufacturer's recommendations.

END OF SECTION

SECTION 236215

MULTIPLE-COMPRESSOR REFRIGERANT CONDENSING UNITS

GENERAL GUIDELINES

1.1 SECTION INCLUDES
- A. Qualitative requirements for air-cooled refrigerant condensing units with multiple compressors.

1.2 SUBMITTALS
- A. Submittals are required and shall include product data noting capacities at the specified conditions, materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE
- A. ASHRAE Standard 15.
- B. Certified performance to ARI 340/360.
- C. UL construction.
- D. Units must meet minimum efficiency requirements of ASHRAE Standard 90.1.

1.4 WARRANTY
- A. Compressors shall include an extended 5 year parts warranty.

1.5 COMPONENTS
- A. Air-Cooled Units, multiple compressors
  1. Compressor: Rotary screw or scroll type; semi-hermetic for the rotary screw, hermetically sealed for the scroll type. Compressors shall be isolated from the unit frame for vibration control. Compressors shall include crankcase heaters, suction strainer, oil strainer, and oil charging connection. Motors shall have internal thermal protection.
  2. Condenser: Copper-tube, aluminum-fin coil with liquid subcooler.
  3. Condenser Fans: Minimum one fan per compressor. Vertical discharge, direct-drive, propeller.
  4. Accessories: Delay timer, automatic reset timer, suction and liquid line service valves with gauge ports, replacable core filter driers, sightglass/moisture indicator, thermal expansion valve, automatic reset timer, suction accumulator, liquid receiver, and relief solder joints.
  5. Casing: Heavy-gauge, zinc-coated galvanized steel with baked enamel finish.
  6. Refrigerant: ***Must comply with the requirements of the U.S. EPA Clean Air Act***
  7. Provide all required safeties including overcurrent, thermal overload, and single-phasing motor protection.

1.6 INSTALLATION
- A. Install the unit per the manufacturer's recommendations.

END OF SECTION

SECTION 236416

PACKAGED, CENTRIFUGAL WATER CHILLER

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for packaged centrifugal compressor, water-cooled water chiller.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacities at specified conditions, materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. Capacity certified to ARI 590.

B. Evaporator/condenser shall be constructed to ASME Boiler and Pressure Vessel Code Section VIII.

C. ASHRAE Standard 15 Safety Code for Mechanical Refrigeration.

D. Conformance to ANSI/Ul 465.

E. Units must meet minimum efficiency requirements of ASHRAE Standard 90.1.

1.4 WARRANTY

A. Compressors shall have an extended 5 year parts warranty.

1.5 COMPONENTS

A. Packaged centrifugal compressor water-cooled water chiller:
1. Compressor: Centrifugal design.
2. Refrigerant: ***Must comply with the requirements of the U.S. EPA Clean Air Act.***
3. Cooler: ASME vessel direct expansion, shell and tube design.
4. Condenser: ASME shell and tube vessel.
5. Evaporator shell shall be wrapped with 3/4 inch thick elastomeric foam insulation.
6. Starter: Unit mounted soft start design
7. Control panel: Unit mounted with complete diagnostics, direct digital control.
8. Provide all required safeties including: overcurrent, thermal overload, and single-phasing motor protection.
9. Provide complete charge of the selected refrigerant.
10. Provide with "marine" water boxes for the cooler and condenser piping connections. Option: Detachable piping connections.
11. Provide with safety flow switch for proof of flow.
12. Provide unit with refrigerant purge unit for applicable refrigerant.
13. Provide safety water flow switch.

1.6 INSTALLATION

A. Install per the manufacturer's requirements.

B. Set the chiller on properly sized vibration isolation devices.

C. Install the flow switch in the leaving water piping from the chiller and wire it into the chiller control panel. Chiller shall not start until proof of flow via the flow switch is established.

D. Vent the refrigerant safety relief valve to the outside of the building.

END OF SECTION

SECTION 236423

PACKAGED, SCROLL WATER CHILLER

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for packaged scroll compressor, air-cooled water chiller.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacities at specified conditions, materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. Capacity certified to ARI 590.

B. Evaporator/condenser shall be constructed to ASME Boiler and Pressure Vessel Code Section VIII.

C. ASHRAE Standard 15 “Safety Code for Mechanical Refrigeration”.

D. Conformance to ANSI/Ul 465.

E. Units must meet minimum efficiency requirements of ASHRAE Standard 90.1.

1.4 WARRANTY

A. Compressors shall have an extended 5 year parts warranty.

1.5 COMPONENTS

A. Packaged air-cooled scroll water chiller:
   1. Compressor : Hermetic scroll design.
   2. Refrigerant: ***Must comply with the requirements of the U.S. EPA Clean Air Act.***
   3. Evaporator: ASME vessel direct expansion, shell and tube design. Provide with thermostatically controlled electric heat tracing.
   4. Condenser: Air-cooled condenser coils with integral sub-cooling circuit.
   5. Evaporator shell shall be wrapped with 3/4 inch thick elastomeric foam insulation.
   6. Starter: Unit mounted soft start design
   7. Control panel: Unit mounted with complete diagnostics, direct digital control.
   8. Provide all required safeties including: overcurrent, thermal overload, and single-phasing motor protection.
   9. Provide complete charge of the selected refrigerant.
   10. Provide with integral condenser fans
   11. Provide with safety flow switch for proof of flow.
   12. Condenser coil protection.
   13. Provide with safety water flow switch.

1.6 INSTALLATION

A. Install per the manufacturer's requirements.

B. Set the chiller on properly sized vibration isolation devices.

C. Install the flow switch in the leaving water piping from the chiller and wire it into the chiller control panel. Chiller shall not start until proof of flow via the flow switch is established.

END OF SECTION

SECTION 236426

PACKAGED, ROTARY SCREW WATER CHILLER

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for packaged rotary screw air-cooled or water-cooled, water chiller.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacities at specified conditions, materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. Capacity certified ARI 590.

B. Evaporated/condenser shall be constructed to ASME Boiler and Pressure Vessel Code Section VIII.

C. ASHRAE Standard 15 Safety Code for Mechanical Refrigeration.

D. Conformance to ANSI/UL 465.

E. Units must meet the minimum efficiency requirements of ASHRAE Standard 90.1.

1.4 WARRANTY

A. Compressors shall have an extended 5 year parts warranty.

1.5 COMPONENTS

A. Water-cooled and air-cooled helical rotary screw chiller:
   1. Compressor: Semi-hermetic helical rotary screw design with double wall construction for sound attenuation.
   2. Refrigerant: ***Must comply with the requirements of the U.S. EPA Clean Air Act***
   3. Cooler: ASME vessel direct expansion, shell and tube design. Provide thermostatically controlled electric heat tracing for exterior air-cooled chillers.
   4. Condenser: ASME vessel, shell and tube design for water-cooled design.
   5. Evaporator shell shall be wrapped with 3/4 inch thick elastomeric foam insulation.
   6. Starter: Unit mounted soft start design
   7. Control panel: Unit mounted with complete diagnostics, direct digital control.
   8. Provide all required safeties including: overcurrent, thermal overload, and single-phasing motor protection.
   9. Provide with "marine" water boxes for the cooler and condenser piping connections for water-cooled design.
   10. Provide complete charge of the select refrigerant.
   11. Provide integral multiple compressor fans for air-cooled design.
   12. Provide condenser coil protection on outdoor air-cooled units.
   13. Provide with water flow switch.

1.6 INSTALLATION

A. Install per the manufacturer's requirements.

B. Minimize the number of daily starts as recommended by the manufacturer.

C. Vent the refrigerant safety relief valve to the outside of the building.

D. Set the chiller on properly sized vibration isolation devices.

E. Mount the safety flow switch in the chilled water supply piping. Wire the flow switch to the chiller control panel. Chiller shall not start until proof of flow via the flow switch is established.

END OF SECTION

SECTION 236440

REFRIGERANT MONITORING SYSTEMS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for refrigerant monitoring equipment and breathing apparatus.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. Products and installation shall comply with requirements of ASHRAE Standard 15.

1.4 COMPONENTS

A. Gas Detection System

1. ***System shall be capable of detecting presence of any HCFC, CFC, or HFC refrigerant.*** Provide the appropriate sensors for the refrigerant being used.
2. The system shall indicate alarm and shut down the refrigeration equipment and start the refrigerant ventilation fan system.
3. Oxygen deprivation monitoring shall not be used in lieu of TLV-TWA monitoring for human safety exposure.
4. Sequential sampling and multi-point monitoring shall be required as defined in the latest issue of ASHRAE Standard 15.
5. The analyzer shall be microprocessor based and employ infrared (IR) sensor technology and shall accurately provide sensing down to 1 part per million.
6. Unit shall be factory calibrated for the refrigerant and sensors.
7. Sensors shall be capable of being installed up to 500 feet from the microprocessor.

B. Breathing Apparatus

1. Self-contained with 30 minutes of air. Provide with full face mask, breathing tube, air tank, controls and harness. Provide with wall mounted storage cabinet.

1.5 INSTALLATION

A. Provide refrigerant monitoring/alarm system for refrigeration equipment located inside the building.

B. The monitoring system shall shut-down all refrigeration equipment in the room, start the refrigerant emergency exhaust system, and sound the alarm.

C. Locate the breathing apparatus in a protective wall mounted enclosure immediately outside of the refrigeration room.

D. Mount and wire the remote audible alarms inside the room containing the refrigeration equipment and immediately outside of the refrigeration room.

END OF SECTION

SECTION 236500

PACKAGED COOLING TOWERS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for induced draft cross-flow package cooling towers, and forced-draft, counter-flow packaged cooling towers.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacities at the specified conditions, materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. Certified for thermal performance to CTI 201.

B. ASTM E84 for burning characteristics of building materials.

C. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

D. Units must meet minimum efficiency requirements of ASHRAE Standard 90.1.

1.4 COMPONENTS

A. Induced-Draft, Cross-Flow Cooling Towers
1. Fan Type: Propeller with cast-aluminum, fixed-pitch or galvanized-steel, fixed-pitch blades.
2 Fan Drive: Gear, with speed reducer or belt drive.
3 Fan Motor: Two-speed or suitable for variable-frequency drive control, totally enclosed, fan-cooled.
4. Fan-vibration cutoff switch.
5. Hot-water distribution system.
6. Hot-Water Basin Control Valves: Globe.
7 Casing: Galvanized steel with polymer coating or stainless steel.
8. Collecting Basin: Galvanized steel with polymer coating or stainless steel.
9. Fill Material: Formed PVC or CPVC.
10. Drift Eliminator Material: Formed PVC.
11. Louver Material: Galvanized steel with polymer coating.
12. Water Level Control: Electric float switch with solenoid make-up valve.
13. Basin Heaters: Electric immersion sized to maintain a minimum 40 degree F pan water temperature.
14. Handrails, Ladders, and Safety Cage: Galvanized steel pipe.
15. Vibration Controls: Manufacturer recommended. Rubber and glass-fiber pad isolators.
16. Basin drain connection and overflow connections.
17. Anti-vortex suction diffuser/screen constructed of stainless steel.

A. Forced-Draft, Counter-Flow Cooling Towers
   1. Fan Type: Propeller with cast-aluminum, fixed-pitch or galvanized steel, fixed-pitch blades. Centrifugal forward curved fans are also acceptable.
   2. Fan Drive: Gear, with speed reducer or belt drive.
   3. Fan Motor: Two speed or suitable for variable frequency drive control, totally enclosed, fan cooled.
   4. Fan vibration cutoff switch.
   5. Hot water distribution system.
   6. Hot Water Basin Control Valves: Globe.
   7. Casing: Galvanized steel with polymer coating or stainless steel.
   8. Collecting Basin: Galvanized steel with polymer coating or stainless steel.
   9. Fill Material: Formed PVC or CPVC.
   10. Drift Eliminator Material: Formed PVC.
   11. Louver Material: Galvanized steel with polymer coating.
   12. Water Level Control: Electric float switch with solenoid makeup valve.
   13. Basin Heaters: Electric immersion sized to maintain a minimum 40 degree F pan water temperature.
   14. Handrails, Ladders, and Safety Cage: Galvanized steel pipe.
   15. Vibration Controls: Manufacturer recommended. Rubber and glass fiber pad isolators.
   16. Basin drain connection and overflow connections.
   17. Anti-vortex suction diffuser/screen constructed of stainless steel.

1.5 INSTALLATION

A. Install cooling towers to conform with the manufacturer's requirements

END OF SECTION

SECTION 236533

CLOSED CIRCUIT FLUID COOLERS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for closed-circuit evaporative fluid coolers.

1.2 SUBMITTALS

A. Provide submittals indicating capacity at the specified conditions, electrical requirements, construction material, and dimensions.

1.3 QUALITY ASSURANCE

A. Units must meet minimum efficiency requirements of ASHRAE Standard 90.1.

1.4 COMPONENTS

A. Coil: Continuous serpentine, cleanable, galvanized tubes with removable cover plates on headers.

B. Drift Eliminator Material: Hot-dip galvanized steel with polymer coating.

C. Hot Water Distribution System: Schedule 40 PVC with removable branch pipes.

D. Inlet Screens: Galvanized steel mesh with polymer coating mounted on removable frame.

E. Basin Heaters: Electric.

F. Circulating Pumps: Centrifugal, closed-coupled, bronze fitted with mechanical seals.

G. Water Level Control: Electric float switch with solenoid makeup valve.

H. Fan: Centrifugal
   1. Drive: Belt.
   2. Motor: Totally enclosed, fan-cooled energy-efficient type.
   3. Motor Speed: Single speed.
   4. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

I. Vibration cutout switch.

J. Discharge dampers, inlet dampers, and controls.

K. Casing Material: Galvanized steel with polymer coating or stainless steel.

L. Collecting Basin: Galvanized steel with polymer coating or stainless steel.

M. Vibration Controls: Manufacturer's recommended rubber and glass-fiber pads or restrained spring isolators.

1.5 INSTALLATION

A. Mount fluid cooler on vibration isolators.

B. Provide open circuit cooling tower chemical water treatment for control of scale, corrosion, and biological growth.

END OF SECTION

SECTION 237119

ICE STORAGE SYSTEM

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for ice storage tanks.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacities at the specified conditions, materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. Unit controls shall be UL or ETL listed and labeled.

1.4 COMPONENTS

A. Thermal ice storage tanks shall be constructed of galvanized steel or polyethylene.

B. Heat exchangers shall be constructed of polyolefin, polyethylene or galvanized steel.

C. The bottom, sides, and cover(s) of each ice storage tank shall be factory insulated to ensure standby losses do not exceed one percent of system capacity in 24 hours.

D. Ice storage tanks that are to be buried shall be specifically designed for burial.

E. An ice inventory measuring device shall be provided to interface with the HVAC Direct Digital Controls system.

1.5 Install per manufacturer’s requirements.

1.6 Manufacturer shall check-test-start units.

END OF SECTION

SECTION 237200

AIR TO AIR ENERGY RECOVERY EQUIPMENT

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for total energy heat recovery wheels and energy recovery modules.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacities at the specified conditions, materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. Recovery performance shall be tested in accordance with ASHRAE Standard 84.

B. Units shall bear the ETL label and shall be ETL certified.

C. Recovery performance at specified conditions shall be guaranteed by the manufacturer.

1.4 COMPONENTS

A. Energy Recovery Wheel

1. The energy recovery wheel shall have a minimum heating and total cooling effectiveness of 80%, based on balanced airflow (relief airflow matching outside airflow). The effectiveness of this wheel shall not be below 70% under design airflow conditions.
2. The unit shall be constructed of structural steel tubular frame with epoxy primer and finish. The cabinet shall be of 16 gauge bright galvanized steel construction.
3. The heat wheel transfer media shall be a coated aluminum or polymer media with air permeable matrix with laminar flow flutes coated with a renewable desiccant. The heat wheel media shall be driven by an electric motor.
4. The face velocity across each side of the media (supply and exhaust) shall be less than 800 FPM and more than 350 FPM with a purge method that prevents exhaust air from being recirculated.
5. Each unit shall include a frost control method. The control of the unit shall be provided by the DDC control system.

B. Energy Recovery Module

(This type of energy recovery does not meet the prescriptive path requirements of the energy code. If this type is to be used, compliance with the energy cost-budget method must be demonstrated – ASHRAE 90.1 ***(most recent as adopted by OBC or USGBC.)***)

1. The energy recovery module shall have a heating net total effectiveness of 62% and a cooling net total effectiveness of 41%.
2. The module shall be constructed of 16 gauge galvanized steel with epoxy primer. Access doors shall have gasket, hinge, and door latches to provide a

tight seal.

3. The fixed plate exchange module shall be fixed plate cross-flow construction. Water vapor transfer shall be through molecular transport by hydroscopic resin.

C. Furnish a digital display for readout of both air stream temperatures and control settings.

D. Provide filter racks and filters with a minimum MERV rating of 7 on both entering air sides of the wheel or energy recovery module.

E. Each unit shall include a frost control method. The control for the unit shall be provided through the building DDC control system.

1.5 INSTALLATION

A. Install per manufacturers requirements.

B. Manufacturer shall test-check-start units.

END OF SECTION

SECTION 237313

MODULAR INDOOR AIR HANDLING UNITS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for central station modular air handling units including fan sections hot water heating coils, chilled water cooling coils, filter sections, mixing boxes, face and bypass dampers, access modules, and other such equipment and accessories.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting the following:
   1. Product data indicating dimensions, weights, capacities, and materials.
   2. Fan performances including curves.
   3. Sound power levels.
   4. Filter data, mounting method, and performance.

1.3 QUALITY ASSURANCE

A. Construction standard shall meet NFPA 90A.

B. Product certification shall comply with ARI 430.

C. Sound power level rating shall comply with AMCA 300, ASHRAE 68, and AMCA 301.

D. Fan performance rating shall comply with AMCA 210.

E. Damper leakage rating shall comply with AMCA 500.

F. Coil performance shall comply with ARI 410.

G. Safety code for mechanical refrigeration shall comply with ASHRAE 15.

H. Filtration shall comply with ASHRAE 52.

1.4 COMPONENTS

A. Unit Casing
   1. Galvanized steel framing on channel base with welding construction.
   2. Zinc coated steel with primer coat and final finish of protective enamel.
   3. Dual wall construction throughout.
   4. 2 inch thick insulation with minimum R-value of R-8.3 ft^2●h●°F/Btu.
   5. Double wall, stainless steel drain pan, insulated and sloped to assure drainage.
   6. Access doors shall be 2" thick dual wall construction with hinge and door latches to provide a tight seal. Bolted doors are not acceptable.

B. Water Coils
   1. Common or individual with minimum 16 gauge galvanized steel casings and intermediate supports for lengths over 60 inches.
   2. Constructed of seamless copper tubes with aluminum plate fins, cast iron or copper headers, with connections for drain valve and air vent.
   3. Drainable serpentine type.
   4. Tested at 300 psi under water.

5. Dual wall, insulated, stainless steel drain pan of IAQ design under all cooling coils.

C. DX Refrigerant Coils
1. Constructed of seamless copper tubes with aluminum plate fins,
2. Seamless copper suction header and distributor tube with low pressure drop distributors.
3. Multi-circuited, fully intertwined, staggered row for full face cooling at variable air flows.
4. Tested at 400 psi under water.

D. Face and Bypass Dampers
1. Dampers shall be opposed acting, with break-formed dampers having gaskets and edge seals.

E. Access Section
1. Section shall include an access door.
2. Access sections shall be placed between coil sections to allow access for cleaning and repair.

F. Mixing Box
1. Section shall be provided with return air and economizer air connections.
2. Dampers shall be provided and installed by the Temperature Control Contractor.

G. Fans
1. Fan type shall be (airfoil) (backward inclined) (forward curved) type.
   a. Double width, double inlet multi-blade fan wheel.
   b. Self aligning, grease lubricated ball bearings with lubrication fittings
   c. Fan and motor assembly internally isolated from unit casing.
2. Fan type shall be plug type.
   a. Single width, single inlet, multi-blade fan wheel.
   b. Self aligning, anti-friction pillow block bearings.
   c. Fan and motor assembly internally isolated including spring-supported inertia pad.
3. Fan assemblies shall be statically and dynamically balanced.
4. Guards for belts and fans shall be provided to meet OSHA requirements.

H. Motors/Drives
1. Heavy-duty, high efficiency designed specifically for use with electronic variable frequency drives. Efficiency shall meet the minimum requirements of IEEE 112, Test Method B.
2. Temperature rating shall be 50 deg C maximum rise at 40 deg C ambient.
3. Service factor shall be 1.15 for polyphase motors and 1.35 for single-phase motors.
4. Each motor shall be mounted on an adjustable base.
5. Noise rating shall be quiet.
6. Overload protection shall be built-in thermal with automatic-reset.
7. Sheaves shall be cast iron with v-belt sized for 150 percent BHP.
8. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

I. Filter Section
   1. Filter section shall be a cartridge section separate from the mixing box.
   2. The pre-filters shall be 2 inch and have a minimum MERV rating of 7.
   3. The primary filters shall have a minimum MERV rating ***between 11-14***, and be mounted just after the pre-filters.
   4. Refer to “LEED For Schools” for additional requirements.

J. Vibration Isolation
   1. Each fan system shall be isolated from the cabinet with spring-type isolation.
   2. Fans shall include concrete-filled inertia bases where recommended by unit manufacturer.
   3. Thrust restraints shall be included for all fan types.

K. Lighting and Convenience Outlet Circuit
   1. 1 vapor-proof service light and 1 convenience outlet shall be provided in each fan section and mixing box section. (optional for units less than 15,000 cfm)

1.5 INSTALLATION

A. Install in accordance with manufacturers requirements.

B. Startup and training to be provided by a factory-trained service technician.

LESSONS LEARNED

3.1 Air handling units designed and utilized at 100 percent outside air units (DOAS) should be equipped with a return/recirculation damper to assist the building in morning warm-up mode before occupancy. Reliance on heat pumps, VRF fan coils or chilled beams to warm up the building alone will cause longer warm-up times and using the DOAS unit for assistance without recirculating the return air will cause unnecessary energy consumption. Once the building enters morning warm-up, the recirculation damper should be closed and the unit operated per design.

END OF SECTION

SECTION 237323

CUSTOM INDOOR AIR HANDLING UNITS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Central station custom air handling units including fan sections, hot water heating coils, chilled water cooling coils, filter sections, mixing boxes, access modules, and other such equipment and accessories. Custom air handling units are intended only to be used to accommodate unusual mechanical room configurations where modular air handling units will not fit space allocated.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting the following:
   1. Product data indicating dimensions, weights, capacities, and materials.
   2. Fan performances including curves.
   3. Sound power levels.
   4. Filter data, mounting method, and performance.

1.3 QUALITY ASSURANCE

A. Construction standard shall meet NFPA 90A.

B. Product certification shall comply with ARI 430.

C. Sound power level rating shall comply with AMCA 300, AMCA 301, and ASHRAE 68.

D. Fan performance rating shall comply with AMCA 210.

E. Damper leakage rating shall comply with AMCA 500.

F. Coil performance shall comply with ARI 410.

G. Safety code for mechanical refrigeration shall comply with ASHRAE 15.

H. Filtration shall comply with ASHRAE 52.

1.4 COMPONENTS

A. Unit Construction
   1. Unit base shall be constructed of structural steel channel with welded construction. Include lifting lugs and internal supports for spans over 96 inches.
   2. Exterior housing shall be dual wall constructed with minimum 16 gauge galvanized exterior skin and 20 gauge interior skin over 2 inch, 3 pounds per cubic foot insulation.
   3. Unit floor shall be minimum 16 gauge galvanized steel and shall be welded to the floor structural system.
   4. Access doors shall be dual wall, and installed in each fan section and mixing box section as a minimum. Each door shall be fully gasketed with heavy-duty hinges and adjustable latches. Insulation and panel construction shall match the rest of the unit sections.

5. Insulation shall be minimum 2 inch thick, R-8.3 ft^2●h●°F/Btu for all wall and door assemblies. Floor insulation shall be 2 inch, R-8.3 ft^2●h●°F/Btu and installed directly beneath floor surface.
6. The finish for the unit shall include a painted exterior over galvanized steel having a minimum A-60 application.

B. Water Coils
1. Common or individual with minimum 16 gauge galvanized steel casings and intermediate supports for lengths over 60 inches.
2. Constructed of seamless copper tubes with aluminum plate fins, cast iron or copper headers, with connections for drain valve and air vent.
3. Drainable serpentine type.
4. Tested at 300 psi under water.
5. Dual wall, insulated, stainless steel drain pan of IAQ design ***under all cooling coils.***

C. Access Section
1. Section shall include an access door.
2. Access sections shall be placed between coil sections to allow access for cleaning and repair.

D. Mixing Box
1. Section shall be provided with return air and economizer air connections.
2. Dampers shall be provided and installed by the Temperature Control Contractor.

E. Fans
1. Fan type shall be (airfoil) (backward inclined) (forward curved) type.
   a. Double width, double inlet multi-blade fan wheel.
   b. Self aligning, grease lubricated ball bearings with lubrication fittings
   c. Fan and motor assembly internally isolated from unit casing.
2. Fan type shall be plug type.
   a. Single width, single inlet, multi-blade fan wheel.
   b. Self aligning, anti-friction pillow block bearings.
   c. Fan and motor assembly internally isolated including spring-supported inertia pad.
3. Fan assemblies shall be statically and dynamically balanced.
4. Guards for belts and fans shall be provided to meet OSHA requirements.

F. Motors/Drives
1. Heavy-duty, high efficiency designed specifically for use with electronic variable frequency drives. Efficiency shall meet the minimum requirements of IEEE 112, Test Method B.
2. Temperature rating shall be 50 deg C maximum rise at 40 deg C ambient.
3. Service factor shall be 1.15 for polyphase motors and 1.35 for single-phase motors.
4. Each motor shall be mounted on an adjustable base.
5. Noise rating shall be quiet.
6. Overload protection shall be built-in thermal with automatic-reset.
7. Sheaves shall be cast iron with v-belt sized for 150 percent BHP.
8. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

G. Filter Section
1. Filter section shall be a cartridge section separate from the mixing box.
2. The pre-filters shall be 2 inch and have a minimum MERV rating of 7.
3. The primary filters shall have a minimum MERV rating ***between 11-14*** and be mounted just after the pre-filters.
4. Refer to “LEED for Schools” for additional requirements.

H. Vibration Isolation
1. Each fan system shall be isolated from the cabinet with spring-type isolation.
2. Fans shall include concrete-filled inertia bases where recommended by unit manufacturer.
3. Thrust restraints shall be included for all fan types.

I. Lighting and Convenience Outlet Circuit
1. 1 vapor-proof service light and 1 convenience outlet shall be provided in each fan section, and mixing box section.

1.5 INSTALLATION

A. Install in accordance with manufacturers requirements.

B. Startup and training to be provided by a factory-trained service technician.

LESSONS LEARNED

3.1 Air handling units designed and utilized at 100 percent outside air units (DOAS) should be equipped with a return/recirculation damper to assist the building in morning warm-up mode before occupancy. Reliance on heat pumps, VRF fan coils or chilled beams to warm up the building alone will cause longer warm-up times and using the DOAS unit for assistance without recirculating the return air will cause unnecessary energy consumption. Once the building enters morning warm-up, the recirculation damper should be closed and the unit operated per design.

END OF SECTION

SECTION 238113

UNITARY AIR CONDITIONING EQUIPMENT

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for packaged through-the-wall terminal air conditioning equipment and accessories.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacity, materials, controls, dimensions, and accessories.

1.3 QUALITY ASSURANCE

A. Refrigeration system shall meet ASHRAE 15.

B. Units must meet minimum efficiency requirements of ASHRAE Standard 90.1.

C. Performance rating shall comply with ARI 310/380.

D. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

1.4 WARRANTY

A. The unit compressor shall be warranted for 5 years.

1.5 COMPONENTS

A. The cabinet shall be constructed of galvanized steel with removable front panel.
   1. Mounting: Wall installation with wall sleeve.
   2. Finish: Baked enamel over heavy, 18 gauge, phosphatized galvanized steel.
   3. Subbase: Enameled steel.
   4. Louvers: Extruded aluminum, architectural style grille with horizontal louvers and baked enamel finish.
   5. Discharge grille and access door: Extruded aluminum.
   6. Cabinet extensions matching cabinet construction.

B. The refrigeration system shall be direct-expansion indoor coils with capillary restrictor and constant-pressure expansion valve, hermetically sealed compressor, outdoor coil and fan, and coaxial tube-in-tube condenser.

C. The indoor air system shall include forward-curved centrifugal indoor fan and motor, and permanent filters. Motors shall be high efficiency, permanent split capacity type. A positive pressure ventilation damper with connection cable shall be included with each unit.

D. The outdoor fan system shall include forward-curved centrifugal fan with separate motor from indoor system. Motors shall be high efficiency, permanent split capacity type.

E. Heating coils shall be electric resistance type with fusible link and an overheat limit control.

F. Condensate drain shall be provided for direct flow to the exterior of building.

G. The control system shall include a unit mounted control panel for setting of fan speeds, heating/cooling mode and automatic control.
   1. A unit mounted thermostat shall sense the air temperature at the fan inlet for control. The setting shall be adjustable.

1.6 INSTALLATION

A. Install in accordance with manufacturers requirements.

END OF SECTION

SECTION 238123

COMPUTER ROOM AIR CONDITIONERS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for air conditioning units intended specifically for computer rooms including package unit, refrigerant piping and specialties, reheat control, valves, and unit control.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacity, materials, controls, dimensions, and accessories.

1.3 QUALITY ASSURANCE

A. Refrigeration system shall meet ASHRAE 15.

B. Units must meet minimum efficiency requirements of ASHRAE Standard 90.1.

C. Units shall be UL Listed and CSA Certified.

D. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

1.4 WARRANTY

A. The entire unit shall be warranted for 5 years.

1.5 COMPONENTS

A. Cabinet and frame construction
   1. Welded, heavy gauge galvanized steel frame
   2. Zinc-coated steel with primer coat and baked enamel finish
   3. Minimum 2 inch, 2 pound density fiber insulation
   4. Hinged filter and grille for access

B. Filters
   1. 1 inch thick, disposable and ***minimum MERV 7.***
   2. Provide extra set at completion of work

C. Evaporator fan assembly
   1. Fan shall be direct-drive with double inlet blower.

D. Refrigeration system
   1. Direct expansion coil with aluminum fins, copper tubes, thermal expansion valve, liquid line filter-dryer, service shutoff valves, charging valves, and stainless-steel drain pan.
   2. Hermetic compressor with vibration mounts.

E. Condenser section
   1. Air-cooled, copper tubes, aluminum fins, with refrigerant circuit of counterflow design including desuperheating section.
   2. Fan shall be double inlet, direct drive with a 3-speed motor and low limit ambient control to prevent evaporator freezeup.

F. Reheat section
   1. Electric reheat coils shall be low-density, tubular type elements, with UL approved safety switches.

G. Condensate drain system
   1. The condensate drain system shall include a condensate pump with integral float switch, pump/motor assembly, and reservoir.

H. Control system
   1. The control system shall be solid state and shall include a remote thermostat and shutoff switch for field installation.

1.6 INSTALLATION

A. Install in accordance with manufacturers requirements.

B. Startup and training to be provided by a factory-trained service technician.

END OF SECTION

SECTION 238146

WATER SOURCE HEAT PUMPS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for packaged horizontal or vertical water source heat pump air conditioning/heating unit, unit-mounted controls, and accessories.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacity, materials, controls, dimensions, and accessories.

1.3 QUALITY ASSURANCE

A. Refrigeration system shall meet ASHRAE 15.

B. Units must meet minimum efficiency requirements of ASHRAE Standard 90.1.

C. Performance rating shall comply with ARI/ASHRAE/ISO 13256-1.

D. Safety requirements shall comply with UL 484/559.

E. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

1.4 WARRANTY

A. Heat pump unit shall be warranted for one year for all parts including labor and a total of 5 years on compressor parts.

1.5 COMPONENTS

A. Unit shall be rated to operate with an entering water temperature from 25 degrees Fahrenheit to 115 degrees Fahrenheit. Note that operating the ground loop below 40 degrees will require glycol freeze protection.

B. The cabinet shall be constructed of galvanized steel with 0.5 inch, 1-1/2 pound per cubic foot density insulation. Internal sheet metal parts shall be protected with a thermosetting, plastic coating.

C. Heat pump shall include refrigeration circuit with single or dual capacity hermetic compressor.
   1. Refrigerant air-to-air copper-tube coil heat exchanger.
   2. Refrigerant shall be HFC
   2. Water-to-refrigerant coaxial tube-in-tube heat exchanger.
   3. Refrigerant flow control using capillary tube or thermal expansion valve.
   4. High and low pressure safety cutoffs.
   5. Pilot controlled reversing valve.

6. Thermal overload protection.
7. External vibration isolation.
8. Internal compressor vibration isolation.
9. Insulate water-to-refrigerant heat exchanger and refrigerant suction lines.

D. Forward curved, centrifugal type evaporator fan with multi-speed, high-efficiency PSC or ECM type motor including integral mounting brackets and thermal overload protection.

E. Galvanized steel insulated drain pan with external drain connection. Provide with solid-state liquid detection device in the drain pan to stop compressor if condensate accumulates.

F. Filter frame with 1 inch throwaway filter. Filter must be MERV 13 if designer is going after LEED EQ 5.0.

G. The control system shall include a unit-mounted microprocessor control panel design for interface to the building DDC electronic control system. Controller shall be capable of auto heating and cooling changeover and capacity control. Manufacturer shall provide all necessary control components (t-stats, humidistats, etc.) necessary for control of heat pump.

H. Units shall be finished with enamel paint to the manufacturer's standard color.

I. Provide interior acoustical insulation to deaden fan and compressor noise.

J. Provide insulated auxiliary drain pan under the coil connections if equipment is above finished ceilings.

1.6 INSTALLATION

A. Install in accordance with manufacturers requirements.

B. Hose kit and associated shutoff and flow control devices shall be field installed by the HVAC Contractor.

END OF SECTION

SECTION 238156

GROUND SOURCE HEAT PUMPS (GEOTHERMAL)

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for packaged horizontal or vertical ground source heat pump air conditioning/heating unit, unit-mounted controls, and accessories.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacity, materials, controls, dimensions, and accessories.

1.3 QUALITY ASSURANCE

A. Refrigeration system shall meet ASHRAE 15.

B. Units must meet minimum efficiency of 16 EER cooling and 3.5 COP Heating under ARI/ISO Standard 13256-1 Ground Loop Conditions (ARI 330). Multiple or variable speed heat pumps shall achieve this rating at high speed.

C. Performance rating shall comply with ARI/ASHRAE/ISO 13256-1.

D. Safety requirements shall comply with UL 484/559.

E. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

1.4 WARRANTY

A. Heat pump unit shall be warranted for one year for all parts including labor and a total of 5 years on compressor parts.

1.5 COMPONENTS

A. Unit shall be rated to operate with an entering water temperature from 25 degrees F. to 115 degrees F. Note that operating the ground loop below 40 degrees will require glycol freeze protection.

B. The cabinet shall be constructed of galvanized steel with 0.5 inch, 1-1/2 pound per cubic foot density insulation. Internal sheet metal parts shall be protected with a thermosetting, plastic coating.

C. Heat pump shall include refrigeration circuit with single or dual capacity hermetic compressor.
   1. Refrigerant air-to-air copper-tube coil heat exchanger.
   2. Refrigerant shall be HFC.
   2. Water-to-refrigerant coaxial tube-in-tube heat exchanger.

3. Refrigerant flow control using capillary tube or thermal expansion valve.
4. High and low pressure safety cutoffs.
5. Pilot controlled reversing valve.
6. Thermal overload protection.
7. External vibration isolation.
8. Internal compressor vibration isolation.
9. Insulate water-to-refrigerant heat exchanger and refrigerant suction lines.

D. Forward curved, centrifugal type evaporator fan with multi-speed, high-efficiency ECM type motor including integral mounting brackets and thermal overload protection.

E. Galvanized steel insulated drain pan with external drain connection. Provide with solid-state liquid detection device in the drain pan to stop compressor if condensate accumulates.

F. Filter frame with 1 inch throwaway filter. Filter must be MERV 13 if designer is going after LEED EQ 5.0.

G. The control system shall include a unit-mounted microprocessor control panel design for interface to the building DDC electronic control system. Controller shall be capable of auto heating and cooling changeover and capacity control. Manufacturer shall provide all necessary control components (t-stats, humidistats, etc.) necessary for control of heat pump.

H. Units shall be finished with enamel paint to the manufacturer's standard color.

I. Provide interior acoustical insulation to deaden fan and compressor noise.

1.6 INSTALLATION

A. Install in accordance with manufacturers requirements.

B. Hose kit and associated shutoff and flow control devices shall be field installed by the HVAC Contractor.

END OF SECTION

SECTION 238219

FAN COIL UNITS – FOUR PIPE

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for fan coil units and accessories.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacity, materials, controls, dimensions, and accessories.

1.3 QUALITY ASSURANCE

A. Units must meet minimum efficiency requirements of ASHRAE Standard 90.1.

B. Performance rating shall conform to N.E.C requirements and shall be UL labeled.

C. Unit capacities shall be certified in accordance with ARI Standard 440-98.

1.4 WARRANTY

A. The entire unit shall be warranted for 5 years.

1.5 COMPONENTS

A. Cabinet and frame construction
   1. Welded, heavy gauge galvanized steel frame
   2. Zinc-coated steel with primer coat and baked enamel finish
   3. Minimum 2 inch, 2 pound density fiber insulation
   4. Hinged filter and grille for access

B. Filters
   1. 1 inch thick, disposable and ***MERV 7*** efficiency.
   2. Provide extra set at completion of work.

C. Centrifugal supply air fan
   1. Fan shall be forwardly curved double width-double inlet, with common shaft mounted on a removable fan board, driven by a three-speed permanent split capacitor motor having built-in overload protection.

D. Chilled water cooling coil
   1. Coil shall consist of seamless copper tubes with bonded aluminum fins. Coils shall be designed for 300 psi w.p.
   2. A manual air vent shall be provided on each coil.

E. Hot water heating coil
   1. Coil shall consist of seamless copper tubes with bonded aluminum fins. Coils shall be designed for 300 psi w.p.
   2. A manual air vent shall be provided on each coil.

F. Condensate drain system

1. The condensate drain system shall include a condensate drain pan under the cooling coil, pitched to drain, and an auxiliary drain pan under the coil connections. Provide auxiliary drain pan and/or condensate high limit fan cutoff as required by code.

G. Control system

1. The control system shall be a complete system of electronic direct digital controls.

1.6 INSTALLATION

A. Install in accordance with manufacturers requirements.

B. Startup and training to be provided by a factory-trained service technician.

END OF SECTION

SECTION 238223

UNIT VENTILATORS – FOUR PIPE

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for unit ventilator units and accessories.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacity, materials, controls, dimensions, and accessories.

1.3 QUALITY ASSURANCE

A. Units shall be tested and performance certified in accordance with ARI 840-98.

B. Units must meet minimum efficiency requirements of ASHRAE Standard 90.1.

C. Units shall be UL or ETL listed.

1.4 WARRANTY

A. The entire unit shall be warranted for 5 years.

1.5 COMPONENTS

A. The cabinet shall be constructed of galvanized steel with removable front panel.
   1. Mounting: Wall installation with wall sleeve.
   2. Finish: Baked enamel over heavy, 18 gauge, phosphatized galvanized steel.
   3. Subbase: Enameled steel.
   4. Louvers: Extruded aluminum, architectural style grille with horizontal louvers and baked enamel finish.
   5. Discharge grille and access door: Extruded aluminum.
   6. Cabinet extensions matching cabinet construction.

B. Centrifugal fans, forwardly curved double width-double inlet, with common shaft mounted on a removable fan board, driven by a single speed, permanent split capacitor motor having built-in overload protection and Class F winding insulation. The motor shall be factory wired to a solid state, single phase, variable speed controller with minimum turndown to 30% of total motor speed. A toggle type disconnect switch shall be furnished with each unit to provide electrical disconnect of power to all components.

C. Chilled water cooling coil and separate hot water heating coil for a four-pipe system, each consisting of seamless copper tubes with bonded aluminum fins. Coils shall be designed for 300 psi w.p. A manual air vent shall be provided on each coil.

D. Outside Air – Return air dampers with edge seals arranged for automatic operation modulating form zero to 100% outside air intake.

E. Coil face and bypass modulating dampers with edge seals, arranged for automatic operation to regulate heat output.

F. Insulated drain pan under the cooling coil and insulated auxiliary drain pan under the coil connections shall be furnished.

G. Air filter, 1" pleated filter with cardboard frame. MERV value shall be 7.0.

H. Control system
   1. The control system shall be a complete system of electronic direct digital controls.

1.6 Outside air intake louver and protective lattice grille. Louver shall have vertical blades and bird screen. Louver and grilles shall be furnished in Kynar 500 with color selected by the Architect. Louvers and grilles shall be standard sizes except where otherwise noted on the drawings.

1.7 INSTALLATION

A. Install in accordance with manufacturers requirements.

B. Startup and training to be provided by a factory-trained service technician.

END OF SECTION

SECTION 238233

CONVECTORS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for convectors and fin tube radiation.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacities at the specified conditions, materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. Radiation pressure tested to 200 psig.

1.4 COMPONENTS

A Hydronic Finned-Tube Radiation and Enclosure
1. Finned Tubes: Constructed of copper tube and aluminum fins
2. Enclosure: Steel, sloped front with factory baked enamel finish.
3. Provide with wall hang brackets for piping, finned tube element and enclosure support.

1.5 INSTALLATION

A. Install per manufacturers requirements.

END OF SECTION

SECTION 238239

CABINET UNIT HEATERS

GENERAL GUIDELINES

1.1 SECTION INCLUDES
- A. Qualitative requirements for ceiling mounted hydronic and electric cabinet unit heaters.

1.2 SUBMITTALS
- A. Submittals are required and shall include product data noting capacities at the specified conditions, materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE
- A. Capacity rated in accordance with ARI.
- B. Hydronic coils shall be pressure tested to 400 psig.
- C. Units shall be UL or ETI listed and labeled.

1.4 COMPONENTS
- A Hydronic Cabinet Unit Heaters
  1. Cabinets shall be formed steel suitable for recessed ceiling mounting. Provide with stamped grilles for air inlet and outlet or ducted connections.
  2. Coils shall be constructed of seamless copper tubing that is mechanically bonded to aluminum fins.
  3. Fans shall be forward curved centrifugal direct drive.
  4. Provide with disconnect switch, fused motor protection and fan speed controller switch.
  5. Provide with 1 inch throw away fiberglass filter.
  6. Provide with end pockets on both ends of the cabinet suitable in size for concealing piping and valving.
  7. Provide factory enamel finish.
- B. Electric Cabinet Unit Heaters
  1. Cabinets shall be formed steel suitable for wall mounting (surfaced or semi-recessed to 8 inches) or recessed ceiling mounting. Provide with stamped grilles for air inlet and outlet (location dependent on style selected).
  2. Coils shall be constructed of nickel chromium wire in a metallic sheath with fins no closer than .16 inches and free from expansion noise and 60-Hz hum.
  3. Fans shall be forward curved centrifugal direct drive.
  4. Provide with disconnect switch, coil relay switches, and fan speed controller switch.
  5. Provide with fan and electric coil circuit protection.
  6. Provide factory enamel finish.

1.5 INSTALLATION
- A. Install per manufacturers requirements.

END OF SECTION

SECTION 238240

PROPELLER UNIT HEATERS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for horizontal or vertical hydronic and electric propeller unit heaters.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacities at the specified conditions, materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. Capacity rated in accordance with ARI.

B. Hydronic coils shall be pressure tested to 400 psig.

C. Units shall be UL or ETI listed and labeled.

1.4 COMPONENTS

A Hydronic Propeller Unit Heaters
1. Cabinets shall be formed steel. Provide with louvered adjustable grilles for air outlet.
2. Coils shall be constructed of seamless copper tubing that is mechanically bonded to aluminum fins.
3. Fans shall be propeller type direct drive.
4. Provide factory enamel finish.

B. Electric Propeller Unit Heaters
1. Cabinets shall be formed steel. Provide with louvered adjustable grilles for air outlet.
2. Coils shall be constructed of nickel chromium wire in a metallic sheath with fins no closer than .16 inches and free from expansion noise and 60-Hz hum.
3. Fans shall be forward curved centrifugal direct drive.
4. Provide with fused fan and electric coil circuit protection.
5. Provide factory enamel finish.

1.5 INSTALLATION

A. Install per manufacturers requirements.

END OF SECTION

SECTION 238316

RADIANT HEATING HYDRONIC SYSTEM

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for hydronic ceiling radiation and enclosure.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacities at the specified conditions, materials, sizes, and dimensions.

B. Shop drawings are required denoting layout of each radiant panel.

1.3 QUALITY ASSURANCE

A. Radiation pressure tested to 400 psig.

1.4 COMPONENTS

A Hydronic ceiling radiation:
1. Panels: Constructed of extruded ribbed aluminum with copper serpentine coil. The coil shall be mechanically bonded to the aluminum panel.
2. Provide 2 inch thick fiberglass insulation on the top side of the radiant panel.
3. Provide factory enamel finish.

1.5 INSTALLATION

A. Install per manufacturers requirements.

END OF SECTION

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SECTION 260513

MEDIUM VOLTAGE CABLES ***601*** to 35,000 V

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for cables, related splices, and terminations.

1.2 QUALITY ASSURANCE

A. IEEE C2

B. NFPA 70 – National Electric Code

C. Underwriter's Laboratory

D. Trained and Certified Cable Splicer – by material manufacturer

1.3 CABLES

A. UL Cable Type MV 90

B. UL 1072, AEIC CS 8, ***ICEA S-94-649***, ICEA s-97-682 compliant

C. Conductor material shall be copper ***or aluminum***

D. Cross linked polyethylene 133 percent insulation

E. ***Bare*** copper shielding wire

1.4 SPLICE KITS

A. Comply with IEEE 404

B. Type recommended by manufacturer

1.5 TERMINATIONS

A. Comply with IEEE 48

1.6 INSTALLATION

A. Install cables according to IEEE 576

END OF SECTION

SECTION 260519

LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for building wire and cable for wiring systems of 600V or less

B. Qualitative requirements for connectors, splices, terminations, and accessories for electrical distribution systems rated 600 volt or less.

1.2 QUALITY ASSURANCE – Copper Conductors

A. NFPA 70 - National Electrical Code

B. Underwriter's Laboratory

C. Copper Conductors NEMA WC 70.

D. 600V Insulating Material NEMA WC 70.

E. Conductor Connection Torque Value UL 486A.

1.3 QUALITY ASSURANCE – Aluminum Conductors

A. NFPA 70 – National Electrical Code

B. Underwriter's Laboratory 1581 – table 10.1

C. Aluminum Association 8000 series

D. Conductor Connectors UL 486 B

E. UL Standard 44

F. ICEA S-95-658 NEMA WC 70

1.4 COPPER CABLE AND WIRING - 600V OR LESS

A. Conductor material shall be copper.

B. Wire and cable shall be rated 600V.

C. Minimum conductor size shall be #12 AWG

D. Type XHHW

E. Type THHN/THWN

F. Type AC, 3 conductor, 75C insulation, copper conductor, armored cable.

G. Type MC, 3 conductor, 75C insulation, copper conductor, metal clad cable.

1.5 ALUMINUM CABLE AND WIRING – 600v or less

A. Conductor material shall be aluminum

B. Minimum size conductor shall be No. 6 AWG

C. Type XHHW-2

D. 90 degree Celsius temperature rating

E. Cable rated for 600 volts

1.6 MANUFACTURED WIRING SYSTEMS

A. Premanufactured, relocatable, integrated electrical branch wiring system for lighting in accessible ceilings.

B. Minimum No. 12 AWG copper wire with 600-volt, 90 degree insulation.

C. Minimum No. 12 AWG insulated copper ground wire.

D. Pin and socket contacts connected to branch circuit conductor.

E. Metal constructed cable heads with corrosion-resistant heads.

F. Designed so no interconnection can occur between different electrical voltages.

G. System shall be completely modular in construction incorporating conversion modules, prefabricated receptacles located in top of light fixtures, modular selector cables for connecting to light fixtures, and cable extenders.

H. System shall be capable of being manufactured to conforming to light switching arrangements required.

1.7 COPPER PERFORMANCES

A. Type THHN/THWN or XHHW in raceway for service entrance wiring.

B. Type THHN/THWN in raceway for feeders and branch circuits.

C. Type THHN/THWN for exterior branch circuits.

D. Minimum conductor size shall be #12 AWG for power circuits, #14 AWG for controls.

E. Feeders and branch circuits shall be concealed above accessible ceilings, in walls, chases, and below slab-on-grade.

F. Manufactured wiring system installation shall be limited to wiring between light fixtures located in accessible acoustical tile ceilings and from junction box located above ceiling to fixtures. Conduit shall be provided from light fixture switch location to junction box located above ceiling.

1.8 ALUMINUM PERFORMANCES

A. Type XHHW-2 in raceway for service entrance wiring, branch circuit feeders to panelboards, and distribution panels.

B. Connectors shall be dual-rated (AL7CH or AL9CH).

C. Aluminum conductor is not approved for branch circuits to receptacles, lighting fixtures, or mechanical/electrical motor circuits.

D. Feeders and branch circuits shall be concealed above accessible ceilings, in walls, chases, and below slab-on-grade.

E. Aluminum conductors shall be connected, terminated, and torque per manufacturer's recommendations.

END OF SECTION

SECTION 260526

GROUNDING and BONDING OF ELECTRICAL SYSTEMS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for grounding for low and medium voltage systems and equipment

B. Qualitative requirements for basic requirements for grounding for protection of life, equipment, circuits, and systems

C. Qualitative requirements for grounding of underground distribution components.

1.2 QUALITY ASSURANCE

A. NFPA 70 - National Electrical Code

B. UL 467

C. Bare solid copper conductors ASTM B3.

D. Bare stranded copper conductors ASTM B8.

E. Underground distribution components IEEE C2.

1.3 MATERIALS

A. Minimum No. 12 AWG 600V insulated copper equipment grounding conductor insulated with green colored insulation.

B. Stranded cable grounding electrode conductors.

C. Bare copper conductors.

D. Grounding bus consisting of bare annealed ¼ inch by 2 inch copper bars of rectangular cross section.

E. Braided No. 30 AWG bare copper wire bonding jumpers.

F. Copper clad steel 3/4 inch grounding rods.

1.4 PERFORMANCES

A. Conduit is not an allowable grounding means.

B. Continuous grounding conductor carried throughout the power system.

C. Grounding of voice, video and data systems.

D. Provide grounding of circuits, equipment, conduits and etc. as required by the NEC.

E. Ground manholes and handholes with grounding electrode and No. 1/0 AWG bare copper conductor.

END OF SECTION

SECTION 260529

HANGERS AND SUPPORTING DEVICES

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Hangers and supporting devices for electrical components

1.2 QUALITY ASSURANCE

A. NFPA 70 - National Electrical Code

B. Underwriter's Laboratory

1.3 MATERIALS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components:
1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel
2. Concrete Inserts: Steel or malleable-iron
3. Clamps for Attachments to Steel Structural Elements
4. Through Bolts: Structural type, hex head, and high strength
5. Toggle Bolts: All-steel springhead type
6. Hanger Rods: Threaded steel

1.4 Hangars, supports, and fastening methods used shall be suitable for the weight of the components being supported.

END OF SECTION

SECTION 260533

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for raceways, boxes, wireways, raceway fittings, and technology raceways.

1.2 QUALITY ASSURANCE

A. NFPA 70 - National Electrical Code

B. Underwriter's Laboratory

. C. Rigid Metal Conduit (RMC) ANSI C80.1.

D. Intermediate Metal Conduit (IMC) ANSI C 80.6.

E. Electrical Metallic Tubing (EMT) ANSI C 80.3.

F. Liquidtight Flexible Metal Conduit (LFMC) UL 360.

G. Underground Non-Metallic Conduit (RNC) NEMA TC 2, Type EPC-40-PVC.

1.3 RACEWAY MATERIALS

A. Rigid Metal Conduit.

B. Intermediate Metal Conduit.

C. Electrical Metallic Tubing (EMT).

D. Liquidtight Flexible Metal Conduit.

E. Underground Non-Metallic Conduit.

1.4 TECHNOLOGY RACEWAY

A. From technology outlet box provide two 1 inch conduits and extend the conduits to the associated telecommunications cable tray. Coordinate requirements with the Technology Designer.

B. Utility Entrances
   1. Two 4 inch for telephone service from service pole to main technology equipment room.
   2. One 3 inch for cable television service from service pole to main technology equipment room.
   3. One 4 inch from service pole to main technology equipment room for wide area network (WAN).

1.5 METAL WIREWAYS

A. Sheet metal sized for conductors.

B. NEMA 250 Type 1.

C. Screw-on covers.

D. NEMA 1 general purpose rating at interior of building.

E. NEMA 3R raintight rating at exterior applications.

1.6 OUTLET C-D DEVICE BOXES

A. Metal boxes NEMA OS 1 compliant.

B. Cast metal, fully adjustable, rectangular floor box.

C. Metal pull boxes NEMA OS 1 compliant.

D. Exposed boxes cast type FS or FSA.

E. Outlet boxes for technology shall be minimum 3 ½ inch deep.

1.7 FITTINGS

A. NEMA FB 1 listed.

B. Hazardous (classified) location UL 886 compliant.

C. EMT Fittings: Metal compression or set screw type.

1.8 PERFORMANCES

A. RNC conduit may be used under building slab on grade for branch feeder and branch circuits. Conduit shall be installed in drainage fill.

B. RNC conduit may be used for exterior branch circuits. Encase PVC conduit in concrete when under drives and parking areas.

C. Raceway installation shall comply with NECA 1.

ALLOWABLE CONDUIT USAGE

CIRCUIT IDENTIFICATION	*ALLOWABLE TYPE CONDUIT*						
	GRC	IMC	EMT**	RNC*	Flex	W.P.Flex	MC Cable
Underground secondary service entrance conduit	X			X			
Feeders to switchboards, panels, motors, transformers, exposed conduit	X	X	X				
Connections to interior light fixtures & transformers					X		
Connections to motors & motorized equipment, interior & exterior						X	
Underground interior feeder conduit	X	X		X			
Branch circuit wiring from light fixture to light fixture						X	X
Underground exterior branch conduit	X	X		X			
Exposed conduits	X	X	X				
Conduits in metal stud partitions			X				X
Conduits buried in block walls	X	X	X				
Conduits above suspended ceilings	X	X	X				
Misc. low voltage systems (fire alarm) up to 4”C size. (EMT not allowed underground or as otherwise limited above)	X	X	X				
Interior above ceiling conduits 3 ½” and larger except as otherwise permitted	X	X	X				

* With 3 inch concrete envelope under drives and sidewalks.
** Not approved for exterior or exposed below 8 feet AFF.

END OF SECTION

SECTION 260536

CABLE TRAY FOR ELECTRICAL SYSTEMS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for cable tray.

1.2 QUALITY ASSURANCE

A. NFPA 70 - National Electrical Code.

B. Underwriter's Laboratory.

C. NEMA VE1 Cable Tray Systems.

1.3 MATERIALS

A. Non-corrosive metal constructed center spine or wire baskets.

B. Rungs at 9 inch on center.

C. Wire mesh basket.

D. Cold-rolled steel ventilated tray.

E. Minimum size shall be 18 inches wide with 6 inch loading depth.

F. Color coded rung caps.

1.4 PERFORMANCES

A. Provide grounding per NFPA 70.

B. Install per NEMA VE2.

C. Install with ½ inch threaded rods.

END OF SECTION

SECTION 260543

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRIC SYSTEMS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for conduits, ducts, handholes, and manholes.

1.2 QUALITY ASSURANCE

A. NFPA 70 – National Electric Code.

B. ANSI C2.

1.3 NON-METALLIC CONDUITS

A. Rigid non-metallic conduit type EPC-40-PVC, NEMA TC2, UL 561.

1.4 NON-METALLIC DUCTS

A. Rigid non-metallic Type EB-20-PVC, ASTM F 512, UL 651A.

1.5 HANDHOLES

A. Reinforced – concrete complying with ASTM C 858.

B. Cast-iron weatherproof frame.

C. Cast-iron cover with “electric” or “communication” legend.

1.6 MANHOLES

A. Reinforced concrete complying with ASTM C 858.

B. Cast-iron weatherproof frame.

C. Cast-iron cover with “electric” or “communication” legend.

1.7 PERFORMANCE

A. Verify ductbank applications with local utility company.

B. Verify loading requirements of manholes and handholes depending on locations.

END OF SECTION

SECTION 260923

LIGHTING CONTROL DEVICES

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for time switches, outdoor photoelectric switches, indoor occupancy sensors, and lighting contactors.

1.2 QUALITY ASSURANCE

A. Underwriter's Laboratory

B. NFPA 70 – National Electric Code

1.3 TIME SWITCHES

A. Contact configuration: SPST, DPST, SPDT, or DPDT.

B. Comply with UL 917.

C. 40-amp contact rating.

D. Electromechanical or fully electronic.

E. Skip-a-Day mode.

F. Astronomic time dial.

1.4 OUTDOOR PHOTOELECTRIC SWITCH

A. Solid State with SPDT or DPST contacts required for application.

B. 1800 VA tungsten or 1000 VA inductive load.

C. Comply with UL 773 A.

D. Illumination monitoring range from 1.5 to 10 foot candles with turn "on" and "off" adjustments.

E. 15 second minimum time delay.

1.5 INDOOR OCCUPANCY SENSORS

A. Contacts rated to operate connected relay complying with UL 773 A.

B. Dry contacts rated for 20 amp ballast load ct 120 and 277 voH.

C. Power supply to server shall be 24-Vdc or 150-mA.

D. Recessed and concealed time delay and sensitivity adjustments.

E. LED indicator to show motion is being detected.

F. Equipped with bypass sensor override switch in case of sensor failure.

G. Passive infrared type.

H. Ultrasonic type.

I. Dual technology combination of infrared and ultrasonic.

1.6 LIGHTING CONTACTORS

A. Electrically or mechanically held type complying with NEMA ICS 2 and UL 508.

B. Two through 12 poles field convertible contacts.

C. 20-A tungsten lighting rating or 30-A fluorescent lighting rating.

D. NEMA 250 type I indoor enclosure.

1.7 INSTALLATION

A. Install and aim sensors to achieve 90 percent of area.

B. Verify operation of each lighting control device and adjust time delays.

END OF SECTION

SECTION 261200

MEDIUM VOLTAGE TRANSFORMERS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for pad mounted, liquid filled transformers.

1.2 QUALITY ASSURANCE

A. ANSI C57.12.26

B. NFPA 70- National Electric Code

C. IEEE C 57.12

D. Underwriter's Laboratory

E. ANSI C57.12.13.

F. Mineral Oil ASTM D 3487

1.3 MATERIALS

A. The mineral oil filled transformer shall be compartmental type, self-cooled and weather protected.

B. Tap changing mechanism for accurate voltage adjustment without opening the tank.

C. Compartments for medium and low voltage separated by a steel barrier.

D. Surge arresters for each primary phases.

E. Primary fuses complying with IEEE C 37.47.

F. Arranged for radial or loop feed as required for application.

G. Primary and secondary voltage as required.

H. Mineral Oil tested according to ASTM D 117.

I. Basic input level shall be standard value for primary equipment voltage per applicable IEEE standard.

END OF SECTION

SECTION 261300

MEDIUM VOLTAGE SWITCHGEAR

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for metal enclosed interruptor switchgear.

1.2 QUALITY ASSURANCE

A. NFPA – National Electric Code

B. Underwriter's Laboratory

C. IEEE C2

D. IEEF C37.20.3

1.3 METAL-ENCLOSED INTERRUPTOR SWITCHGEAR

A. Suitable for application in 3-phase, 60 Hz, solidly grounded-neutral system.

B. System Voltage: KV nominal to match utility voltage available.

C. 600 amp main continuous bus rating.

D. Power fuses to comply with NEMA SG-2.

E. Outdoor enclosure of weatherproof steel construction.

F. Surge arrestors to comply with NEMA LA1.

G. Tin-plated copper or aluminum busing.

1.4 INSTALLATION

A. Coordinate location and voltage with local electric utility and authority having jurisdiction.

B. Provide arc flash hazard label on equipment per the National Electrical Code.

END OF SECTION

SECTION 262200

LOW VOLTAGE TRANSFORMERS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for dry type distribution transformers rated 600V or less, buck-boost transformers, and energy efficient dry type transformers.

1.2 QUALITY ASSURANCE

A. Dry Type Distribution Transformers: NEMA TP-1.

B. High Efficiency Dry Type Distribution Transformers: Department of Energy CSL 3.

C. Buck-Boost Transformers NEMA ST 1, UL 506.

D. Sound levels NEMA ST1-4 and ANSI C89.1.

1.3 DRY TYPE TRANSFORMERS (NEMA TP-1)

A. Transformers shall be dry type gravity ventilated for wall or floor mounting.

B. KVA rating shall be as denoted on the drawings.

C. Transformers rated 7.5 kVA through 24 kVA shall have two -5 percent taps, below rated voltage.

D. Transformers rated 25 kVA and larger shall have two 2-1/2 percent F.C.A.N. taps and four 2-1/2 percent F.C.B.N. taps, unless otherwise noted.

E. Coils: continuous windings without splices except for taps.

F. Insulation Class for Transformers 14 kVA and smaller: 180 degrees C, UL component recognized insulation system with a maximum of 115 degrees C rise above 25 degrees C ambient temperature.

G. Insulation Class for Transformers 15 kVA and Larger: 220 degrees C, UL component recognized insulation system with a maximum of 150 degrees C rise above 40 degrees C ambient temperature.

H. Cores shall be manufactured with non-ageing silicon steel.

I. The core and coil assembly shall be mounted on vibration pads and bolted to the enclosure.

J. Copper or aluminum windings to brace coil layers.

K. Enclosure shall be heavy gauge steel.

L. There shall be no metal to metal contact between the core, coil, and the enclosure.

1.4 DRY TYPE TRANSFORMER (***NEMA Premium***)

A. Transformer shall be dry type gravity ventilated.

B. KVA rating shall be as shown as drawings.

C. Transformers rated 30 KVA–300 KVA shall have two 2-1/2% F.C.A.N. and two 2-1/2% F.C.B.S. taps. Transformers rated 15 KVA–500 KVA shall have one 5% F.C.A.N. and one 5% F.C.B.N. tap.

D. Copper ***or aluminum***-wound, 3-phase, common core insulation transformer built to NEMA ST20.

E. 200% rated neutral, 60 Hz, 10kV BIL.

F. Insulation class 220 degrees C.

G. Labeled K Rating: K-7.

H. Minimum efficiency shall comply with the following when tested per ***10 C.F.R. Part 431 and TP-2 procedures***:

Three Phase Efficiencies	
KVA Size	Efficiency
15	***97.90***
30	***98.25***
45	***98.39***
75	***98.60***
112.5	***98.74***
150	***98.81***
225	***98.95***
300	***99.02***
500	***99.09***
750	***98.16***
1000	***99.23***

1.5 BUCK-BOOST TRANSFORMER

A. Self-cooled dry type: continuous duty rating.

B. Ventilated enclosure NEMA 250 Type 2.

END OF SECTION

SECTION 262413

SWITCHBOARDS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for switchboards and fusible bolted-pressure contact switch.

1.2 QUALITY ASSURANCE

A. Switchboards 600 v or less: NEMA PB-2.

B. NFPA 70 - National electrical Code

C. Underwriter's Laboratory

1.3 SWITCHBOARDS

A. Nominal system voltage, main bus continuous with uniform capacity for entire length of bus.

B. Short circuit rating of 65K, 100K, or 200K to meet or exceed application.

C. Low voltage circuit breakers to be continuous current, interrupting, and short-time current ratings for each circuit breaker suitable for use. Voltage and frequency ratings same as switchboard.

D. Fusible switch branch units.

E. Three-phase, four-wire configuration.

F. Front connected, front accessible with fixed main device, panel-mounted branches and sections front and rear aligned.

G. Tin plated copper or aluminum neutral and phase bussing.

H. Minimum .25 by 2 inch full length ground buss.

I. One hundred percent rated full length neutral buss.

J. Utility Metering Compartment: Acceptable to local utility company.

K. Integral fusible or circuit breaker type main switch.

L. NEMA 1 enclosure.

1.4 FUSIBLE BOLTED-PRESSURE CONTACT SWITCH

A. Labeled for use as service equipment.

B. Manual handle operation for opening and closing.

C. Contact interruption capability: twelve times switch rating.

D. Ground fault relay: comply with UL 1053.

E. Fused switch: NEMA KS 1 Type HD with clips to accommodate specified fuses.

1.5 INSTALLATION

A. Provide arc flash hazard label on equipment per the National Electrical Code.

1.6 MULTI-FUNCTION DIGITAL METERING MONITOR

A. Microprocessor-based unit.

B. Mounted flush or semi-flush in unit.

C. RS485 / RS232 and Modbus protocol digital communications output.

D. Monitoring functions including:

1. Phase currents each phase
2. Phase to phase voltages
3. Phase to neutral voltages
4. Megawatts – kilowatt hours
5. Megavars
6. Power factor
7. Power demand
8. Harmonics

END OF SECTION

SECTION 262416

PANELBOARDS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for lighting and appliance branch circuit panelboards and distribution panelboards.

1.2 QUALITY ASSURANCE

A. Lighting and appliance branch circuit panelboards – NEMA PB 1.

B. Distribution Panelboards: NEMA PB.1.

C. NFPA 70 - National Electrical Code

D. Underwriter's Laboratory

1.3 LIGHTING AND APPLIANCE BRANCH CIRCUIT PANELBOARDS / DISTRIBUTION PANELBOARDS

A. Tin plated copper or aluminum phase and neutral bussing.

B. Integral ground bus.

C. Lighting and appliance branch circuit panelboards to be provided with circuit breaker type overcurrent protective devices with short circuit current available at terminals.

D. Distribution panelboards to be provided with fusible or circuit breaker type overcurrent protective devices with short circuit current rating available at terminals.

E. Mechanical type main and neutral lugs.

F. Feed-through lugs suitable for use with conductor material. Locate at opposite end of incoming lugs on main device.

G. Bus bars in lighting and appliance branch circuit panelboards and distribution panel assemblies shall be adequately braced to withstand the maximum short circuit current at the point of application.

1.4 INSTALLATION

A. Provide arc flash hazard label on equipment per the National Electrical Code.

END OF SECTION

SECTION 262419

MOTOR CONTROL CENTERS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for motor control centers rated 600 V or less.

1.2 QUALITY ASSURANCE

A. NFPA 70 - National Electrical Code

B. Underwriter's Laboratory

1.3 MOTOR CONTROL CENTER

A. NEMA 250 Type 1 indoor enclosure.

B. Modular construction with individual doors.

C. Compartments constructed to allow for removal of units without opening adjacent doors.

D. Copper or tin plated aluminum bus.

E. Full size neutral bus.

F. Non-insulated equipment ground bus.

G. Phase, neutral, and ground buses to have same capacity the entire length.

H. Unit to have short circuit withstand rating shall as rating of section.

I. NEMA size 3 and smaller controllers shall be constructed with drawout mountings.

J. Equipment unit with controller to meet application as specified in specification section 262913.

1.4 INSTALLATION

A. Provide arc flash hazard label on equipment per the National Electrical Code.

END OF SECTION

SECTION 262726

WIRING DEVICES

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES QUALITATIVE REQUIREMENTS FOR:

A. High Capacity Floor Boxes

B. Duplex Receptacles and Integral GFCA Receptacles

C. Tamper-Resistant Duplex Receptacles

D. Wall Switches

E. Wall Switch Occupancy Sensors

F. Dimmer Switches

G. Poke Through Assemblies

H. Device Coverplates

1.2 QUALITY ASSURANCE

A. High Capacity Floor Boxes: Underwriter's Laboratory Listed.

B. Duplex Receptacles and Integral GFCA Receptacles: Underwriter's Laboratory 498, NEMA WD 1.

C. Tamper-Resistant Duplex Receptacles: NEMA WD 1, UL 498..

D. Wall Switches: NEMA WD 1, UL 20.

E. Wall Switch Occupany Sensors: Underwriter's Laboratory.

F. Dimmer Switches: UL 1472.

G. Poke Through Assemblies: Underwriter's Laboratory.

1.3 HIGH CAPACITY FLOOR BOXES

A. Stamped steel 8 gang 2 compartments units.

B. Fully adjustable.

C. Rectangular steel with carpet flange and carpet insert.

D. Blank aluminum plate where floor finish is not carpet.

1.4 DUPLEX RECEPTACLES AND INTEGRAL GFCI RECEPTACLES

A. 1-pole, 3 wire, grounding.

B. 20 amp, 125 volt rated.

C. Heavy Duty Specification grade, Duplex, back and side wired.

D. Ground fault protection where required shall be built into receptacle. Trippins values shall conform: UL 1436 and UL 943.

1.5 TAMPER-RESISTANT DUPLEX RECEPTACLES

A. 1-pole, 3 wire, grounding.

B. 20 amp, 125 volt rated.

C. Hospital grade.

1.6 WALL SWITCHES

A. 20 amp, 120/277 volt rated with ground screw.

B. Specification grade.

1.7 WALL SWITCH OCCUPANY SENSORS

A. Adaptive technology with adjustable time delay.

B. 180 degree field of view.

C. 1800 watts at 120-volt.

D. 4155 watts at 277-volt.

E. Passive infrared.

F. Push “on”-“off” occupant switch

1.8 DIMMER SWITCHES

A. Architectural grade, rotary knob series.

B. 120 volt, wattage as required by fixture wattage.

1.9 POKE THROUGH ASSEMBLIES

A. Factory fabricated.

B. Fire rated or non-fire rated assemblies.

C. Flush with floor type.

1.10 DEVICE COVERPLATES

A. Stainless steel jumbo size with U.S. 32D finish.

B. Configuration of plates to match devices.

C. Weatherproof type stainless steel with U.S. 32D finish on exterior mounted duplex receptacles.

1.11 PERFORMANCES

A. Provide receptacles on roof as required by National Electric Code.

B. Toggle type in classrooms and key type in public areas.

C. Provide tamper-resistant receptacles in pre-kindergarten and kindergarten classrooms.

END OF SECTION

SECTION 262813

FUSES AND FUSE HOLDERS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for cartridge fuses rated 600 V and less and spare fuse cabinets.

1.2 QUALITY ASSURANCE

A. NFPA 70 - National Electrical Code

B. Underwriter's Laboratory

C. Cartridge Fuses: NEMA FU 1

1.3 CARTRIDGE FUSES

A. Fuses shall be nonrenewable cartridge type, noninterchangeable type.

B. Service entrance fuses shall be Class R or Class L rejection type, time delay, high interrupting, current limiting, dual element.

C. Feeder fuses shall be Class L or J time delay.

D. Motor branch circuit shall be NEMA Class "RK1" time delay.

E. Other branch circuits Class J time delay.

1.4 SPARE FUSE CABINET

A. Wall mounted steel constructed unit with hinged door and cam lock and pull.

B. Three spare fuses for each type and size.

END OF SECTION

SECTION 262816

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for molded case circuit breakers, fusible and non-fusible switches, bolted-pressure contact switches, enclosures.

1.2 QUALITY ASSURANCE

A. Molded Case Circuit Breakers: UL 489, NEMA AB 1.

B. Fusible and Non-Fusible Switches, NEMA KS 1.

C. Bolted-Pressure Contact Switches UL 977.

D. Enclosures, NEMA AB 1 and NEMA KS 1.

E. NFPA 70 - National Electrical Code

1.3 MOLDED CASE CIRCUIT BREAKER

A. Interrupting capacity to meet available fault current at point of application.

B. Magnetic trip elements.

C. Lugs: Suitable for number, size, trip ratings, and conductor material.

D. GFCI Circuit Breakers: Single and two pole with 5mA trip sensitivity.

E. Type SWD for switching fluorescent lights.

F. Type HACR for heating, air conditioning, and refrigerant equipment.

G. Shunt trip: 120 v coil energized from separate circuit.

1.4 FUSIBLE AND NON-FUSIBLE SWITCHES

A. Fusible Switches, 1200 amp and Smaller: NEMA KS 1, Type HD (heavy duty) with lockable handle.

B. Non-fusible Switches: NEMA KS 1, Type HD (heavy duty) with lockable handle.

1.5 BOLTED-PRESSURE CONTACT SWITCHES

A. Labeled for use as service equipment.

B. Manual handle operation for opening and closing.

C. Contact interruptions capability: twelve times switch rating.

D. Ground fault relay comply with UL 1053.

1.6 ENCLOSURES

A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions.
   1. Outdoor locations: NEMA 250 Type 3R
   2. Kitchen areas: NEMA 250 Type 4X, stainless steel.

1.7 INSTALLATION

A. Series rated circuit breaker not acceptable.

END OF SECTION

SECTION 262913

ENCLOSED CONTROLLERS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for across-the-line, manual, and magnetic controllers; and reduced-voltage controllers.

1.2 QUALITY ASSURANCE

A. NFPA 70 - National Electrical Code

B. Underwriter's Laboratory

1.3 ACROSS-THE-LINE MANUAL CONTROLLERS

A. Manual controller with quick make or quick break toggle switch or push button.

B. General purpose Class A type.

C. Equipped with heaters and sensors in each phase matched to nameplate full-load current of motor.

1.4 ACROSS-THE-LINE MAGNETIC CONTROLLERS

A. Nonreversing across the line full voltage type.

B. NEMA ICS 2 Class A full voltage.

C. 120 volt control circuit obtained from integral control transformer.

D. Heavy duty type, hand/off/auto selector switch with pilot light and test push button.

E. Equipped with under voltage and phase-failure relays.

1.5 COMBINATION ACROSS-THE-LINE CONTROLLER / DISCONNECT

A. Nonreversing across-the-line full voltage type.

B. NEMA ICS 2 Class A full voltage.

C. 120 volt control circuit obtained from integral control transformer.

D. Heavy duty, fusible switch with rejection type fuses. NEMA KS 1.

E. Heavy duty type, hand/off/auto selector switch with pilot light and test push button.

F. Equipped with under voltage and phase-failure relays.

1.6 REDUCED-VOLTAGE ENCLOSED CONTROLLERS

A. Solid state controller suitable for use with polyphase induction motor.

B. Adjustable acceleration rate and adjustable starting torque control.

C. Surge suppressor in solid-state power circuit.

D. LED indicators showing motor and control status.

E. Heavy duty type, hand/off/auto selector switch with pilot light and test push button.

F. Equipped with under voltage and phase-failure relays.

1.7 ENCLOSURES

A. NEMA 250 Type 1 for indoor applications.

B. NEMA 250 Type 3R for outdoor applications.

C. NEMA 250 Type 1 for kitchen areas.

END OF SECTION

SECTION 263213

PACKAGE ENGINE GENERATORS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for packaged engine generator system

1.2 QUALITY ASSURANCE

A. Compliance with NFPA 110

B. Factory testing

C. Field testing

D. NFPA 70 - National Electrical Code

E. UL 2200 – Stationary generators
UL 142 – Subbase fuel storage tanks

F. Installation of stationary generator - NFPA 37

1.3 PACKAGED GENERATOR SYSTEM CHARACTERISTICS

A. Type: Standby automatically started engine coupled to an AC generator unit.

B. Ratings: Voltage, frequency, and power output ratings suitable for use.

C. Maximum transfer time to assume full load: Per NEC.

D. Fuel type: Diesel or natural gas dependent upon application and authorities having jurisdiction.

E. Fuel supply: Minimum per NEC.

1.4 PACKAGED GENERATOR SYSTEM COMPONENTS

A. Engine

B. Cooling system: liquid-cooled unit mounted radiator.

C. Subbase diesel double wall fuel storage tank with leak monitor or natural gas supply.

D. For outdoor generator set provide weatherproof steel housing, louvers, and dampers.

E. Provide vibration isolators.

F. Critical type muffler/silencer.

END OF SECTION

SECTION 263600

TRANSFER SWITCHES

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for automatic transfer switch for packaged engine generators.

1.2 QUALITY ASSURANCE

A. NFPA 70 – National Electric Code.

B. NFPA 110 – Emergency and Standby Power Systems Level 1

C. NEMA ICS 1

1.3 AUTOMATIC TRANSFER SWITCH

A. Fault current and withstand ratings adequate for available fault currents.

B. Solid state controls.

C. Double-throw type, incapable of pauses or intermediate positions stops.

D. 3 pole (phase) switching type.

END OF SECTION

SECTION 264313

TRANSIENT VOLTAGE SUPPRESSION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES
A. Transient Voltage Surge Suppressors

1.2 QUALITY ASSURANCE
A. NFPA 70 - National Electrical Code. Including article 285, NEC 2002.
B. Underwriter's Laboratory
C. Transient Voltage Surge Suppressors: UL 1449 2nd Edition and UL 1283, ANSI/IEEE C62.41 Category A, B, C, and C62.45 testing.
D. NEMA LS-1

1.3 TRANSIENT VOLTAGE SURGE SUPPRESSORS
A. Individually fused Metal oxide varistors (MOVs) or each mode of protection is to be protected with surge rated fuses and thermal disconnects.
B. Line protection
1. Line to line
2. Line to neutral
3. Line to ground
4. Neutral to ground

C. UL 1449 Edition suppressed voltage rating:

Voltage Configuration	L-N	L-G	N-G	L-L
120/208 Three Phase Wye	400v	400v	400v	800v
277/480 Three Phase Wye	800v	800v	800v	1200v

D. One percent variation in metal oxide varistors.
E. LED indicator light.
F. Rated as a UL 1283 electromagnetic interference filter.
G. NEMA 1 rated enclosure.

1.4 SERVICE ENTRANCE
A. Integral or external mounting.
B. Minimum single surge current rating of 120k per node.

1.5 BRANCH PANELBOARD
A. Integral or external mounting.
B. Minimum single surge current rating of 80k per node.

1.6 INSTALLATION
A. Install transient voltage surge suppressors on the load side of the main disconnect at the main switchboard and each branch circuit panelboard serving duplex receptacles. Utilize a spare 30 to 60a two or three pole breaker for TVSS disconnect.

END OF SECTION

SECTION 265100

INTERIOR LIGHTING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for interior lighting fixtures, lamps and ballast, emergency lighting units, exit sign, and lighting fixture support.

1.2 QUALITY ASSURANCE

A. Underwriter's Laboratory

B. NFPA 70 - National Electrical Code

C. Fluorescent fixtures UL 1598.

D. Explosionproof fixtures UL 844.

E. Track lighting UL 1574.

F. Exit signs UL 924.

G. Emergency lighting UL 924.

H. Solid state lighting (LED) UL 1598.

1.3 FLUORESCENT INTERIOR LIGHTING FIXTURES

A. Fluorescent Troffers
1. Static Recessed 2 by 4 foot, 2 by 2 foot, or 1 by 4 foot
2. .125 inch Prismatic virgin acrylic A12 lens
3. Flat steel door
4. Number of lamps as required
5. Steel construction

B. Fluorescent Troffers – Specular Reflector
1. Static recessed 2 foot by 4 foot, 2 foot by 2 foot, or 1 foot by 4 foot
2. 0.125 inch prismatic virgin acrylic A12 lens
3. Flat steel door
4. 0.020 inch aluminum reflector, 92% specular, 3% diffuse
5. Number of lamps as required
6. Steel construction

C. Fluorescent Wraparound Fixtures
1. One piece acrylic prismatic
2. Number of lamps as required
3. Four foot length
4. Steel construction
5. Surface or suspended mounting

D. Fluorescent Strip Fixtures
   1. No lenses
   2. Four foot length
   3. Asymmetric or Symmetric reflectors as required.
   4. Steel construction

E. Fluorescent Recessed Cans
   1. Minimum 6 inch diameter
   2. Clear alzak reflector
   3. Compact fluorescent
   4. Open lens unless required.

F. Deleted

G. Fluorescent Recessed Indirect/Direct
   1. Static recessed by 2 by 4 foot, 2 by 2 foot
   2. Perforated metal round shield
   3. Number of lamps as required
   4. Matte white aluminum reflector
   5. Steel housing construction

H. Fluorescent Pendant High-Bays
   1. 15 inch minimum round
   2. Steel stem or aircraft cable support
   3. Open or enclosed bottom
   4. UV stabilized prismatic acrylic reflector
   5. Die-cast aluminum ballast housing
   6. Compact fluorescent lamps
   7. Number of lamps as required
   8. Safety chain
   9. Wireguard

I. Interior Track Lighting
   1. Track
      a. Surface or recessed track
      b. Two circuit minimum
      c. Standard lengths with all fittings
   2. Fixtures
      a. Shape per Design Professional
      b. Dimmable LED
      c. Color selection by design professional

J. High output Fluorescent High-Bay Industrial Fixtures
   1. Sizes
      a. 16” x 4’
      b. 2’ x 4’
      c. 16” x 8’
      d. 2’ x 8’
   2. Steel Construction
   3. No lens
   4. High output T5HO lamps

5. 95% reflectance segmented specular aluminum reflector
6. Full wireguard

K. Labels and Miscellaneous
1. Wet and damp location labels as required.
2. Provide wireguards on fixtures, exit signs, and emergency lighting in gymnasiums.

L. Installation
1. Chain hang troffer type fixtures from structural steel independent of grid or screw attach fixtures to grid and grid support at each corner of grid.

1.4 TRACK LIGHTING

A. Types
1. Open front type
2. Round or flat back
3. Porcelain socket

1.5 SOLID STATE LIGHTING (LED) LUMINAIRES

A. Types
1. Recessed or surface mount
2. Comply with IES LM-79
3. CRI 75 minimum
4. Color consistency NEMA SSL 3
5. B50 rating at least 50,000 hours per IES LM-80

1.6 EXPLOSIONPROOF FIXTURES

A. Types
1. Comply with hazardous classification for its location per the National Electrical Code
2. Lamp type suitable for condition.

1.7 EMERGENCY LIGHTING UNITS

A. Type
1. Provide from fixtures above connected to emergency generator.

1.8 EXIT SIGNS

A. Type
1. Cast aluminum construction
2. Color by design professional
3. LED lamp type
4. Wireguards as required
5. Red lettering
6. Directional arrows

1.9 LINEAR FLUORESCENT BALLAST

A. Electronic type with maximum 10 percent total harmonic distortion.
B. Rapid start, instant start, or programmed start type.
C. Suitable for T8, T5, or T5HO lamps.
D. 95 percent minimum power factor.
E. Class A sound rating.
F. .71, .88, or 1.15 ballast factor.

1.10 DIMMABLE LINEAR FLUORESCENT BALLAST

A. Electronic type.
B. 100 percent to 5 percent dimming range.

1.11 COMPACT FLUORESCENT BALLAST

A. Electronic type with maximum 20 percent total harmonic distortion.
B. Programmed rapid start.
C. 95 percent minimum power factor.
D. 95 percent or higher ballast factor.
E. Class A sound rating.

1.12 DIMMABLE COMPACT FLUORESCENT BALLAST

A. Electronic type.
B. 100 percent to 5 percent dimming range.

1.13 DIGITAL ELECTRONIC DIMMING BALLAST

A. Provides a continuous 2-wire dimming signal.
B. Internal circuitry to limit inrush current.
C. Operating voltages of 120/240/277 volts at 50 or 60 Hz.
D. Continuous flicker free dimming range from 100% to 10%.
E. Capable of connecting one or multiple sensors.
F. Capable of generating digital communication commands to digital bus.
G. Capable of monitoring lamp and ballast conditions.
H. Total harmonic distortion (THD) less than 20%.
I. Power factor greater than 95%.
J. Ballast factor greater than 85% for T8 lamps and equal to 1.0 for T5 and T5HO lamps.

1.14 FLUORESCENT LAMPS

A. T8 rapid-start low-mercury lamps, rated 32 W maximum, nominal length of 48 inches, 2950 initial lumens (minimum), CRI 85 (minimum), color temperature ***of 4100K*** and average rated life 30,000 hours, unless otherwise indicated.

B. T8 rapid-start low-mercury lamps, rated 17 W maximum, nominal length of 24 inches, 1350 initial lumens (minimum), CRI 85 (minimum), color temperature ***of 4100K*** and average rated life 20,000 hours, unless otherwise indicated.

C. T8 rapid-start low-mercury lamps, rated 28 W maximum, nominal length of 18 inches, 2725 initial lumens (minimum), CRI 85, color temperature ***of 4100K*** and average rated life 36,000 hours, unless noted otherwise.

D. T8 rapid-start low-mercury lamps, rated 32 W maximum, nominal length of 48 inches, 3100 initial lumens (minimum), CRI 85, color temperature ***of 4100K*** and average rated life of 36,000 hours, unless rated otherwise.

E. T5 rapid-start low-mercury lamps, rated 28 W maximum, nominal length of 45.2 inches, 2900 initial lumens (minimum), CRI 85 (minimum), color temperature ***of 4100K*** and average rated life 20,000 hours, unless otherwise indicated.

F. T5HO rapid-start high output low-mercury lamps, rated 54 W maximum, nominal length of 45.2 inches, 5000 initial lumens (minimum), CRI 85 (minimum), color temperature ***of 4100K*** and average rated life 20,000 hours, unless otherwise indicated.

G. Compact Fluorescent Lamps: 4-pin, low mercury, CRI 80 (minimum), color temperature ***of 4100K*** and average rated life of 10,000 hours at 3 hours operation per start, and suitable for use with dimming ballasts, unless otherwise indicated.
1. 13 W: T4, double or triple tube, rated 900 initial lumens (minimum).
2. 18 W: T4, double or triple tube, rated 1200 initial lumens (minimum).
3. 26 W: T4, double or triple tube, rated 1800 initial lumens (minimum).
4. 32 W: T4, triple tube, rated 2400 initial lumens (minimum).
5. 42 W: T4, triple tube, rated 3200 initial lumens (minimum).
6. 55 W: T4, triple tube, rated 4300 initial lumens (minimum).

1.15 LIGHT FIXTURES SUPPORT COMPONENTS

A. 1/4 inch minimum diameter thread steel rod hangers

B. ½ inch steel tubing with swivel ball fittings and ceiling canopy.

END OF SECTION

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SECTION 265561

THEATRICAL DIMMING SYSTEM

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Stage dimming and control.

B. Stage lighting.

1.2 QUALITY ASSURANCE

A. NFPA - National Electrical Code.

B. Underwriter's Laboratory.

C. Light Fixtures UL 1573.

D. Main Control Console UL 508.

1.3 MAIN CONTROL CONSOLE

A. Minimum 48 channel single scene microprocessor based.

B. Non-volatile memory disk backup.

C. Minimum 12 scene masters.

D. Console receptacles located at stage managers panel, at rear of cafetorium and in booth (if one is provided).

E. Minimum 10 foot cables for power and signal.

F. Tabletop unit.

1.4 DIMMER RACK

A. Dual 2400 watt dimmers.

B. Free standing rack mounted with cooling fan(s).

C. Primary circuit breaker with fault current rating for point of service.

D. Capable of data transmission with USITT DMX 512.

1.5 LIGHTING UNITS

A. Front Lighting (cafetorium ceiling)

1. Connector Strips: Approximately 4 inch by 4 inch with flush receptacles, hangers, interior terminal strip.

For School	Overall Dimmed Length Circuits	Number of Receptacles	Minimum Quantity
Middle 10’	Six each	Six each	Two
High 10’	Six each	Six each	Three

Locate at minimum the distance equal to proscenium height from the stage out onto the ceiling, centered on proscenium edges plus at proscenium center line for high school.

2. Lighting Instruments: Ellipsoidal spotlights, 6 inch by 20 degrees, 575 watt lamp, 36 inch leads, connector, color frame, safety cable, “C” Clamp.

For School	Minimum Quantity	Initial Location
Middle	Six	Three each connector strip
High	Nine	Three each connector strip

E. Overstage Lighting (Electrics): Should appear approximately 3 feet back, then at intervals of approximately eight feet.

1. Connector strips approximately 4 inch by 4 inch plus junction box, with receptacles on 18 inch pigtails, double pipe hangers. Provide additional (*) three receptacles at ends and center on a circuit switched at stage managers panel for worklights.

For School	Minimum overall Length	Dimmed Circuits	Number of Receptacles	Minimum Quantity
Middle	3/4 proscenium width	Twelve	Fifteen*	Two
High	3/4 proscenium width	Eighteen	Twenty-one*	Two

2. Additional Overstage: Third Electric (fourth electric if stage is more than 25 foot deep). Four, 4 circuit/receptacle plug boxes on flexible cables capable of reaching a point 5 feet above the stage floor.

3. Spotlights: Fresnel Spotlights: 6 inches, 750 watt lamp, 36 inch leads, connector, color frame, safety cable, “C” Clamp.

For School	Minimum Quantity	Initial Location
Middle	Twelve	Six each connector strip
High	Eighteen	Nine each connector strip

4. Striplights: 7'-6" x 4 circuit, with red, green, blue, and clear roundels, 200 watt lamps, 36 inch leads at each end with appropriate connectors.

For School	Minimum Quantity	Initial Location
Middle	Six	Three each connector strip
High	Six	Three each connector strip

5. Stage Worklights: Scoops: 10 inches, 150 watt lamp 36 inch leads, connector, color frame, safety cable, "C" Clamp.

For School	Minimum Quantity	Initial Location
Middle	Six	Three each connector strip
High	Six	Three each connector strip

C. Backstage Worklights:
1. ***2700 Lumen Fluorescent or LED*** in industrial reflectors to limit spill onto the stage.
2. Minimum two each side of either type stage.

1.6 MISCELLANEOUS

A. Provide stage managers panel to allow control of area lighting functions.

B. Provide a minimum of two floor pockets, one each side of the stage, each with three dimmed circuits/receptacles and one constant duplex receptacle.

1.7 INSTALLATION

A. Neutrals from system feed to be 130 percent of hot line size.

B. All branch circuits are to be two wire no common neutrals.

C. All strips and floor pockets shall be grounded per NEC.

END OF SECTION

SECTION 265600

EXTERIOR LIGHTING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for exterior luminaries with lamps and ballast; and poles.

1.2 QUALITY ASSURANCE

A. Underwriter's Laboratory

B. NFPA 70 - National Electrical Code

C. Luminaires UL 1598.

D. High intensity discharge (HID) ballast UL 1029.

E. ***Solid state lighting (LED) UL 1598***

1.3 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

A. Dead load weight of luminaire, supports, lowering devices as stated in AASHTO LTS-4.

B. Fixtures and poles shall be designed for wind load pressures conforming to the Ohio Basic Code.

1.4 LUMINAIRES

A. Listed and labeled for installation in wet location.

B. Metal parts free of burrs, sharp corners, and edges.

C. Constructed of corrosion-resistant aluminum.

D. Rigidly formed housings that provide weathertight and lighttight enclosures.

E. Stainless steel exposed hardware.

F. Doors and frames shall prevent accidental falling during relamping or ballast replacement.

G. Heat and aging-resistant reslient gasket to seal lenses to luminaire door.

1.5 FLUORESCENT BALLAST AND LAMPS

A. Low temperature ballast for reliable starting and operation of lamps to minus 20 degrees Fahrenheit.

B. Ballast to have less than 10 percent total harmonic distortion.

C. Electromagnetic ballast to be high power factor Class P.

D. Fluorescent lamps shall be low-mercury type and reliable starting and operation to minus 20 degrees Fahrenheit.

1.6 BALLAST FOR HID LAMPS

A. Constant wattage autotransformer or high power factor type.

B. Minimum starting temperature of minus 22 degrees Fahrenheit.

C. High pressure sodium ballast shall be electro magnetic type with solid state igniter/starter and minimum starting temperature of minus 40 degrees Fahrenheit.

1.7 HID LAMPS

A. High-Pressure Sodium Lamps: ANSI C78.42, CRI 21 (minimum), color temperature 1900K, and average rated life of 24,000 hours, minimum.

B. Metal-Halide Lamps: ANSI C78.1372, with a minimum CRI 65, and color temperature 4000 K.

C. Pulse-Start Metal-Halide Lamps: Minimum CRI 65, and color temperature 4000 K.

D. Ceramic, Pulse-Start, Metal-Halide Lamps: Minimum CRI 80, and color temperature 4000 K.

1.8 SOLID STATE LIGHTING (LED) LUMINAIRES

A. Wall or pole mounted

B. Comply with IES LM-79

C. CRI 75 minimum

D. Color consistency NEMA SSL 3

E. B50 rating at least 50,000 hours per IES LM-80

1.9 DRIVERS FOR SOLID STATE LIGHTING (LED) LUMINAIRES

A. Comply with ANSI 82.11

B. UL 935 approved

C. 100 to 277-volt input rating

D. 24v DC output rating

E. Power Factor: .90 or higher

1.10 POLES

A. Structural Characteristics: Comply with AASHTO LTS-5.

1.11 STEEL POLES

A. Poles complying with ASTM A 500 Grade B carbon steel with minimum yield of 46,000 psig.

B. One piece construction.

C. Weld ½ inch threaded lug for grounding conductor connections.

D. Vibration dampeners for Mode 1 and Mode 2

E. Factory-painted finish.

1.12 ALUMINUM POLES

A. Poles complying with ASTM B429 / B429M constructed with extruded seamless 6063 alloy.

B. Heat treated full length shaft to produce a T6 temper.

C. 1/2" threaded lug for grounding conductor connections.

D. A356 aluminum anchor base welded to shaft.

E. Vibration dampeners for Mode 1 and Mode 2.

F. Integrally-colored or electrolytically deposited color coating complying with AAMA 611.

1.13 FIBERGLASS POLES

A. 65% fiberglass with resin.

B. Resin color uniform throughout entire wall thickness UV inhibited.

C. Direct embedded along pedestrian walkways.

D. Concrete base mounted in vehicular traffic areas.

1.14 CONCRETE POLES

A. Poles: Manufactured by centrifugal spin-casting process or of cast concrete.

B. Cure with wet steam and age for a minimum of 15 days before installation.

C. Fabricate poles with a hard, non-porous surface that is resistant to water, frost, and road and soil chemicals and that has a maximum water-absorption rate of 3 percent.

END OF SECTION

DIVISION 27 COMMUNICATIONS

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SECTION 270526

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

GENERAL GUIDELINES

1.1 SUMMARY

A. This Section defines the general design requirements for a uniform Telecommunications Grounding and Bonding infrastructure that shall be followed for all OFCC Technology construction projects.

1. Figure 1 describes the Telecommunications Bonding System

2. Refer to Section 8500, Technology Systems, and Section 8600, Electrical Systems, for additional information.

1.2 SECTION INCLUDES

A. Telecommunications Main Grounding Busbar (TMGB)

B. Telecommunications Grounding Busbar (TGB)

C. Telecommunications Bonding Backbone (TBB) ***– optional.***

1.3 QUALITY ASSURANCE

A. All equipment shall be UL listed.

B. All equipment and Installation Practices shall comply with the latest ANSI/NFPA-70 National Electric Code.

C. All equipment Installation Practices shall comply with the Local Electric Code.

D. All equipment Installation Practices shall comply with the latest ANSI/TIA/EIA-758 Customer Owned Outside Plant Standard.

E. All equipment shall comply with the latest ANSI-J-STD-607 Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications Standard.

F. All equipment and Installation Practices shall comply with the latest BICSI Telecommunications Distribution Methods Manual (TDMM).

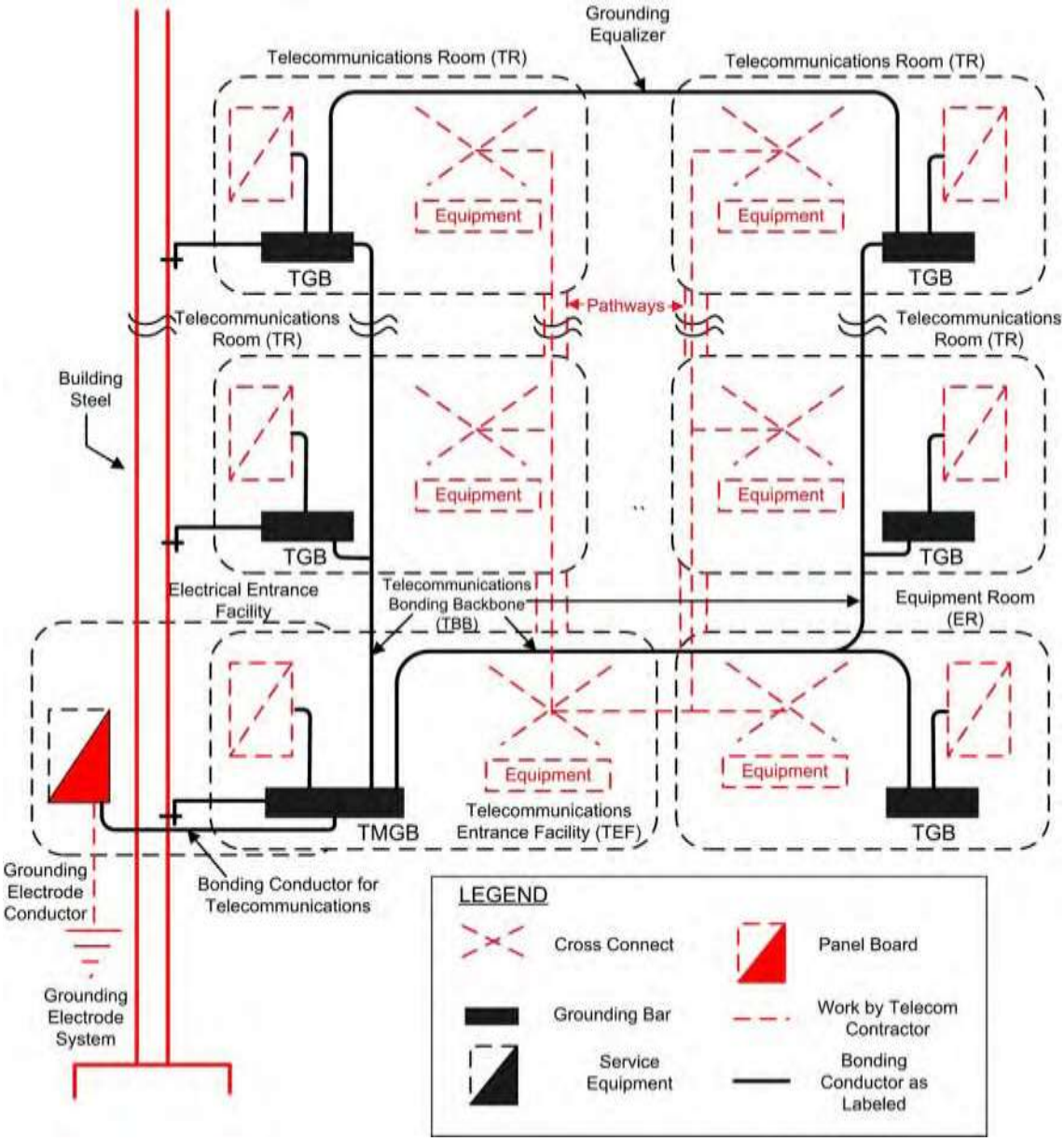

Figure 1 – Telecommunications Bonding System

1.4 TELECOMMUNICATIONS MAIN GROUNDING BUSBAR (TMGB)

A. Provide Telecommunications Main Grounding Busbar (TMGB) in Main Equipment Room (ER) and Telecommunications Room (TR).

B. All TMGB Connections to be made with double-bolted, Compression style, Grounding Lugs.

1.5 TELECOMMUNICATIONS GROUNDING BUSBAR (TGB)

A. Provide Telecommunications Grounding Busbar (TGB) in all Telecommunications Rooms (TRs) and AV Equipment Cabinets.

B. All TGB Connections to be made with double-bolted, Compression style, Grounding Lugs.

1.6 TELECOMMUNICATIONS BONDING BACKBONE (TBB) - OPTIONAL

A. Provide Telecommunications Bonding Backbone (TBB) between all TGBs and the TMGB.

B. All TBB Connections to be made with double-bolted, Compression style, Grounding Lugs.

C. Where a TBB is provided, install in accordance with BICSI Telecommunications Design Method Manual chapter 9 (Bonding and Grounding).

1.7 GROUNDING/BONDING CONDUCTORS

A. All Grounding and bonding conductors shall be copper and may be insulated. When Conductors are insulated, they shall be listed for the application. The minimum bonding conductor shall be No. 6 AWG.

1.8 INSTALLATION

A. As a minimum, Bond TMGB to following:
   1. Building Steel, (minimum No. 2 AWG insulated copper bonding conductor). CAD Weld Bonding Conductors to Building Steel.
   2. Main Electrical Service Grounding Electrode System (minimum No. 2 AWG insulated copper bonding conductor).
   3. Local Service Panel Ground (minimum No. 6 AWG insulated copper bonding conductor).
   4. Telecommunications Bonding Backbone (TBB) that connects TMGB to other TGBs (***size per BICSI TDMM***) **–** optional.
   5. Associated Telecommunications Cable Tray(s) (continuous No. 6 AWG bare copper bonding conductor connecting all Cable Tray Sections).
   6. Telecommunications Conduit(s) Entering TR (minimum No. 6 AWG insulated copper bonding conductor).

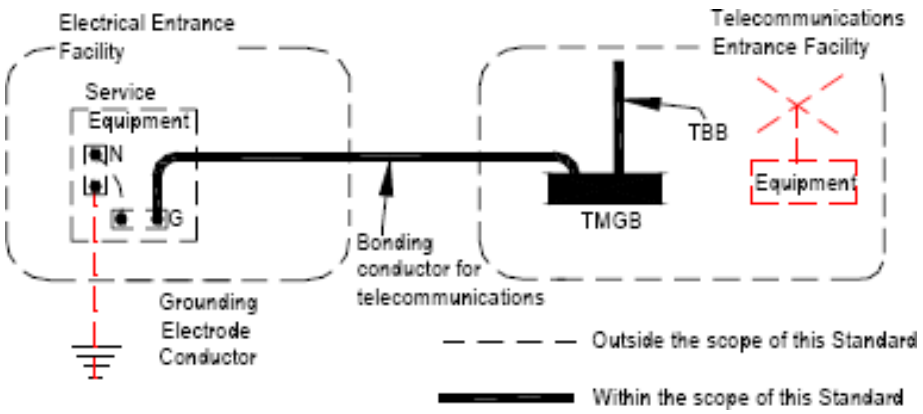

Figure 3 – Connection to Grounding Electrode

B. As a minimum, Bond TGB to following:
   1. Building Steel, (minimum No. 2 AWG insulated copper bonding conductor). CAD Weld Bonding Conductors to Building Steel.
   2. Local Service Panel Ground (minimum No. 6 AWG insulated copper bonding conductor).
   3. Telecommunications Bonding Backbone (TBB) that connects TGB to other TGBs and TMGB (***size per BICSI TDMM***) - Optional.
   4. Associated Telecommunications Cable Tray(s) (continuous No. 6 AWG bare copper bonding conductor connecting all Cable Tray Sections).
   5. Telecommunications Conduit(s) Entering TR (minimum No. 6 AWG insulated copper bonding conductor).

C. As a minimum, the Technology Contractor shall bond the following devices to the associated TMGB and TGBs using a minimum No. 6 AWG insulated copper bonding conductor using compression style lugs:
   1. Antenna Cable Shields
   2. Backbone Cable Shields
   3. CATV Equipment
   4. Coupled Bonding Conductors (CBCs)
   5. Equipment Racks and Cabinets
   6. Lightning and Surge Protectors
   7. PABX Equipment
   8. Raised Floors
   9. Telecommunication and Fiber Cable Shields
   10. Telecommunications Devices
   11. TR Cable Ladder and Tray

END OF SECTION

SECTION 271100

COMMUNICATIONS EQUIPMENT ROOM FITTINGS

GENERAL ***GUIDELINES***

1.1 GENERAL

A. This Section defines the general design requirements for a uniform Communications Room Infrastructure that shall be followed for all OFCC Technology construction projects.
   1. Communications Rooms consist of:
      a. Main Equipment Room (ER)
      b. Telecommunication Rooms (TR)
   2. Figure 1 describes a typical Communications Room
   3. Refer to Section 8500, Technology Systems, and Section 8600, Electrical Systems, for additional information.

1.2 SECTION INCLUDES

A. Equipment Room (ER)

B. Telecommunication Rooms (TR)

C. Equipment Backboards

D. Equipment Racks and Cabinets

E. Cable Ladder and Cable Tray

1.3 QUALITY ASSURANCE

A. All equipment shall be UL listed.

B. All equipment and Installation Practices shall comply with the latest ANSI/NFPA-70 National Electric Code.

C. All equipment Installation Practices shall comply with the Local Electric Code.

D. All equipment shall comply with the latest ANSI-J-STD-607 Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications Standard.

E. All equipment and Installation Practices shall comply with the latest BICSI Telecommunications Distribution Methods Manual (TDMM).

F. All equipment Racks and Cabinets shall comply with the latest ANSI/EIA-310 Cabinets, Racks, Panels and Associated Equipment Standard.

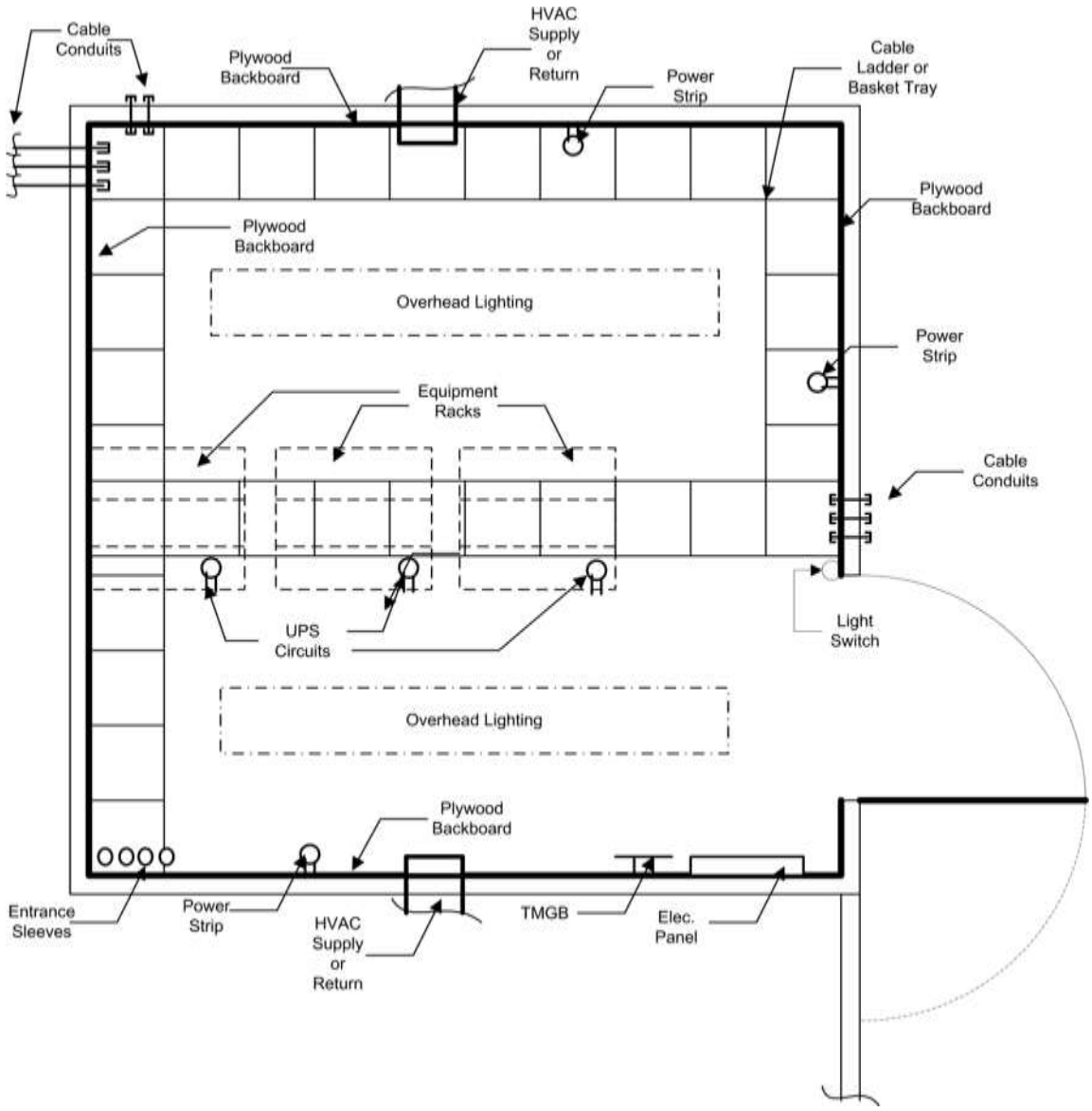

Figure 1 - Typical 10 ft x 10 ft Communications Room

1.4 EQUIPMENT ROOM (ER) GENERAL

A. Each Building shall be equipped with at least 1 ER

B. Locate the ER in a Central area of the Building.

C. For multiple story buildings, consider centrally locating the ER so it can serve multiple floors.

D. Extend Service Entrance Conduits to the ER

E. The ER typically contains the following equipment:

1. ACTIVE EQUIPMENT
   a. Access Control Systems
   b. CATV Systems
   c. CCTV Systems
   d. Clock Systems
   e. Intercom Systems
   f. Network Electronics
   g. Paging Systems
   h. PBX Equipment
   i. Security Electronics
   j. UPS Systems
   k. Video Systems
   l. Voice Mail Systems
   m. Wireless Electronics

2. CROSS-CONNECT EQUIPMENT
   a. Racks
   b. Cabinets
   c. Patch Panels
   d. Backboards
   e. 110 Blocks

3. BUILDING FACILITIES EQUIPMENT
   a. Associated HVAC Equipment
   b. Associated Electrical Equipment

1.5 TELECOMMUNICATION ROOM (TR) GENERAL

A. When more than one Equipment Room (ER) is required, additional satellite Telecommunications Rooms (TRs) shall be provided.

B. Centrally locate the TRs in the areas being served.

C. For multiple story buildings, consider centrally locating the TRs so they can serve multiple floors.

D. The TR typically contains the following equipment:
   1. ACTIVE EQUIPMENT
      a. CATV Systems
      b. Network Electronics
      c. UPS Systems
   2. CROSS-CONNECT EQUIPMENT
      a. Racks
      b. Cabinets
      c. Patch Panels
      d. Backboards
      e. 110 Blocks
   3. BUILDING FACILITIES EQUIPMENT
      a. Associated HVAC Equipment
      b. Associated Electrical Equipment

E. Fiber and Copper Backbone cables shall be provided to interconnect the TR(s) with the ER.

1.6 ER AND TR REQUIREMENTS

A. Verify and coordinate ER/TR quantity, size and location with the Design Professional during the programming phase.

1. Refer to the OSDM space plates for minimum SF requirements.

2. Consider additional space requirements if district is considering thin client or N.O.C. applications.

B. The minimum ER and TR minimum ceiling heights shall be 8 feet (2.4 m) above finished floor (AFF). Consideration should be given to 10 ft (3 m) ceilings.

C. The ER and TR shall be rectangular in shape.

D. Consolidate multiple floors and serving areas into a single TR whenever possible. For example, a centrally located TR on the 2nd floor could also serve the 1st and 3rd floor.

E. The ER and TR shall have tiled floors.

F. The ER and TR shall have at least one lockable door that opens outward and has minimum dimensions of 3 feet (0.91 m) wide by 6.7 feet (2.0 m) tall.

G. Provide each ER and TR with an HVAC system that maintains continuous environmental control 24 hours per day, 365 days per year.

H. Maintain temperature between 64º F (18º C) to 75º F (24º C).

I. Maintain relative humidity between 30% and 55% -- non-condensing.

J. Provide Telecommunications Grounding Systems

K. Provide the following minimum clearances:

1. Minimum of 40 in. (1 m) between equipment racks and the front of cross-connect fields.
2. Allow a minimum of 6 in. (150 mm) from the wall for wall-mounted equipment.
3. Minimum of a 40 in. (1 m) aisle in front of and behind all equipment racks and cabinets.
4. Minimum of 36 in. (0.91 m) floor area depth for equipment racks and cabinets.

L. Provide sufficient Generator Electrical circuits to service the associated UPS units.

M. Power all active devices from UPS units, which are connected to the Building generator.

N. Provide a minimum of 500 lux (50-foot candles of uniform lighting when measured at 3 feet AFF.

O. Use light colored walls to enhance lighting.

1.7 EQUIPMENT BACKBOARDS

A. Cover at least two (2) walls with AC grade or better, void free ¾ in. (19 mm) plywood at least 8 feet (2.4 m) high.

B. Place the grade C surface towards the wall and coat the plywood with two coats of fire-retardant white paint.

1.8 EQUIPMENT RACKS

A. Place equipment racks or cabinets in a continuous row.

B. Equipment racks shall be black, 84 inches high, have 19 inch EIA, pre-tapped, mounting rails and shall have integral, 5 inch minimum, vertical cable organizers on both the left and right of the rack.

C. Equipment racks shall be provided with rear vertical cable organizers on both the left and right side of the rack.

D. Provide at least one 4-posted rack or equipment cabinet in the ER for placing file servers and other equipment requiring four-corner mounting.

E. Equipment racks are the preferred equipment-mounting device.

F. When equipment cabinets are furnished, they shall be black, have vented side panels and lockable front and back doors. ***Provide ventilation fans as required for active equipment.*** Cabinets shall be a minimum of 24 inches (610 mm) wide by a minimum of 42 in. (1.07 m) deep and 84 in. (2.15 m) high.

G. All equipment racks and cabinets shall be of the same manufacturer and model type.

1.9 CABLE LADDER AND CABLE TRAY

A. Line the walls of the ER and TR with a minimum of 12 in (305 mm) wide cable ladder or wire basket cable tray for cable management.

B. Provide a minimum of 12 in (305 mm) wide cable ladder or wire basket cable tray over the tops of racks and cabinets for cable management.

C. Provide waterfall support structure to assure proper cable bend radius.



Figure 2 -- Typical Communications Room Cable Conduits



Figure 3 -- Typical Communications Room Overhead Cable Ladder and Backboard

1.10 GENERAL

A. All racks, patch panels, cables, jacks, system components, etc. shall be labeled according to ANSI/EIA/TIA-606 specifications and in coordination with the District/architect.

B. Coordinate the location of lighting equipment so that fully loaded cable trays and ladder do not impede or obstruct the lighting.

END OF SECTION

SECTION 271313

COMMUNICATIONS COPPER BACKBONE CABLING

GENERAL ***GUIDELINES***

1.1 GENERAL

A. This Section defines the general design requirements for a uniform Intra and Inter-Building Communications Copper Backbone Cabling Infrastructure that shall be followed for all OFCC Technology construction projects.

1. Figures 1, 2 and 3 describe a typical Intra-Building Communications Copper Backbone Cabling Systems

2. Figure 4 describes a typical Inter-Building Communications Copper Backbone Cabling System

3. Refer to Section 8500, Technology Systems, and Section 8600, Electrical Systems, for additional information.

1.2 SECTION INCLUDES

A. INTRA-BUILDING COPPER BACKBONE CABLE SYSTEMS

1. Main Equipment Room (ER) to Telecommunication Rooms (TR) Voice Backbone Cable System.

2. Main Equipment Room (ER) to Telecommunication Rooms (TR) Data Backbone Cable System.

3. Entrance Facility (EF) to Main Equipment Room (ER) Voice Backbone Cable System.

4. Entrance Facility (EF) to Main Equipment Room (ER) Data Circuit Backbone Cable System.

B. INTER-BUILDING COPPER BACKBONE CABLE SYSTEMS

1. Main Equipment Room (ER) to Main Equipment Room (ER) Voice Backbone Cable System.

1.3 QUALITY ASSURANCE

A. All equipment shall be UL listed.

B. All equipment and Installation Practices shall comply with the latest ANSI/NFPA-70 National Electric Code.

C. All equipment Installation Practices shall comply with the Local Electric Code.

D. All equipment shall comply with the latest ANSI-J-STD-607 Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications Standard.

E. All equipment and Installation Practices shall comply with the latest BICSI® Telecommunications Distribution Methods Manual (TDMM) and BICSI® Customer-Owned Outside Plant Design Manual.

F. All equipment shall comply with the latest ANSI TIA/EIA-568, 569, 606, 607, Standards.

G. All Inter-Building cabling shall comply with the latest ANSI/TIA/EIA-758. Customer-Owned Outside Plant Telecommunications Cabling, Standard, as applicable.

H. All Inter-Building cabling shall comply with the latest ANSI/ICEA S-98-688. Broadband Twisted-Pair, Telecommunications Cable Aircore, Polyolefin Insulated Copper Conductors, Standard, as applicable.

I. All Inter-Building cabling shall comply with the latest ANSI/ICEA S-99-689. Broadband Twisted-Pair, Telecommunications Cable Filled, Polyolefin Insulated Copper Conductors, Standard, as applicable.

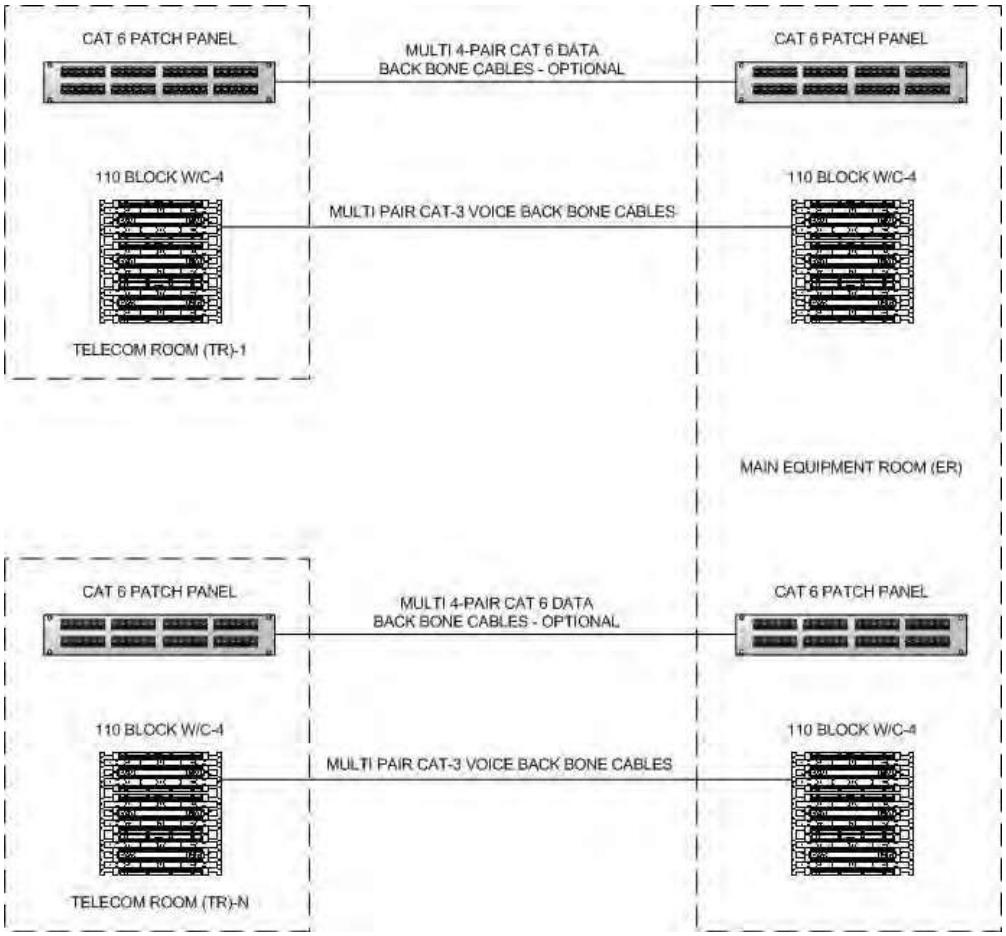

Figure 1 – Main Equipment Room (ER) to Telecommunication Rooms (TRs) Data and Voice Backbone Cable System, Option - 1

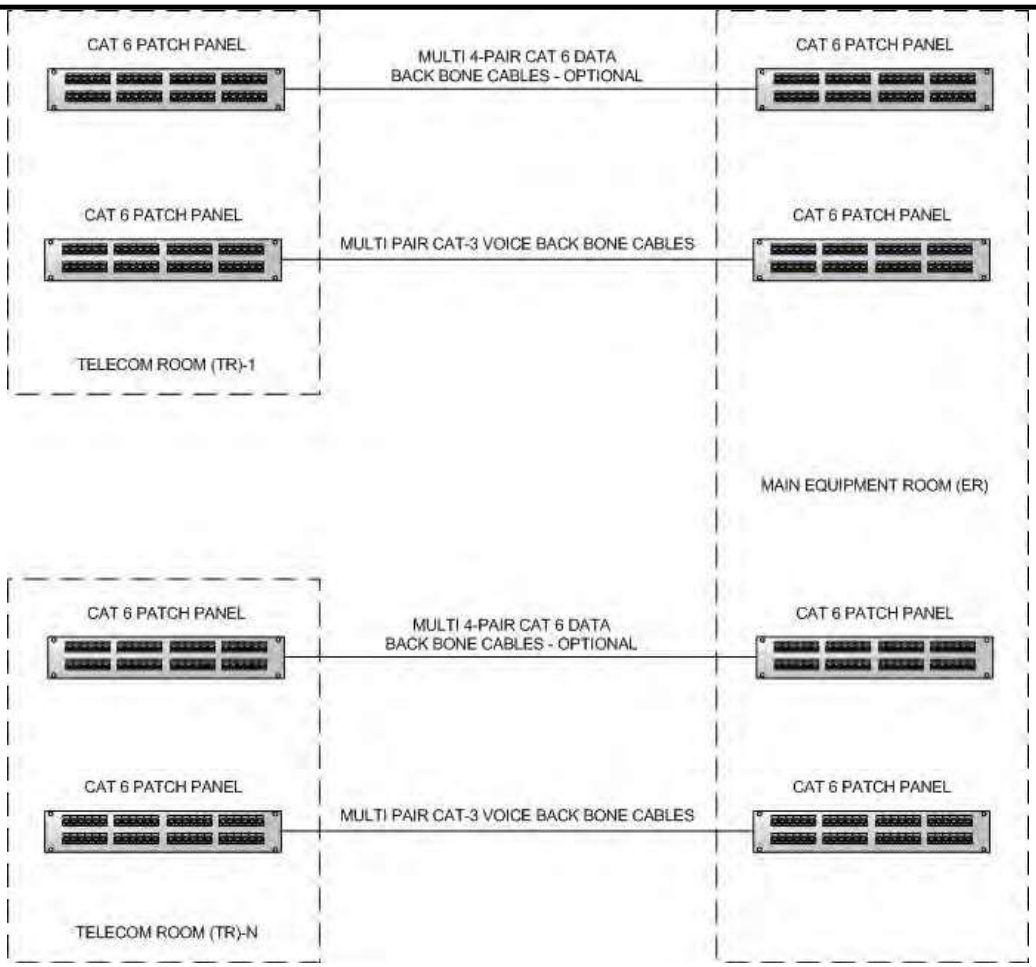

Figure 2 – Main Equipment Room (ER) to Telecommunication Rooms (TRs) Data and Voice Backbone Cable System, Option – 2

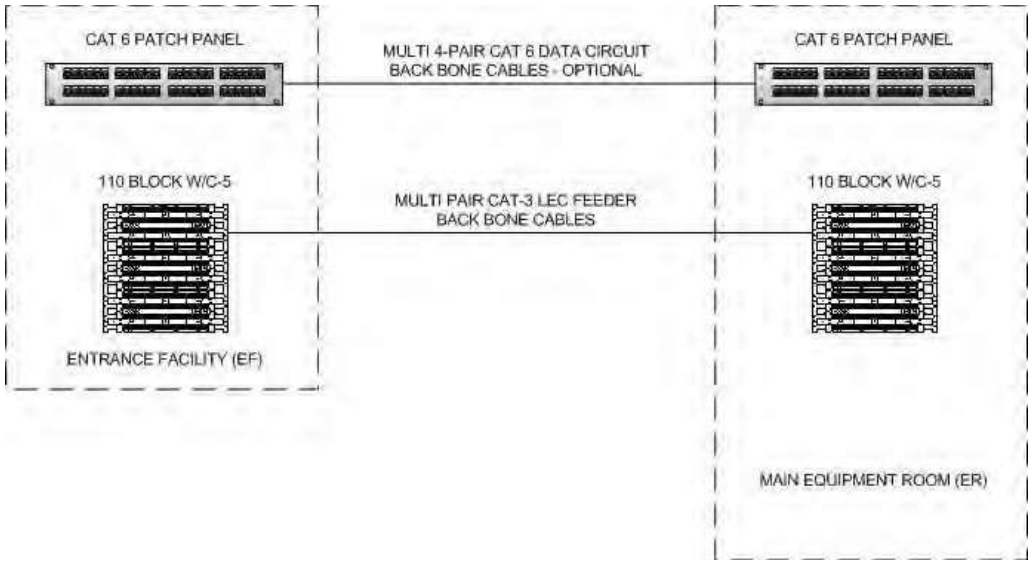

Figure 3 – Entrance Facility (EF) to Main Equipment Room (ER) Data Circuit and Voice Backbone Cable System

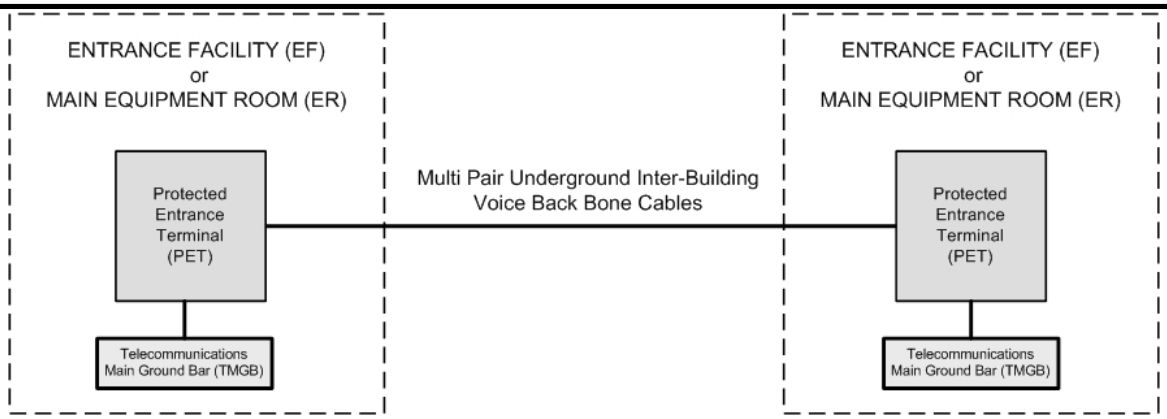

Figure 4 – Main Equipment Room (ER) to Main Equipment Room (ER) Inter-Building Voice Backbone Cable System

1.4 WARRANTY

A. System shall carry an industry standard, performance based warranty, by the manufacturer and contractor, for a period of at least 20 years on the complete cabling system; including patch panels, patch cables, terminations and labor. The remaining portions of the system shall be warranted for a period of three (3) years from date of substantial completion.

1.5 INTRA-BUILDING COPPER BACKBONE CABLE SYSTEMS

A. MAIN EQUIPMENT ROOM (ER) TO TELECOMMUNICATION ROOMS (TR) VOICE BACKBONE CABLE SYSTEM

1. When the School has a Traditional IP-Enabled PBX Phone System, provide a multi-pair CAT-3 Voice Backbone system between the ER and the associated TRs, sufficient to serve all voice stations with 2 pairs in the backbone.

2. When the School has an all-IP Phone System, a minimal 25-pair CAT-3 Voice Backbone is recommended ***but*** not required.

3. Provide a minimum of one (1) 100-pair cable between the ER and each associated TR. Equip cables in increments of 100 pairs. For TE/TR serving less than 24 users, provide a minimum 50 pair cable.

4. Provide a minimum of one (1) pair per associated TR telephone outlet with 50% spare capacity.

5. Terminate 100-pair cables on 110 Blocks using C-4 Clips or ***Cat-6***, rack-mounted, patch panels as minimum 2-pair circuits – See figures 1 and 2 above.

B. MAIN EQUIPMENT ROOM (ER) TO TELECOMMUNICATION ROOMS (TR) DATA CIRCUIT BACKBONE CABLE SYSTEM - OPTIONAL

1. Provide a minimum of six (6) four-pair, ***Cat-6*** cables to match category rating of data cables between the ER and each associated TR.

2. Terminate the cables on ***Cat-6***, rack-mounted, Patch panels at each end. – See figures 1 and 2 above.

C. ENTRANCE FACILITY (EF) TO MAIN EQUIPMENT ROOM (ER) VOICE BACKBONE CABLE SYSTEM

1. Separate Entrance Facilities (EF) are generally encountered during renovations to existing buildings and are not recommended for new construction. For new construction, co-locate the Entrance Facility (EF) in the Main Equipment Room (ER).

2. When the Entrance Facility is not co-located in the Main Equipment Room (ER), provide a multi-pair CAT-3 Voice Backbone system between the EF and the ER, for the extension of voice, FAX and alarm circuits provided by the Service Provider (SP).

3. Provide a minimum of one (1) 100-pair cable between the EF and each associated ER. Equip cables in increments of 100 pairs.

4. Terminate LEC Feeder, 100-pair cables on 110 Blocks using C-5 Clips at both ends. – See figure 3 above.

D. ENTRANCE FACILITY (EF) TO MAIN EQUIPMENT ROOM (ER) DATA CIRCUIT BACKBONE CABLE SYSTEM

1. When the Entrance Facility is not co-located in the Main Equipment Room (ER) provide a minimum of six (6) four-pair, ***Cat-6*** cables between the EF and the ER for the extension of special circuits (T-1, PRI, etc.) provided by the Service Provider (SP) - Optional.

2. Terminate the cables on a ***Cat-6***, wall-mounted, Patch panel at the EF end and on a ***Cat-6***, wall-mounted or rack-mounted patch panel at the ER end. – See figure 3 above.

3. Terminate LEC Feeder, 100-pair cables on 110 Blocks using C-5 Clips at both ends. – See figure 4 above.

1.6 INTER-BUILDING COPPER BACKBONE CABLE SYSTEMS

A. MAIN EQUIPMENT ROOM (ER) TO MAIN EQUIPMENT ROOM (ER) VOICE BACKBONE CABLE SYSTEM

1. When multiple School Buildings are located on the same campus, and served by a common IP-Enabled Phone System, provide a multi-pair, under- ground or aerial telecommunications cable between the ER or EF of the building containing the common Phone System and the ER or EF of each of the associated satellite buildings.

2. Provide a minimum of 25 pairs.

3. Provide a minimum of one pair for each active telephone outlet in the associated satellite building.

4. Provide a minimum of 25 % spare pairs for growth.

5. When the School has an all-IP Phone System, the multi-pair inter-building Voice Backbone is optional. In cases where only one Service Provider DEMARC is provided per campus, provide an inter-building Voice Backbone cable for 911 backup and alarm circuits.

6. Terminate the inter-building cables on Protected Entrance Terminals (PETs) at both ends. – See figure 4 above.

7. Provide Gas-Tube Protector Modules for all pairs at both ends.

8. Ground the Cable sheath and the PET to the associated Telecommunications Main Grounding Bus (TMGB) at both ends.

9. Depending on the application, provide metal protective sheaths and appropriate rodent protection devices for aerially installed Telecommunications cables.

1.7 INSTALLATION

A. All cabling shall be installed according to ANSI/EIA/TIA specifications and BISCI standards.

B. All ***Cat-6*** cabling shall be terminated on ***Cat-6*** (minimum) patch panels and jacks as noted above.

C. All system multi-pair voice backbone cabling shall be terminated on ***Cat-6*** (minimum) patch panels or 110 style punch blocks as noted above.

D. Provide designated space on Telecommunications Backboard for location of Access Provider's (AP's) Service Entrance Cable Termination and Protection Point.

1.8 LABELING

A. All racks, patch panels, cables, jacks, system components, etc. shall be labeled according to ANSI/EIA/TIA-606 specifications and in coordination with the District/architect.

B. All cables shall be equipped with a self-laminating, wrap-around, machine printed label at both ends of the cable.

C. All Patch Panels shall be equipped with pre-printed, cable identification designation strips installed behind clear plastic label holders on the front of the patch panel.

1.9 TESTING

A. All ***Cat-6*** backbone cables shall be tested to ***Cat-6*** performance levels in accordance with ANSI/TIA/EIA-568-B.2 (or latest) specifications, using a Level III compliant tester.

B. All multi-pair, backbone cables shall be tested to Cat-3 (minimum) performance levels in accordance with ANSI/TIA/EIA-568-B.2 (or latest) specifications, using a Level III compliant tester.

C. All multi-pair, inter-building backbone cables shall be tested to Cat-3 (minimum) performance levels in accordance with ANSI/TIA/EIA-568-B.2 (or latest) specifications, using a Level III compliant tester.

D. All Cable test results shall be stored and presented to the Architect in both hard copy and electronic format for approval.

E. All Cable Tester record designations shall match the associated cable label, and associated patch panel or 110-block label designation.

END OF SECTION

SECTION 271323

COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING

GENERAL GUIDELINES

1.1 GENERAL

A. This Section defines the general design requirements for a uniform Intra and Inter-Building Communications Optical Fiber Backbone Cabling Infrastructure that shall be followed for all OFCC Technology construction projects.

1. Figure 1 describes a typical Intra-Building Communications Optical Fiber Backbone Cabling System

2. Figure 2 describes a typical Inter-Building Communications ***Optical Fiber*** Backbone Cabling System

3. Refer to Section 8500, Technology Systems, and Section 8600, Electrical Systems, for additional information.

1.2 SECTION INCLUDES

A. INTRA-BUILDING OPTICAL FIBER BACKBONE CABLE SYSTEMS
1. Main Equipment Room (ER) to Telecommunication Rooms (TR) Fiber Optic Backbone Cable System

B. INTER-BUILDING OPTICAL FIBER BACKBONE CABLE SYSTEMS
1. Main Equipment Room (ER) to Main Equipment Room (ER) Fiber-Optic Backbone Cable System

C. OPTICAL FIBER PATCH PANEL SYSTEMS
1. Fiber-Optic Patch Panels
2. Fiber-Optic Connectors
3. Fiber-Optic Splice Trays

1.3 QUALITY ASSURANCE

A. All equipment shall be UL listed.

B. All equipment and Installation Practices shall comply with the latest ANSI/NFPA-70 National Electric Code.

C. All equipment installation practices shall comply with the local electric code.

D. All equipment shall comply with the latest ANSI-J-STD-607 Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications Standard.

E. All equipment and Installation Practices shall comply with the latest BICSI® Telecommunications Distribution Methods Manual (TDMM) and BICSI® Customer-Owned Outside Plant Design Manual.

F. All equipment shall comply with the latest ANSI TIA/EIA-568, 569, 606, 607, standards.

G. All 62.5 micron, multi-mode fiber equipment shall comply with the latest American National Standards Institute/Telecommunications Industry Association/Electronic Industries Alliance Specification ANSI/TIA/EIA-492AAAA. Detail Specification for 62.5-µm Core Diameter/125-µm Cladding Diameter Class 1a Graded-Index Multimode Optical Fibers. Note: 62.5 micron is only for legacy systems.

H. All 50 micron, multi-mode equipment shall comply with the latest American National Standards Institute/Telecommunications Industry Association/Electronic Industries Alliance Specification ANSI/TIA/EIA-492AAAB. Detail Specification for 50-µm Core Diameter/ 125-µm Cladding Diameter Class 1a Multimode Graded- Index Optical Waveguide Fibers. 50 micron fiber shall be OM4 laser optimized with support for 10 GB serial at 500m.

I. All single-mode equipment shall comply with the latest American National Standards Institute/Telecommunications Industry Association/Electronic Industries Alliance Specification ANSI/TIA/EIA-492CAAA. Detail Specification for Class IVa Dispersion—Unshifted Single-Mode Optical Fibers.

1.4 SYSTEM WARRANTY

A. System shall carry an industry standard, performance based warranty, by the manufacturer and contractor, for a period of at least 20 years on the fiber-optic cabling; including patch panels, patch cables, terminations and labor. The remaining portions of the system shall be warranted for a period of ***three (3) years*** from date of substantial completion.

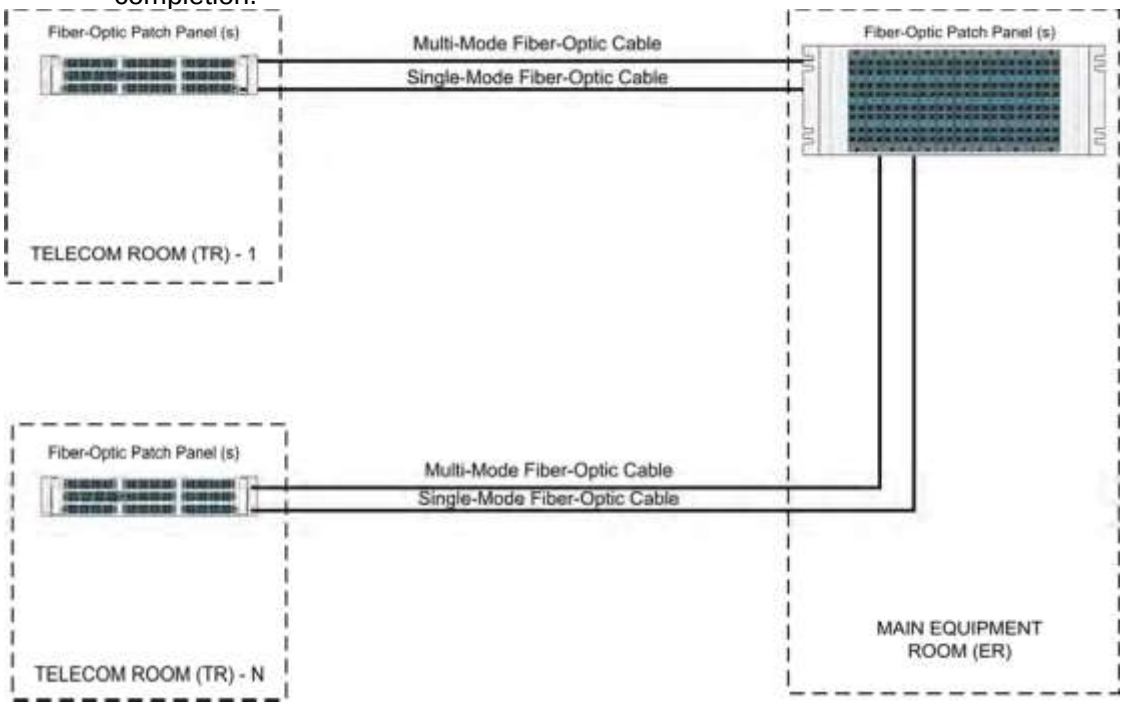

Figure 1 – Main Equipment Room (ER) to Telecommunication Rooms (TRs) Fiber-Optic Backbone Cable System

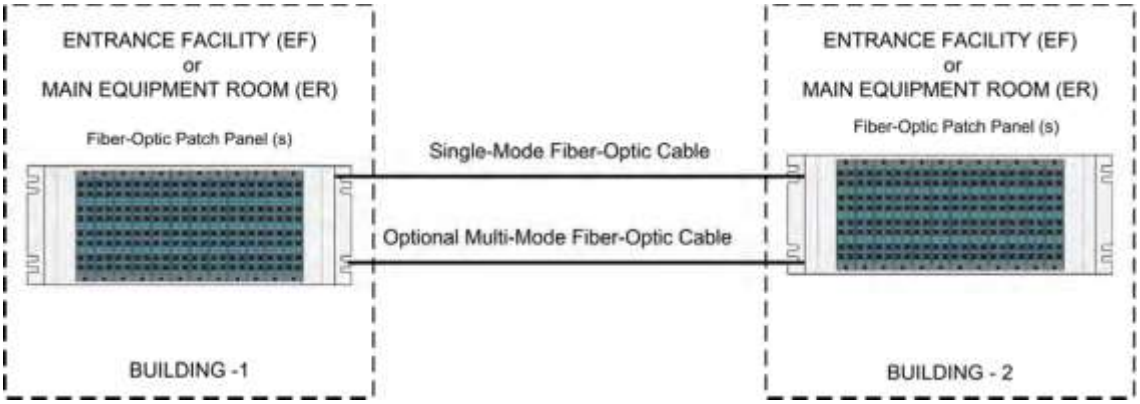

Figure 2 – Main Equipment Room (ER) to Main Equipment Room (ER) Inter-Building Fiber-Optic Backbone Cable System

1.5 INTRA-BUILDING OPTICAL FIBER BACKBONE CABLE SYSTEMS

A. MAIN EQUIPMENT ROOM (ER) TO TELECOMMUNICATION ROOMS (TR) FIBER-OPTIC BACKBONE CABLE SYSTEM

1. GENERAL

a. Provide a multi-mode and single-mode Optical Fiber Backbone System for all new and renovated Buildings when the building contains more than one (1) Telecommunications Closet.

b. Upgrade existing Optical Fiber Backbone Systems to the following requirements.

c. Ground the Cable sheath of aerial fiber-optic cables to the associated Telecommunications Main Grounding Bus (TMGB) at both ends.

d. Depending on the application, provide metal protective sheaths and appropriate rodent protection devices for aerially installed fiber-optic cables.

2. MULTI-MODE FIBER-OPTIC CABLE

a. Provide a Multi-Mode, Fiber-Optic Cable between the Main Equipment Room and each associated Telecommunications Room (TR).

b. The Multi-Mode, Fiber-Optic cable shall be 50/125, OM4 micron laser optimized fiber.

c. The Multi-Mode, Fiber Optic cable shall be OFNP rated, tight-buffered and installed in plenum rated inner-duct.

d. The Multi-Mode, Fiber-Optic cable shall be sized per the following formula; # strands: 6 strands per 48 ports. TR serving less than 96 users shall be minimum 12 strands.

e. Provide spare fibers after initial Network Configuration Design.

f. The Multi-Mode fibers shall be terminated with fusion-spliced, factory-polished, SC or LC Pigtails or pre-terminated backbone fiber with associated fiber cassettes.

g. Classroom fibers are not supplied for new construction; however, for existing construction (renovations), the fibers may be terminated with epoxy cured, field-terminated, SC or LC Connectors.

3. SINGLE-MODE FIBER-OPTIC CABLE
   a. Provide a Single-Mode, Fiber-optic Cable between the Main Equipment Room (ER) and each associated Telecommunications Room (TR).
   b. The Single-Mode, Fiber Optic cable shall be ***OS2*** 8.7/125 micron fiber.
   c. The Single-Mode, Fiber Optic cable shall be OFNP rated, tight-buffered and installed in plenum rated inner-duct.
   d. The Single-Mode, Fiber Optic cable shall be a minimum ***12 strands*** per TR to ER.
   e. The Single-mode fibers shall be terminated with fusion-spliced, factory-polished, SC or LC Pigtails or pre-terminated backbone fiber with associated fiber cassettes capable of 10 Gbps operation.
   f. Angle-Polished Connectors (APC) shall be utilized on all Single-mode fibers used to support AM Video (CATV, etc.) applications.

1.6 INTER-BUILDING OPTICAL FIBER BACKBONE CABLE SYSTEMS

A. MAIN EQUIPMENT ROOM (ER) TO MAIN EQUIPMENT ROOM (ER) INTER-BUILDING FIBER-OPTIC BACKBONE CABLE SYSTEM

1. GENERAL
   a. Provide a single-mode Optical Fiber Backbone System between all buildings on the same campus.
   b. Provide an optional, multi-mode Optical Fiber Backbone System between all buildings on the same campus that are less than 250 meters between building ERs.
   c. Upgrade existing Optical Fiber Backbone Systems to the following requirements.

2. MULTI-MODE FIBER-OPTIC CABLE - OPTIONAL
   a. Provide an optional Multi-Mode, Fiber-Optic Cable between the Main Equipment Room (ER) of the Network Center and each associated Building's Main Equipment Room (ER).
   b. The Multi-Mode, Fiber-Optic cable shall be 50/125, OM4 micron laser optimized fiber.
   c. The Multi-Mode, Fiber Optic cable shall be gel-filled or indoor/outdoor rated, tight-buffered cable installed in underground duct banks or aerially between buildings.
   d. If the fiber-optic cable shares the duct bank with other cables, install an inner-duct.
   e. The Multi-Mode, Fiber-Optic cable shall be a minimum 12 strands between buildings -- ER to ER.
   f. Provide a minimum of 25% spare fibers after initial Network Configuration Design.

g. The Multi-Mode fibers shall be terminated with fusion-spliced, factory-polished, SC or LC Pigtails or pre-terminated backbone fiber with associated fiber cassettes.

3. SINGLE-MODE FIBER-OPTIC CABLE
   a. Provide a Single-Mode, Fiber-optic Cable between the Main Equipment Room (ER) of the Network Center and each associated Building's Main Equipment Room (ER).
   b. The Single-Mode, Fiber Optic cable shall be an ***OS2*** 8.7/125 micron fiber.
   c. The Single-Mode, Fiber Optic cable shall be gel-filled or indoor/outdoor rated, tight-buffered cable installed in underground duct banks or aerially between buildings.
   d. If the fiber-optic cable shares the duct bank with other cables, install an inner-duct.
   e. The Single-Mode, Fiber-Optic cable shall be a minimum 12 strands between buildings -- ER to ER.
   f. The Single-mode fibers shall be terminated with fusion-spliced, factory-polished, SC or LC Pigtails or pre-terminated backbone fiber with associated fiber cassettes capable of 10 Gbps operation.
   g. Angle-Polished Connectors (APC) shall be utilized on all Single-mode fibers used to support AM Video (CATV, etc.) applications.

1.7 OPTICAL FIBER PATCH PANEL SYSTEMS

A. FIBER-OPTIC PATCH PANELS
   1. Fiber-Optic patch panels shall be mounted in equipment racks.
   2. Fiber-Optic patch panels shall be rack-mounted and shall be 24/48/72/144 port, or as required.
   3. Provide "Dual SC or LC" type couplers for multi-mode and single-mode cables.

B. FIBER-OPTIC CONNECTORS
   3. Terminate Multi-Mode fibers with factory-terminated SC or LC multi-mode pigtails. Match fiber cable type provided.
   4. Terminate Single-Mode fibers with factory-terminated SC or LC single-mode pigtails. Match fiber cable type provided.

C. FIBER-OPTIC SPLICE TRAYS (Fusion Splice Pigtails)
   3. Provide Fiber-Optic Fusion Splice Trays for connecting the factory- terminated, SC or LC pigtails to the associated Multi-Mode and Single-Mode fibers.

1.8 INSTALLATION

A. All cabling shall be installed according to ANSI/EIA/TIA specifications and BISCI standards.

B. All fiber-optic cabling shall be terminated on rack-mounted patch panels using fusion-spliced, pigtails, as noted above, or pre-terminated connector panel assembly.

C. Provide space in rack (min 3 units) for possible District or DA-Site-provided, inter-building Fiber-Optic Cable Patch Panel.

1.9 LABELING

A. All racks, patch panels, cables, jacks, system components, etc. shall be labeled according to ANSI/EIA/TIA-606 specifications and in coordination with the District/architect.

B. All Fiber-Optic cables shall be equipped with a self-laminating, wrap-around, machine printed label at both ends of the cable.

C. All Fiber-Optic Patch Panels shall be equipped with pre-printed, cable identification designation strips installed behind clear plastic label holders on the front of the patch panel.

1.10 TESTING

A. All Cable test results shall be stored and presented to the Architect in both hard copy and electronic format for approval.

B. All Cable Tester, Record designations shall match the associated cable label, and associated patch panel label designation.

C. All Fiber-Optic Cables shall be tested with both a power meter and an OTDR.

END OF SECTION

SECTION 271513

COMMUNICATIONS COPPER HORIZONTAL CABLING

GENERAL GUIDELINES

1.1 GENERAL

A. This Section defines the general design requirements for a uniform Communications Copper Horizontal Cabling System Infrastructure that shall be followed for all OFCC Technology construction projects.
   1. Refer to Section 8500, Technology Systems, and Section 8600, Electrical Systems, for additional information.

1.2 SECTION INCLUDES

A. COMMUNICATIONS COPPER HORIZONTAL CABLING SYSTEM SYSTEMS
   1. Modular Jacks
   2. Modular Cover Plates
   3. Horizontal Cable
   4. Modular Patch Panels

1.3 QUALITY ASSURANCE

A. All equipment shall be UL listed.

B. All equipment and Installation Practices shall comply with the latest ANSI/NFPA-70 National Electric Code.

C. All equipment Installation Practices shall comply with the Local Electric Code.

D. All equipment shall comply with the latest ANSI-J-STD-607 Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications Standard.

E. All equipment and Installation Practices shall comply with the latest BICSI® Telecommunications Distribution Methods Manual (TDMM).

F. All equipment shall comply with the latest ANSI TIA/EIA-568, 569, 606, 607, 862, standards.

G. All connecting equipment shall be from the same manufacturer.

1.4 SYSTEM WARRANTY

A. System shall carry an industry standard, performance based warranty, by the manufacturer and contractor, for a period of at least 20 years on the horizontal cabling; including patch panels, patch cables, terminations and labor. The remaining portions of the system shall be warranted for a period of ***three (3) years*** from date of substantial completion.

1.5 MODULAR JACKS

A. Each 4-pair 100-ohm UTP data cable shall be terminated in an eight position, modular jack at the Work Area (WA).

B. The data cable shall be terminated directly to the modular jack with insulation displacement connectors.

C. The modular jack shall be a minimum of Category 6 compliant and 6a compliant for wireless solution.

D. The modular jack pair/pin assignments shall be T568B.

1.6 COVER PLATES

A. Plates shall be modular, front-loading and colored to match the video/data wall plates.

B. All plate colors shall be coordinated with the architect to match furnishings and fixtures.

C. Wall mounted phones shall utilize 630 style faceplates.

1.7 HORIZONTAL CABLE

A. In accordance with ANSI/EIA/TIA 568B.2 all horizontal data cable shall be:
   1. UL listed, 4-pair 100 ohm, UTP, Category 6 / ***shielded*** Category 6a (wireless) compliant
   2. Conductors shall be 24 AWG, solid bare annealed copper.
   3. Cable shall be insulated with FEP material.
   4. Cable shall be NEC CMP rated.

B. Cable shall be sequentially marked at 2-foot intervals.

C. Cable pairs shall be color coded:
   1. Pair 1- White/Blue and Blue.
   2. Pair 2- White/Orange and Orange
   3. Pair 3- White/Green and Green
   4. Pair 4- White/Brown and Brown

D. Provide horizontal voice / data cable drops for:
   1. Administrative Computers
   2. Bulletin Board System
   3. CCTV Cameras (as required)
   4. Classroom and Lab Computers
   5. Desk top phones
   6. Distance Learning Systems
   7. Door Phones (as required)
   8. Electrical Closets
   9. Elevator Phones
   10. Energy Management Systems (EMS)
   11. Fax Machines
   12. Fire Alarm Systems
   13. HVAC Equipment

14. LCD TVs
15. Master Clock System (as required)
16. Mechanical Closets
17. Miscellaneous Network Attached Devices
18. Pay Station Phones (as required)
19. Point of Sale Terminals (as required)
20. Printers
21. Projectors
22. Security and Access Control Systems
23. Set Top Boxes (as required)
24. Teacher Technology Centers
25. Video Conference Units
26. Wall mounted phones

E. Provide horizontal Category 6a cable drops for wireless access points***.***

F. Telecommunication outlet/connectors that serve an individual work area may be located in multiple faceplates.

1.8 MODULAR PATCH PANELS

A. All patch panels shall be in accordance with ANSI/EIA/TIA 568B.2 (or latest) and shall be equipped with eight position, modular jacks with insulation displacement connectors, rear cable-management bars/standoffs and front label designation strips.

B. Provide 24 or 48 port, Category 6 rated patch panels for termination of horizontal cabling. When the Equipment Room (ER) or Telecommunications Room (TR) serves more than one floor, sequentially group the cables by floor on separate patch panels.

C. Provide 24 or 48 port, Category 6a rated patch panels for termination of all wireless horizontal cabling. When the Equipment Room (ER) or Telecommunications Rooms (TR) serves more than one floor, sequentially group the cables by floor on separate patch panels.

D. Provide color-coded, Category 6 / ***shielded*** Category 6a (wireless) rated patch cords for all connections (plus 10% spare).

1.9 INSTALLATION

A. All cabling shall be installed according to ANSI/EIA/TIA specifications and BISCI standards.

B. All horizontal voice / data cabling shall be terminated on patch panels and jacks as noted above.

C. Consider providing cable slack at both ends of the horizontal cables to accommodate future cabling system changes.

1.10 LABELING

A. All patch panels, cables, jacks, system components, etc. shall be labeled according to ANSI/EIA/TIA-606 specifications and in coordination with the owner/architect.

B. All horizontal cables shall be equipped with a self-laminating, wrap-around, machine printed label at both ends of the cable.

C. All Patch Panels shall be equipped with pre-printed, cable identification designation strips installed behind clear plastic label holders on the front of the patch panel.

D. All Modular Plates shall be equipped with a pre-printed, cable identification strip, installed behind a clear plastic label holder.

1.11 TESTING

A. All horizontal cabling shall be tested to Category 6 / ***shielded*** Category 6a (for wireless solution) performance levels in accordance with ANSI TIA/EIA-568-B.2 (or latest) specifications, using a Level III compliant tester.

B. All Cable test results shall be stored and presented to the Architect in both hard copy and electronic format for approval.

C. All Cable Tester Record designations shall match the associated cable label, patch panel label and faceplate label.

END OF SECTION

SECTION 271543

AUDIO-VIDEO COMMUNICATIONS HORIZONTAL TRANSPORT SYSTEM

GENERAL GUIDELINES

1.1 GENERAL

A. The baseline A/V system shall utilize digital sources and digital transport medium, to all display devices. The Technology Designer shall provide active electronics where required due to cable distance limitations. Coordinate infrastructure sizes and routing with the Electrical Designer.

B. The use of analog sources and transport medium shall be ***legacy only.***

C. ***All new work shall be digital systems.*** This Section defines the general design requirements for a uniform Audio-Video Horizontal Transport System Infrastructure that shall be followed for all OFCC Technology construction projects.

D. Refer to Section 8500, Technology Systems, and Section 8600, Electrical Systems, for additional information.

E. Refer to Figure 1 – Typical classroom audio-visual system components for general overview of equipment and interconnectivity

1.2 SECTION INCLUDES

A. AUDIO-VIDEO COMMUNICATIONS HORIZONTAL TRANSPORT SYSTEM
   1. Instructor AV interface outlet.
   2. Guest AV Interface Outlet (optional)
   3. Wardrobe AV equipment interface outlet
   4. Instructor AV equipment interface outlet
   5. Classroom Interactive Projector AV interface outlet
   6. Public Monitor/TV AV Interface Outlet

1.3 QUALITY ASSURANCE

A. All equipment shall be UL listed.

B. All equipment and Installation Practices shall comply with the latest ANSI/NFPA-70 National Electric Code.

C. All equipment Installation Practices shall comply with the Local Electric Code.

D. All equipment shall comply with the latest ANSI-J-STD-607 Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications Standard.

E. All equipment and Installation Practices shall comply with the latest BICSI® Telecommunications Distribution Methods Manual (TDMM).

F. All equipment shall comply with the latest ANSI TIA/EIA-568, 569, 606, 607, 862, standards.

1.4 SYSTEM WARRANTY

A. System shall carry an industry standard, performance based warranty, by the contractor, for a period of at least 20 years on the cabling; including patch panels, patch cables, terminations and labor. The remaining portions of the system shall be warranted for a period of ***three (3)*** years from date of substantial completion.

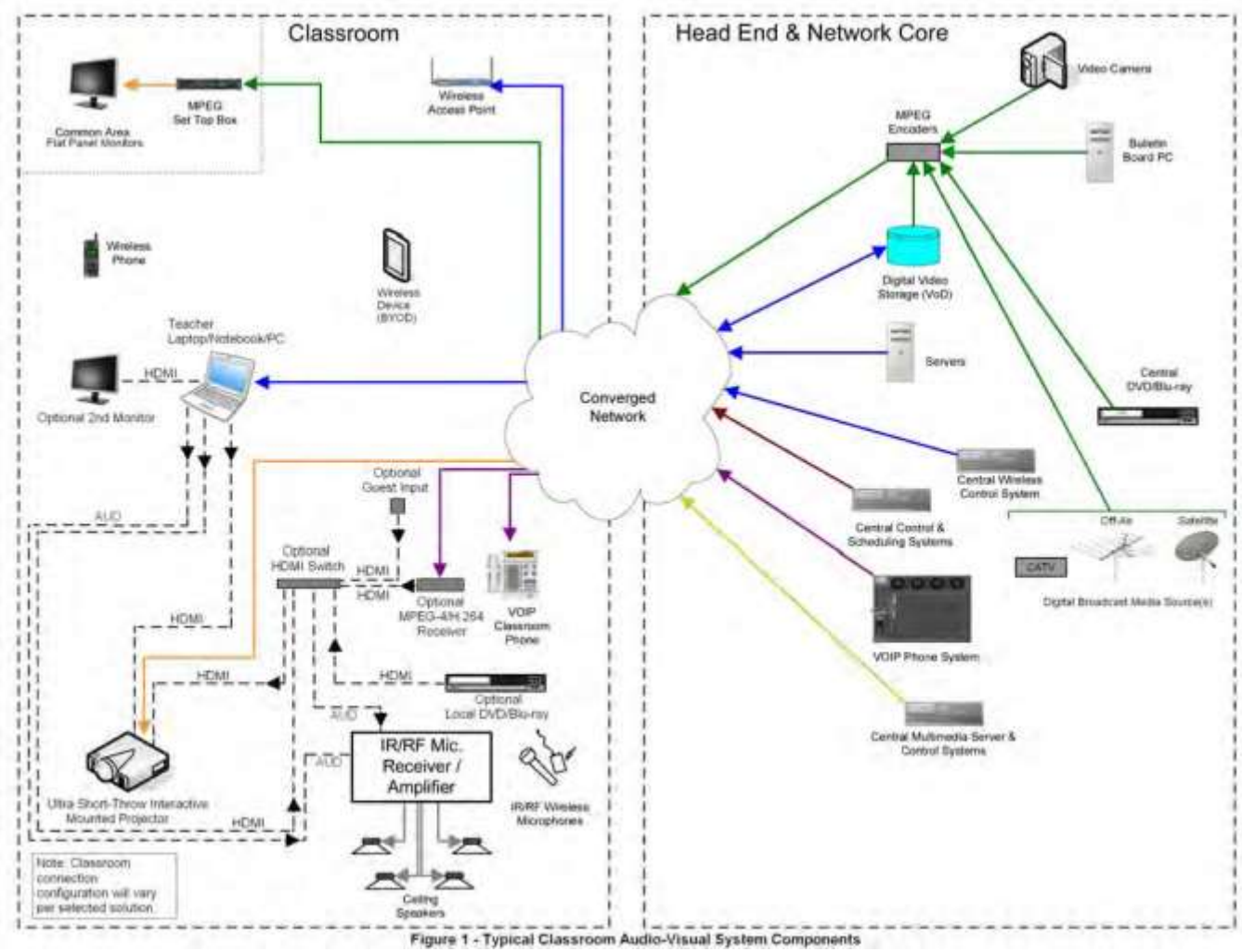

Figure 1 - Typical Classroom Audio-Visual System Components

1.5 AV INTERFACE OUTLETS

A. Each classroom/lab shall be provided with AV system interface outlets to transport digital media from and to the required AV equipment.

B. The video cabling shall utilize the appropriate media to transport digital signals including HDMI, DVI and USB. In addition, where required the cabling shall be provided to transport analog audio media, RS-232 controls and IR controls.

C. Instructor AV Interface Outlet

1. Provide Digital AV interface of HDMI or DVI for connection to the room projector or room HDMI/DVI switch. Utilize either HDMI/DVI cables, shared sheath cabling systems, or an active UTP based solution with appropriate transmitters/receivers based upon cabling distance limitations.

2. Where the room sound enhancement system is not co-located at the Instructor location, provide additional analog audio cabling to the sound enhancement system.

3. Provide interface for USB cabling to local interactive projector.

D. Guest AV Interface Outlet ***(Optional)***

1. Provide Digital AV interface of HDMI or DVI for connection to the room projector or room HDMI/DVI switch. Utilize either HDMI/DVI cables, shared sheath cabling systems, or an active UTP based solution with appropriate transmitters/receivers based upon cabling distance limitations.

E. Wardrobe AV Equipment Interface Outlet – Provide the following cables as required by room interconnectivity design

1. HDMI/DVI switch
   a. Provide Digital AV interface of HDMI or DVI for connection from the Instructor AV Interface, Guest AV Interface, local AV device (BluRay player, Set-top box) and the room projector. Utilize either HDMI/DVI cables, shared sheath cabling systems, or an active UTP based solution with appropriate transmitters/receivers based upon cabling distance limitations
2. Sound Enhancement System
   a. Provide speaker, line level audio (from Instructor AV Interface Outlet, HDMI/DVI switch) and IR sensor cabling.

3. Provide RS-232 cabling (optional) to projector for remote RS-232 to IP interface device.

F. Instructor AV Equipment Interface Outlet - Provide the following cables as required by room interconnectivity design.

1. Provide Digital AV interface of HDMI or DVI for connection from the Guest AV Interface, local AV device (BluRay player, Set-top box) and the room projector. Utilize either HDMI/DVI cables, shared sheath cabling systems, or an active UTP based solution with appropriate transmitters/receivers based upon cabling distance limitations.

2. Sound Enhancement System
   a. Provide speaker, line level audio (from Instructor AV Interface Outlet, HDMI/DVI switch) and IR sensor cabling.

3. Provide RS-232 cabling (optional) to projector for remote RS-232 to IP interface device.

G. Classroom Projector Display AV Interface Outlet

1. Provide Digital AV interface of HDMI or DVI for connection to the Instructor AV Interface Outlet, the Wardrobe AV Equipment Interface Outlet and/or the Instructor AV Equipment Interface Outlet. Utilize either HDMI/DVI cables, shared sheath cabling systems, or an active UTP based solution with appropriate transmitters/receivers based upon cabling distance limitations.

2. Provide interface for USB cabling to Instructor AV Interface Outlet

3. Provide RS-232 cabling (optional) to projector for remote RS-232 to IP interface device.

H. Public Monitor/TV AV Interface Outlet

1. Provide ***CAT 6*** network connectivity as a dual data drop.

2. Where required to have local input - Provide Digital AV interface of HDMI or DVI for connection to the Guest AV Interface Outlet, the Wardrobe AV Equipment Interface Outlet and/or the Instructor AV Equipment Interface Outlet. Utilize either HDMI/DVI cables, shared sheath cabling systems, or an active UTP based solution with appropriate transmitters/receivers based upon cabling distance limitations.

1.6 AV INTERFACE CABLES

A. Digital Video Cables

1. Provide listed cabling to support digital format such as DVI, HDMI, etc. Provide active electronics where required for selected cable distance limitations or for UTP based solutions.

2. The use of HDMI cables may present specific challenges due to the limited bending radius of the cables, the depth of the outlet boxes, and the conduit installation requirements to pull the pre-terminated cables through.

B. Line Level Audio Cable

1. Provide shielded twisted pair cable connected to Female RCA connectors (White/Red).

C. Projector Network Cable

1. Option 1 – Provide one (1) ***Category-6*** UTP cable connected to ***Category-6*** patch panel in associated Telecommunications room.

2. Option 2 – Provide one (1) RS-232 cable connected to RS-232 to IP Interface.

D. Set-Top-Box Network Cable

1. Provide one (1) ***Category-6*** UTP cable connected to ***Category-6*** patch panel in associated Telecommunications room.

E. Instructor Technology Center Network Cable

1. Provide two (2) ***Category-6*** UTP cables connected to the ***Category- 6*** patch panel in associated Telecommunications room.

F. USB Cable

1. Provide one (1) UTP to USB converter on each end with corresponding cabling to connect interactive projector and Teacher Workstation together through UTP based cabling.

1.7 VIDEO COVER PLATES

A. Plates shall be modular to fit all video jack components and shall match the associated voice/data plates.

1.8 INSTALLATION

A. Contractor shall provide and install AV Interface Wiring System.

B. Cables and associated connectors shall be terminated in accordance with industry standards.

C. Route the classroom Sound Reinforcement Amplifier IR sensor coax and associated speaker cables through faceplate to the Amplifier.

1.9 LABELING

A. Cables, jacks, system components, etc. shall be labeled according to ANSI/EIA/TIA-606 specifications and in coordination with the District/architect.

B. All Audio-Video Cables shall be equipped with a self-laminating, wrap-around, machine printed label at both ends of the cable.

1.10 TESTING

A. ***Audio-v***ideo Wiring system and associated systems shall be tested end-to-end complete.

END OF SECTION

SECTION 272100

DATA COMMUNICATIONS NETWORK EQUIPMENT

GENERAL GUIDELINES

1.1 GENERAL

A. This Section defines the general design requirements for a uniform Data Communications Network Infrastructure that shall be followed for all OFCC Technology construction projects.
   1. Refer to Section 8500, Technology Systems, and Section 8600, Electrical Systems, for additional information.

1.2 SECTION INCLUDES

A. DATA COMMUNICATIONS NETWORK EQUIPMENT
   1. File/Building Server – optional.
   2. Network Switches.
   3. Network Core Switch.
   4. Network Security Equipment.
   5. Uninterruptible Power Supplies (UPSs).

1.3 QUALITY ASSURANCE

A. All equipment shall be UL listed.

B. All equipment and Installation Practices shall comply with the latest BICSI® Telecommunications Distribution Methods Manual (TDMM).

1.4 SYSTEM WARRANTY

A. The Local Area Network Electronics and software shall be fully warranted for three (3) years from date of substantial completion by the contractor and manufacturer. If any defects are found within this warranty period, the defective system component shall be replaced at no extra cost to the Owner for parts or labor. Provide a statement of this warranty with the O&M manuals and to the Director of IT. Make available a service contract offering continuing factory authorized service of this system after the initial warranty period.

1.5 GENERAL

A. Each Building shall be provided with a Local Area Network (LAN) System.

B. Existing Facilities that are being remodeled shall be upgraded to the current requirements stated herein.

C. Single Building projects shall be compatible with the existing District Network infrastructure.

D. Wide Area Network (WAN) Interfaces shall be provided to interface the District's WAN provider. Coordinate WAN requirement with the District's fiber provider or DA- Site as applicable.

E. Buildings shall be designed as to minimize the quantity of Telecommunications Rooms and to centralize as much of the Data Network Equipment as possible.

F. Multiple buildings on the same campus should be designed to share common Data Network Electronics and equipment wherever possible.

G. Districts should design their Data Networks to take advantage of Centralization of Common Network Equipment at a Network Operations Center(s).

H. Items that should be centralized include:
1. File/Building Servers.
2. L-3 Routing Devices.
3. Network Management Equipment.
4. Security Devices, Radius Servers, etc.
5. WAN access equipment.
6. Wireless Management Equipment.

I. As a minimum, the Network may be used to support the following applications on a Local and Wide Area basis:
1. Automation Systems.
2. Clock Systems.
3. Control Systems.
4. Data Networking
5. Security Systems.
6. Video Conferencing.
7. Video Streaming/Media Retrieval.
8. VoIP Telecommunications.
9. Wireless Access Points.

1.6 FILE/BUILDING SERVER – Optional (Coordinate need with district)

A. Provide Network File/Building Server for the central administration and storage of computer files and information. The Networked Server shall be of a current design criteria, utilizing SAS 10k-15k rpm RAID level 5 hard drive storage (minimum 2TB)--Quad core processor. Coordinate OS with District. Min. 64-bit Windows Server 2008 if Windows based. Minimum 16 GB of RAM, 2 x 10Gig NIC. Attach to Core via 10 Gig DAC. 22" LED monitor, rack mounted.

B. Provide Operating System based on District requirements.

1.7 NETWORK SWITCHES

A. Provide 1000 Base T Layer 2 Manageable Ethernet Switches with ports in a quantity to support all initially planned devices, ***including wireless access points,*** with 15% spare.

B. Provide a configuration of switch ports utilizing either stackable edge switches or a modular chassis with single engine and dual PS.
1. Provide dual 10GB uplinks to each switch stack or modular chassis.

C. The 1000 switches shall be “non-blocking” and support a minimum forwarding bandwidth equal to the number of switch ports x 1 Gbps.

D. Utilize 10GB uplinks for all uplinks. Switches may be stacked, but provide each stack with a minimum of two uplinks for redundancy.

E. Chassis mounted units are acceptable for Edge Switches, provided that dual power supplies and equivalent uplink bandwidth is supplied.

F. The Network switches shall support advanced services such as:
1. IP Telephony.
2. Wireless Access Points.
3. Building Management Systems.
4. Video Streaming.
5. IP CCTV/Access Control

G. POE+ switches shall be rated to provide POE+ class 3 on all ports simultaneously. Standard 30 watts per port. ***Reference 802.3at standard.***

H. The 1000 switches shall support the following features and specifications:
1. 1000BASE-LX/LH.
2. 1000BASE-SX.
3. 1000BASE-X (SFP).
4. 1000BASE-ZX.
5. Access Control Lists (ACL).
6. Advanced QoS.
7. IEEE 802.1s.
8. IEEE 802.1D Spanning Tree Protocol.
9. IEEE 802.1p CoS Prioritization.
10. IEEE 802.1Q VLAN.
11. IEEE 802.1s.
12. IEEE 802.1w.
13. IEEE 802.1x.
14. IEEE 802.3 10BASE-T specification.
15. IEEE 802.3ab 1000BASE-T specification.
16. IEEE 802.3ad.
17. IEEE 802.3af and 802.11at POE.
18. IEEE 802.3u 100BASE-TX specification.
19. IEEE 802.3x full duplex on 10BASE-T, 100BASE-TX, and 1000BASE-T ports.
20. IEEE 802.3z 1000BASE-X specification.
21. IPv6.
22. Rapid Spanning Tree.
23. Rate Limiting.
24. RMON I and II standards.
25. SNMPv1, SNMPv2c, and SNMPv3.

I. Provide sufficient 1000 ports to accommodate, as a minimum, the following devices as required:
1. Access Control System.
2. Admin PCs.
3. Classroom PC Devices.

4. Clock Systems.
5. Distant Learning Systems.
6. Instructor PCs.
7. Monitor/TVs, as required.
8. MPEG Encoders.
9. PABX System.
10. Printers.
11. Projectors.
12. Set Top Boxes, as required.
13. UPS Units.

J. Provide ***all GB*** POE+ ports to accommodate, as a minimum, the following devices as required:
1. IP Phones
2. IP CCTV Cameras
3. WLAN access points.

1.8 NETWORK CORE SWITCH

A. Provide a modular chassis-based central Layer-3 ethernet routing switch with advanced QoS to serve the entire building or campus. The Core switch shall be provided with backplane capacity to provide full non-blocking support of all installed line cards plus 15% growth.

B. Equip the Central Layer-3 switch with a minimum of two (2) Power Supplies and two (2) Redundant Central Control/Supervisor Units.

C. All Core switch Blades must support full line speed and shall not be over-subscribed.

D. Provide sufficient Ports on the Layer-3 Core Switch, as a minimum, for the following devices:
1. Provide Network Switch uplink ports to support all edge switches plus 15% spare. The switch shall have at least one spare uplink card for redundancy.
2. Building Automation Systems, as required (typically TX).
3. CCTV DVR System (typically TX).
4. File Servers (typically TX, 10GB).
5. Firewall, as required (typically TX).
6. Media Distribution Servers & Controllers (typically TX).
7. Radius Authentication Server, as required, (typically TX).
8. WAN Connectivity (typically LX or CWDM).
9. Wireless Controllers (typically TX, 10GB).
10. Wireless Phone Controller (typically TX).
11. Wireless Control Console (typically TX).

E. In addition to the above listed features and specifications for the Network Switches, the Network Core Switch shall support the following Features and Specifications:
1. 10 Gbps Support capabilities.
2. BGP4 and Multicast Border Gateway Protocol (MBGP).
3. Full Internet Control Message Protocol (ICMP) support.
4. Hot Standby Router Protocol (HSRP).
5. ICMP Router Discovery Protocol.
6. IGMP filtering.

7. IGMP v1, v2, and v3.
8. IP Multicast routing protocols.
9. IP routing protocols: EIGRP, OSPF, Routing Information Protocol (RIP), and RIP2.
10. Non-Blocking GBE Ports.
11. NSF awareness.
12. Policy-based routing (PBR).
13. Virtual Router Redundancy Protocol (VRRP).

1.9 NETWORK SECURITY EQUIPMENT

A. RADIUS SERVER

1. If the District does not have a Central Radius Server, provide a Radius Server for Network Authentication, VLAN Assignment and Policy Assignment for IP Network Attached Devices.

B. FIRE WALL

1. If the District does not have a Central Firewall and Intrusion Detection Device for connection to the Wide Area Network and Internet, provide a Firewall and Intrusion Detection Device for Protection and Security. Establish all Internet Connections via a Firewall.
2. Size the Firewall based on planned Network throughput, available WAN bandwidth and attached IP Devices.
3. Provide VPN services in the Firewall for remote access and network maintenance services.
4. Coordinate requirements with District Technology Department.

1.10 UNINTERRUPTIBLE POWER SUPPLIES (UPSs)

A. Provide Dual Conversion UPS units for ER and TR Local area Network Electronics and File Server, providing sufficient protection from power anomalies.

B. Provide Power strips, connected to the UPS Unit via twist-lock plugs. Locate the power strips in the equipment racks and on the equipment backboards for powering all electronics systems in the ER and TRs.

C. Provide multiple UPS Units based on expected power load or a single large UPS Unit. Locate the multiple UPS units in the associated equipment racks or locate a larger central UPS unit in the Room.

D. Connect the UPS Units to Building Emergency Generator when available.

E. For buildings without a Generator, supply a two-hour (2) standby.

F. Provide shutdown connections from the UPS to servers for graceful power down in the event of a power failure.

G. Equip the UPS Units with a twist-Lock Power cable and SNMP Management Card.

H. Connect the UPS SNMP Management to the Management VLAN.

I. Coordinate UPS voltage, circuit size, and connection requirements with the Electrical Design Professional.

1.11 INSTALLATION

A. Install File Server (optional) and setup basic user accounts and network configuration.

B. Install Data Network Ethernet Switches and validate connectivity throughout. Establish all VLANs, QoS, IP Routing and IP Subnets.

C. Consult with the District and consider providing the following VLANs as a minimum:
1. Administration.
2. HVAC.
3. Management.
4. Point of Sale.
5. Student.
6. Video.
7. Voice.
8. Wireless.
9. Security, CCTV

D. Coordinate network installation and integration with other systems connected to the network with District's and applicable DA-Site's technical and operational requirements.

E. Install and setup UPS units and establish power down procedures.

F. Connect System to DA-Site WAN Links and configure as per DA-Site requirements, when applicable.

G. Program and configure any State of Ohio Educational Network ATM switches required to access the DA-Site or the State of Ohio IVDL Network.

1.12 LABELING AND MARKING

A. Provide a typed schedule of all data ports according to each related room jack designation for all TRs, and ER, in accordance with District's requirements.

1.13 TESTING

A. Test the system "end-to-end" (from TR to ER, and from TR to station jack) at the direction of the Design Professional and verify, in writing, that the data network system is in proper working condition.

B. Verify and demonstrate proper operation of all switches, Access Points, VLANs, Routing, WAN Connectivity and possible ATM Connectivity with District and DA-Site representative, if applicable.

1.14 TRAINING

A. Provide a minimum of forty (40) hours of training to the District's personnel. Plan for multiple training trips to the site. Training session(s) shall cover the following topics at a minimum:
1. System Equipment Connectivity

2. Device Configurations
3. Operation, maintenance, and upgrade procedures.

B. Training to be arranged with District personnel. 40 hours should be spread out over the length of the warranty (Ex: 8 hours at project turnover/completion, 8 hours at 3 months, 8 hours at 6 months, 8 hours at 1 year, 4 hours at 2 years, 4 hours at 3 year).

C. Training to occur in maximum of 2 hour increments per personnel or groups of personnel.

D. Consider requiring Contractor to provide manufacturer training vouchers for a portion of the training, which are valid during the warranty period.

E. Training shall be by certified manufacturer instructor.

F. Training schedule shall be coordinated with District personnel and their needs.

G. Training plan, time line, and agenda shall be provided to District IT personnel and signed off by District and Contractor.

H. Warranty certificate and agreement shall be provided to District IT personnel at initial training session.

I. Provide a digital video copy of the training sessions.

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SECTION 272133

DATA COMMUNICATIONS WIRELESS ACCESS POINTS

GENERAL GUIDELINES

1.1 GENERAL

A. This Section defines the general design requirements for a uniform Data Communications Wireless Network Infrastructure that shall be followed for all OFCC Technology construction projects.

B. Refer to Section 8500, Technology Systems, and Section 8600, Electrical Systems, for additional information.

1.2 SECTION INCLUDES

A. DATA COMMUNICATIONS WIRELESS ACCESS POINTS
1. Wireless Controllers
2. Wireless Software Management
3. Network Tracking
4. Wireless Access Points
5. Mobile Device Management
6. Application Management

1.3 QUALITY ASSURANCE

A. All equipment shall be UL listed.

B. All equipment and Installation Practices shall comply with the latest ANSI/NFPA-70 National Electric Code.

C. All equipment Installation Practices shall comply with the Local Electric Code.

D. All equipment shall comply with the latest ANSI-J-STD-607 Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications Standard.

E. All equipment and Installation Practices shall comply with the latest BICSI® Telecommunications Distribution Methods Manual (TDMM).

F. All equipment shall comply with the latest ANSI TIA/EIA-568, 569, 606, 607, 862, standards.

G. All equipment shall provide protection and containment of unwanted wireless signals and prevent student access to unwanted networks and content, in accordance with CIPA requirements.

H. All equipment shall meet or exceed ***802.11ac*** requirements.

1.4 SYSTEM WARRANTY

A. The Wireless Network Electronics and software shall be fully warranted for three (3) years from date of substantial completion by the contractor and manufacturer. If any defects are found within this warranty period, the defective system component shall be replaced at no extra cost to the Owner for parts or labor. Provide a statement of this warranty with the O&M manuals and to the Director of IT. Make available a service contract offering continuing factory authorized service of this system after the initial warranty period.

1.5 WIRELESS NETWORKING

A. GENERAL

1. Design Wireless System for full building coverage and to assure coverage for ubiquitous high density coverage for an average of 15-20 users per AP in educational areas and standard high density coverage throughout the remainder of the building, as per parameters in this specification.
2. Design Wireless System with 30% growth factored.
3. Design shall allow for additional bandwidth growth and shall be capable of limiting the bandwidth used by each device
4. Design shall provide for multi-state radios that can be switched from 2.4GHz to 5GHz
5. System shall allow bandwidth limits and time of day restrictions to be placed on particular users or particular device types
6. System shall allow network administrators to set QoS parameters for different traffic types
7. Provide ***802.11ac*** Wireless Access Points, management software and associated Wireless Network Controller(s), to support wireless Network Devices and Phones throughout the building and the associated campus.
8. Provide a ***shielded*** CAT 6A horizontal data cable drop for each AP. Terminate the AP Cable drop on a Patch Panel at the associated Telecommunication Room (TR).
9. Connect the AP to the IP Network via an IEEE ***802.3at*** Power Over Ethernet ***(POE+)*** 1 Gbps Switch Port.
10. Coordinate 802.31x, VLAN and Security Settings/Requirements with the District.
11. Shall provide proper network authentication and authorization
12. Security shall have the ability to check antivirus software
13. Wireless network management shall utilize the same firewall, NAC, and RADIUS as the LAN
14. System shall allow different user groups to be created with each group mapped to specific VLANS, access control list, and QoS parameters
15. System shall provide device fingerprinting identifying devices operating systems such as iOS, Microsoft Windows, Blackberry, or Android and shall classify the device type such as tablet, laptop, or smartphone.
16. Once the system has identified the device, a policy can be applied to control a device's reach and behavior
17. The device ID along with the user ID shall be used together to map that instance to a specific user group
18. Provide Wireless coverage for the entire building and associated perimeter area.
19. Provide minimum of -65 dB signal level ***and minimum 36dB SNR*** at all locations in building for ***802.11ac*** coverage.
20. Provide a minimum of 7 Mbps throughput per user.
21. Technology Designer shall verify quantity of users with the District.

22. Supply sufficient Access Points to provide for expected throughput and load sharing.
23. Users can "see" at least 3 Access points to provide for load sharing and balancing.
24. Wireless system shall have full multi-media capabilities by integrating:
    a. 802.11e
    b. WMM
    c. QoS
    d. Stateful Firewall
    e. Wired to wireless mapping and traffic management services based on device, user and/or traffic types. This includes priority queuing for multiple traffic types as well as multicast snooping and pruning.
    f. All APS/Arrays shall provide the ability to optimize multicast traffic by converting to unicast and/or optimize multicast traffic transmit rates to better match speeds of connected users.
25. Wireless system shall provide the following security functions:
    a. Dedicated 24/7 threat sensor radio
    b. Stateful firewall
    c. Integrated RADIUS
    d. Integrated ACLs, 802.11i, 802.1
    e. Line rate encryption, no matter the traffic volume of encryption protocol in use.
26. Wireless Design Validation
    a. During Design Phase, the Technology Designer shall utilize WLAN modeling software to plan the wireless access point deployment in a building and/or campus.
    b. The Technology Designer shall submit a predictive analysis survey via use of WLAN modeling software, along with the OFCC DD and CD technology phase submissions for review.
    c. As a minimum, this analysis shall indicate protocol, through-put and client density.
    d. The WAP quantity and layout shall be based on this modeling.
    e. Predictive analysis survey modeling shall be performed for 2.4 Ghz and 5 Ghz. Include both results in the submittal.
27. Wireless Installation Validation
    a. Prior to installation of cabling for Access Points, the contractor shall perform an on-site Validation Survey. This survey shall be utilized to obtain actual site conditions including RF environment and RF properties of the construction. Prepare an AP placement plan utilizing the Validation Survey information and using the AP controllers "planning" tools. Provide a report to the Owner and Technology Designer for review and approval.
    b. After complete install of all AP's, perform a final survey and tune/optimize the system, ***while the building is occupied,*** to verify coverage. Move any AP's required to guarantee that coverage and performance requirements are met. Provide final report to the Owner and Technology Designer for review and approval.
28. Coordinate with local Law Enforcement and Safety Forces regarding their requirements for remote and wireless access into building Security and Energy Management Systems.
29. Law Enforcement and Safety Forces shall be responsible for providing their own remote access equipment.

B. CABLING INFRASTRUCTURE FOR WIRELESS LOCAL AREA NETWORK
1. Shall consist of single mode fiber for the backbone to enable 10Gig backbone and provide upgradability for future.
2. Shall utilize ***shielded*** CAT 6A horizontal cable solution.
3. Baseline includes ***shielded*** CAT6A cable to each classroom. Wireless design will determine quantity and placement of WAP's.
4. Shall utilize 1 Gig uplink to the switch and a 10 Gig uplink to the headend equipment.

C. WIRELESS SYSTEM SPECIFICATIONS
1. RF Management
2. In-band per IAP Spectrum Analysis
3. Dynamic Channel Configuration
4. Dynamic Cell Size Configuration
5. Monitor radio for threat assessment and mitigation
6. Wired and Wireless Packet Captures (including all 802.11 headers)
7. Radio Assurance for radio self test and healing
8. RF Monitor
9. High Availability Supports Hot Stand-By for mission critical areas
10. Supports ability to turn off radios based on schedule configuration

D. WIRELESS PROTOCOLS
1. IEEE 802.11
2. IEEE 802.11 a
3. IEEE 802.11 b
4. IEEE 802.11 d
5. IEEE 802.11 e
6. IEEE 802.11 g
7. IEEE 802.11 h
8. IEEE 802.11 i
9. IEEE 802.11 j
10. IEEE 802.11 n
11. ***IEEE 802.11ac***

E. WIRED PROTOCOLS
1. IEEE 802.1p – Layer 2 Traffic Prioritization
2. IEEE 802.1q – VLAN Tagging
3. RFC Support
4. RFC 768 UDP
5. RFC 791 IP
6. RFC 2460 IPV6 (Bridging only)
7. RFC 792 ICMP
8. RFC 793 TCP
9. RFC 1122 Requirements for Internet Hosts – Communication Layers
10. RFC 1542 BOOTP
11. RFC 2131 DHCP

F. SECURITY
1. IEEE 802.11iWPA2, RSN
2. RFC 1321 MD5 Message-Digest Algorithm
3. RFC 2246 TLS Protocol Version 1.0
4. RFC 3280 Internet X.509 PKI Certificate and CRL Profile
5. RFC 4347 Datagram Transport Layer Security

6. RFC 4346 TLS Protocol Version 1.1
7. WEP
8. WPA™ – Personal
9. WPA™ – Enterprise
10. WPA2™ – Personal
11. WPA2™ – Enterprise
12. EAP Type(s)
13. EAP-TLS
14. EAP-TTLS/MSCHAPv2
15. PEAPv0/EAP-MSCHAPv2
16. PEAPv1/EAP-GTC
17. Encryption Type
18. Open
19. WEP
20. TKIP-MIC: RC4 40, 104 and 128 bits
21. SSL and TLS: RC4 128-bit and RDA 1024 and 2048 bit

G. AUTHENTICATION
1. IEEE 802.1x
2. RFC 2548 Microsoft Vendor-Specific RADIUS Attributes
3. RFC 2716 PPP EAP-TLS
4. RFC 2865 RADIUS Authentication
5. RFC 2866 RADIUS Accounting
6. RFC 2867 Tunnel Accounting
7. RFC 2869 RADIUS Extensions
8. RFC 3576 Dynamic Authorizations Extensions to RADIUS RFC 3579 **RADIUS Support for EAP**
9. RFC 3748 Extensible Authentication Protocol
10. Web Page Authentication
11. WPR, Landing Page, Redirect
12. Support for Internal WPR Landing Page and Authentication
13. Support for External WPR, Landing Page, and Authentication

H. CHANNEL SUPPORT 2.4GHz
1. ***1 2 3 4 5 6 7 8 9 10 11 12 13 14***

I. CHANNEL SUPPORT 5GHz
1. Uni 1 – Non-DFS Channels
2. ***36 40 44 48***
3. ***UNI I DFS Channels***
4. ***52 56 60 64***
5. ***UNI II DFS Channels***
6. ***100 104 108 112 116 120 124 128 132 136 140***
7. ***UNI III Non-DFS Channels***
8. ***149 153 157 161 165***

J. MANAGEMENT INTERFACES
1. Command Line Interface via serial console, SSHv2, Telnet
2. Web interface (http / https)

K. MANAGEMENT
1. SNMP v1, v2c, v3

2. *RFC 854 Telnet*
3. *RFC 1155 Management Information for TCP/IP Based Internets*
4. *RFC 1156 MIB*
5. *RFC 1157 SNMP*
6. *RFC 1213 SNMP MIB II*
7. *RFC 1350 TFTP*
8. *RFC 1643 Ethernet MIB*
9. *RFC 2030 Simple Network Time Protocol SNTP*
10. *RFC 2616 HTTP 1.1*
11. *RFC 3636 Definitions of Managed Objects for IEEE*
12. *RFC 2674 Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering, and Virtual LAN Extensions*
13. *RFC 2819 Remote Network Monitoring Management Information Base*
14. *RFC 2863 The Interface Group MIB*
15. *RFC 3164 BSD Syslog Protocol*
16. *RFC 3414 User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)*
17. *RFC 3418 Management Information Base (MIB) for the Simple Network Management protocol (SNMP)*

L. RADIO OPTIMIZATION MANAGEMENT

1. *Shall individually control band selection (2.4GHz or 5GHz), transmit power, and channel allocation.*
2. *Shall have option of controlling band selection either automatically or manually.*
3. *Shall support Auto Channel which provides an automatic means of allocating Wi-Fi channels between radios in a deployment.*
4. *Shall provide Auto Channel. System scans the RF environment on a radio-by-radio basis, coordinated among all AP's/Arrays in the network, to determine the best channel of operation per radio.*
5. *Auto Channel function shall be scheduled periodically to tune the design in response to potential environmental changes.*
6. *Shall support Auto Cell – an automatic, self-tuning mechanism that balances cell size between AP's/Arrays. Shall ensure sufficient coverage while limiting the RF energy that would extend beyond the organizational boundary between AP's/Arrays.*

M. RESOURCE ASSURANCE MANAGEMENT

1. *Shall continuously monitor wireless client behavior for potential issues.*
2. *If a client is detected encountering connectivity or performance issues, a notification is logged.*
3. *Elements to be monitored:*
   a. *Authentication failures*
   b. *Packet error rates*
   c. *Packet retry rates*
   d. *Data rates*
   e. *Signal strength*
   f. *Signal-to-noise ratio*
4. *Shall execute local testing of radio resources and self-healing to ensure wireless service availability.*

5. ***The monitor radio shall periodically function as a wireless client and connect to each of the user servicing radios. If a problem is detected, multiple options for action may be taken, including logging a notification or resetting the radio itself.***
6. ***Network Assurance shall actively monitor the status of key network elements, including the Gateway, RADIUS servers, NTP servers, SNMP trap hosts, and DNS servers. If any of these are unreachable, a notification is logged.***
7. ***The System shall be optionally configured to disassociate users proactively if network resources are not available so that clients do not remain connected wirelessly with no network service.***

N. DEVICE OPTIMIZATION MANAGEMENT

1. ***Wi-Fi devices shall be identified by type upon connecting to the network, e.g. laptop, tablet, smartphone, gaming device, etc.***
2. ***This information is then used to map the device to specific resources as desired. Dedicated radios and wireless networks (SSIDs) can be assigned to devices that need high bandwidth or are operating in a specific mode.***
3. ***Shall provide Station Load Balancing.***

O. SECURE WIRELESS NETWORK

1. ***Shall perform packet encryption and decryption. All encryption processes are performed at line-rate in hardware.***
2. ***Wireless encryption supported shall include the standard three encryption options:***
   a. ***Wi-Fi Protected Access with AES***
   b. ***Wi-Fi Protected Access (WPA & WPA2)***
   c. ***WEP-40 bit or WEP-128bit – only use this for legacy devices that cannot support a stronger encryption type***
3. ***Should also support TKIP and AES protocols simultaneously on the same SSID to support mixed and dynamic client environments.***
4. ***Shall include PCI and FIPS140-2 audit modes of operation to monitor for compliance.***
5. ***Shall monitor, detect, mitigate and report on active or potential wireless threats to your network. These include:***
   a. ***Dedicated threat sensor radio, depending on network design, for complete 24x7 IDS/IPS coverage of the RF environment.***
   b. ***Continuous 24x7 monitoring of the wireless RF environment.***
   c. ***Detection of potential rogue or malicious APs, ad hoc, and stations.***
   d. ***Rogue device classification***
   e. ***Automatic alerts, alarms, and logging of rogue devices.***
   f. ***Key rogue device information such as first seen, last seen, manufacturer, SSID, and channel.***
   g. ***Automatic shielding of rogue devices by Array radios to contain threatening devices when detected, while still scanning for new threats.***
6. ***Ensures compliance with wireless security policies and regulations through automated reporting.***
7. ***Continuously monitor all 802.11 channels for throughput, signal, noise, errors, and interference levels continually per channel.***

8. ***Administrators centrally collect data from their desk and monitor the entire network at one time.***
9. ***Monitor all 802.11 channels, not just the ones that are currently being used for data traffic.***
10. ***Provides device locating via analysis of Received Signal Strength Indication (RSSI) data collected by radios. This capability is available via the CLI, WMI, and XMS interfaces/applications at different levels of functionality.***
11. ***Use integrated directional antennas on each radio, providing angle of orientation information about device location in addition to estimated distance based on RSSI level.***
12. ***Both associated and unassociated stations can be located in this fashion.***
13. ***Aggregate data from multiple AP's/Arrays to determine device positioning. Multi-AP/Array design provides for even greater accuracy than single AP/Array methods.***
14. ***Locating in normal conditions shall provide accuracy within a 5-meter radius or better.***
15. ***User access control protocols and features designed to classify, assign, and monitor associated and unassociated clients. These include:***
    a. ***RADIUS 802.1x***
    b. ***Fully support 802.1x authentication servers***
    c. ***MAC Access Control Lists (ACLs) supports 512 ACL entries***
    d. ***Web Page Redirect (Captive Portal) capabilities***
    e. ***Web-based authentication against internal or external RADIUS server***
    f. ***Local host or remotely hosted web page redirect (log-in/splash screen)***
    g. ***Configure splash screen time-out***
16. ***Failover capability by allowing the specification of primary and secondary RADIUS servers and timeout values.***
17. ***Each SSID can specify a unique RADIUS server set enabling each SSID independent authentication control.***
18. ***Each SSID can define limits for users based on time of day, day of week, and traffic volume.***
19. ***Identify devices by operating systems, such as iOS®, Microsoft®, BlackBerry®, or Android™***
20. ***Identify devices by type, such as tablet, laptop or smartphone.***
21. ***The device ID, along with the user ID, can be used together to map the device to a policy to control a user's reach and behavior.***

P. LOCATION SERVICES

1. ***Provide Wi-Fi client location services across the entire wireless network using a Management System. Each AP provides a signal reading for each client, and the direction of the antenna provides information about the direction of the client relative to the AP/Array.***
2. ***Mapping – Based on RF settings and properties of the environment, the management software shall generate heat maps showing RF coverage patterns across the environment.***

3. ***Asset Tracking – Can have the ability to track assets across a wide variety of devices and use cases. Devices can be tracked to within 3-5 feet accuracy.***

Q. GUEST SERVICES

1. ***Web Page Redirect (WPR) allows a guest to be presented with a web browser welcome screen before gaining access to the wireless network.***
2. ***Directory Integration – Shall integrate with the same systems used for the wired network.***
3. ***Policy Management – Bandwidth limits can be configured to ensure guest users do not overrun educational staff and student traffic usage. Restrictions can be placed on time of day access and day of the week access. Policies can be set to enforce use policies for different device types. Policies can be set and enforced on a user, role, device, and time basis.***

R. VOICE AND MULTI-MEDIA SUPPORT (QoS)

1. ***Optimize application support so all standard QoS (802.11e) and Wireless Multi-Media (WMM) features including multiple traffic queues (4) and packet level identification of voice traffic. Wired to wireless QoS mapping (802.11p/q) support. Separate protocol support for the leading providers of 802.11 handsets.***
2. ***Enable end-to-end QoS support and tag 802.1P packets.***
3. ***Shall have multicast-to-unicast conversion and IGMP snooping to optimize the performance of multicast in a Wi-Fi environment. IGMP (Internet Group Management Protocol) is used to establish and manage the membership of multicast groups. The following configuration options are available:***
   a. ***Send multicasts unmodified***
   b. ***Convert to unicast and send unicast packets to all stations***
   c. ***Convert to unicast, snoop IGMP, and only send to stations subscribed (send as multicast if no subscription).***
   d. ***Convert to unicast, snoop IGMP, and only send to stations subscribed (don't send packet if no subscription).***
4. ***Each SSID can define separate traffic controls based on business requirements, including QoS (VoIP) and QoS tags can also be updated based on policy rules via the integrated Stateful firewall.***

S. MOBILE DEVICE MANAGEMENT

1. ***Provide a high level of flexibility in allocating Wi-Fi users and devices among system resources to optimize overall performance.***
2. ***Wi-Fi devices shall be identified by type upon connecting to the network (e.g. laptop, tablet, smartphone, gaming device).***
3. ***Dedicated radios and wireless networks (SSIDs) can be assigned to devices that need high bandwidth or are operating in a specific mode. Coordinate with Owner.***
4. ***Based on device type, specific policies can be applied such as bandwidth restrictions, application types, and time restrictions. Coordinate with Owner.***

5. Resources can also be allocated based on device performance ensuring the performance of faster device types (e.g. ***802.11ac***) are not negatively impacted by slower device types (e.g. 802.11b). Coordinate with Owner.
6. Users can be assigned to specific resources based on not just login information, but also client type and class. Identify the devices' operating systems such as iOS®, Microsoft® Windows®, BlackBerry®, or Android™ and can then classify the device type such as tablet, laptop, or smartphone. Once the device has been identified, a policy can then be applied to control a user's reach and behavior. The device ID, along with the user ID, can be used together to map that instance to a specific user group.
7. Allow different user groups to be created with each group being mapped to specific VLANs, access control list, and QoS parameters.

T. WIRELESS CONTROLLERS AND LOCATION TRACKING
1. Equip each building with a Wireless Controller(s). Provide Location Tracking as an option. This may be a separate appliance or software upgrade to wireless controller(s).
2. These devices shall be directly attached to the associated L-3 Network Core Switch via 10 Gigabit interfaces as required.
3. Shall adhere to all requirements in the aforementioned sections.
4. Hosted Control Systems can be utilized as long as all required features are provided as well as a minimum 5 years of licensing.

U. WIRELESS ACCESS POINTS
1. Provide centrally powered IEEE ***802.11ac*** Wireless Access Points (APs) for each new and remodeled building.
2. Each Access Point shall support a minimum of 14 VoWLAN Phones and dynamically throttle back non-VoIP traffic.
3. Place and dimension the number of Access Points based on required throughput, load balancing and location tracking.
4. Shall adhere to all requirements in the aforementioned sections.

1.6 INSTALLATION

A. Contractor shall provide and install Wireless System and associated cabling, POE devices, Central Controllers and Console.

B. The Building Floor Plans and Site Plans shall be entered into the Central Wireless Control Console.

C. The Central Wireless Control Console floor and site plans shall be calibrated after the installation has been performed.

D. Access Point cables and associated connectors shall be terminated in accordance with industry standards.

E. Balance Wireless Access Points to insure complete coverage with minimal service degradation.

F. Setup Wireless Access Security and provide for CIPA Compliance.

G. Determine the optimum location of all devices in the wireless LAN coverage areas and consider the access point density and location.

H. Locate all internal Access Points above the ceiling tile grid wherever possible.

I. Provide Antennas mounted external to the building for coverage of areas surrounding the building such as: playgrounds, parking lots, athletic fields, etc.

J. Connect the external antennas to APs mounted inside of the building.

1.7 LABELING

A. Cables, jacks, system components, etc. shall be labeled according to ANSI/EIA/TIA-606 specifications and in coordination with the District requirements.

B. All AP Cables shall be equipped with a self-laminating, wrap-around, machine printed label at both ends of the cable.

1.8 TESTING

A. Perform complete site survey after system placement and verify coverage and throughput to comply with the specifications and to optimize the system.

1.9 TRAINING

A. Provide a minimum of ***forty (40)*** hours of training to the District's personnel and/or designated representative. Plan for multiple training trips to the site. Training session(s) shall cover the following topics at a minimum:
   1. System Equipment Connectivity
   2. Device Configurations
   3. Operation, maintenance, and upgrade procedures.

B. Training to be arranged with District personnel. 40 hours should be spread out over the length of the warranty (Ex: 8 hours at project turnover/completion, 8 hours at 3 months, 8 hours at 6 months, 8 hours at 1 year, 4 hours at 2 years, 4 hours at 3 year).

C. Training to occur in maximum of 2 hour increments per personnel or groups of personnel.

D. Consider requiring Contractor to provide manufacturer training vouchers for a portion of the training, which are valid during the warranty period.

E. Training shall be by certified manufacturer instructor.

F. Training schedule shall be coordinated with District personnel and their needs.

G. Training plan, time line, and agenda shall be provided to District IT personnel and signed off by District and Contractor.

H. Warranty certificate and agreement shall be provided to District IT personnel at initial training session.

I. Provide a digital video copy of the training session.

END OF SECTION

SECTION 273113

IP-ENABLED PABX SYSTEM

GENERAL GUIDELINES

1.1 GENERAL

A. This Section defines the general design requirements for a uniform IP-Enabled PABX System that shall be followed for all OFCC Technology construction projects.
B. Refer to Section 8500, Technology Systems for additional information.
C. An IP-Enabled PBX shall only be specified for projects that are expanding or extending existing systems.

1.2 SECTION INCLUDES

A. Central IP-Enabled PABX.
B. Attendant Console Terminal.
C. Executive Display Digital Voice Terminal.
D. Standard Display Digital Voice Terminal.
E. Single Line Voice Terminal.
F. Voice Mail with Automated Attendant.
G. E-911 Console.
H. Uninterruptible Power Supply (UPS)

1.3 QUALITY ASSURANCE

A. All equipment shall be UL listed.
B. Compliance with the National Electric Code.
C. Compliance with FCC rules.
D. Comply with latest NENA E-911 requirements.

1.4 SYSTEM WARRANTY

A. ***The IP Enabled PABX System and software shall be fully warranted for three (3) years from date of substantial completion by the contractor and manufacturer. If any defects are found within this warranty period, the defective system component shall be replaced at no extra cost to the Owner for parts or labor. Provide a statement of this warranty with the O&M manuals and to the Director of IT. Make available a service contract offering continuing factory authorized service of this system after the initial warranty period.***

1.5 GENERAL REQUIREMENTS

A. Each Building's telephone system must provide the following minimum requirements:
1) Support for E-911.
a. ***Allow the caller to be located down to the specific office/room on a particular floor of a building.***
2) Support for the following carrier and Inter-switch interfaces:
a. Digital (T-1, PRI).
b. Session Initiation Protocol (SIP).
c. Analog (POTS) lines.

d. Provide carrier circuit interfaces adequate to handle ALL incoming and outgoing calls.

3) Support for Direct inward Dialing (DID).

4) Support for the following endpoints (phones/devices):
   a) Digital (TDM)
   b) IP (must support non proprietary H.323 and SIP compliant devices).
   c) Analog (phones/faxes etc.)
   d) Endpoints that provide "full duplex speakerphone" capability must be provided in specific rooms.
   e) Provide system with capacity for all endpoints required plus 10% spare.

5) Provide support for a minimum of two (2) fax stations per building.

6) Provide UPS.

B. System to have maintenance and administration terminal and remote access capabilities.

C. A common Telephone Switching Platform shall be used across the District to insure inter-operability. In the event that the District already has an established Telephone System that meets OFCC requirements, additional buildings may be added to the District, specifying existing Vendor's system.

D. In the event that no standard system exists for the District, then the OFCC PA shall decide if the first systems bid establish a critical mass and if the multiple vendor requirement can be waived.

1.6 WORK BY LOCAL UTILITIES

A. Coordinate all work with the local and long-distance Service Providers (SPs).

1.7 IP-ENABLED PABX

A. The Central Switching Exchange shall be a fully-digital, IP-Enabled (minimum) PBX Telephone Switch. Key Systems and hybrid intercom/telephone systems will NOT be acceptable.

B. The IP-ENABLED PABX must be modular in design.

C. The IP-ENABLED PABX shall be sized according to student population and traffic requirements and shall be equipped with carrier circuit interfaces for incoming/outgoing call lines. The minimum circuits shall be as follows:
   1. One PRI or equivalent SIP trunk for up to 100 stations.
   2. Two PRIs or equivalent SIP trunks for greater than 100 stations.
   3. Additional PRIs or equivalent SIP trunks based on traffic requirements.
   4. The use of analog central office (CO) line interface is acceptable if system is supporting existing analog phone service and as long as adequate line capacity is provided to support call traffic. System must still include digital carrier interface for future growth.

D. The IP-ENABLED PABX shall be equipped with full Name and Number Caller ID functions for incoming and outgoing calls.

E. The IP-ENABLED PABX must be equipped with a minimum of three (3) analog lines to the local Service Provider for E-911 services and PRI backup.
   1. ***Allow the caller to be located down to the specific office/room on a particular floor of a building.***

F. Connect the Analog Lines to a Power Failure Transfer (PFT) Unit and supply a minimum of three (3) analog phones, located in the Central Office Area for emergency operation.

G. The telephone system must have the following minimum features:

1) Access Codes.
2) Attendant's Console.
3) Automatic Location Identifier (ALI).
4) Automatic Number Identification Support (ANI).
5) Call Accounting Software and Hardware.
6) Call Conferencing.
7) Call Forwarding on Busy.
8) Call Forwarding External Calls
9) Call Forwarding Internal Calls.
10) Call Hold.
11) Call Pickup.
12) Call Screening.
13) Dialed Number Identification Service (DNIS).
14) Direct Inward Dialing (DID).
15) Distinctive ring tones.
16) Do Not Disturb
17) E-911 and latest NENA support.
18) E-911 Call Recording and Bridging to E-911 Central Console.
19) FCC Registration.
20) Full Caller ID – Incoming/Outgoing.
21) Full duplex, Digital Display, Speaker Phones.
22) Hands Free Intercom – Phone-to-Phone.
23) IEEE 802.3af compliant VoIP Power
24) Least Cost Routing.
25) Maintenance and Administration Terminal.
26) Malicious Call Trace/Hold.
27) Message Waiting Lamp.
28) Paging Interface (minimum 6 zones).
29) Minimum of eight (8) Pre-program buttons.
30) PRI/T-1 Trunking.
31) Remote diagnostics.
32) SIP Signaling Protocol
33) Standards Based, VoIP Phone Support.
34) Support wireless 802.11 VoWLAN phones
35) System Speed Dial.
36) Unified Messaging.
37) VoIP Trunking – H.323 and SIP.

H. Inter-Building Trunks (Links) between Systems shall be designed using T-1 Lines, PRI Lines or VoIP Trunking. A minimum capacity of 23 inter-building links shall be provided. Dimension all Trunks based on a minimum of P=0.01 Grade of Service.

I. When a high-speed WAN connection exists, use a VoIP connection between buildings.

J. Design the District-Wide system to provide for Least-Cost Routing and Toll-Bypass when applicable. Supply additional PRI circuits as required.

K. Provide IEEE 802.3af compliant Power Injectors/switches for all VoIP Phone instruments.

L. Each District Building's IP-ENABLED PABX shall be capable of complete stand- alone operation (with the exception of centralized voicemail) in the event that the Inter-Building Trunks (Links) are not operational.

M. District-Wide Systems shall function as a single system with Common Features, Centralized Voice Mail, and Centralized Call Detail Recording with a single record per call and the ability for Centralized Attendant Service for the entire District.

N. When more than one building per District is involved, all incoming and outgoing calls may be routed over carrier circuits connected to a Central IP-Enabled PABX. The Central IP-ENABLED PABX capacity shall be dimensioned to handle all current and planned District buildings.

O. IP-ENABLED PABX units shall employ a hardened Operating System that is not susceptible to Internet Computer Viruses.

P. IP-ENABLED PABX units shall be provided with a minimum of 10% spare line/station capacity at initial installation.

Q. The PABX shall be an IP-Enabled PABX or an IP Based PABX. The all IP Based system shall maintain the same high level of functionality, redundancy and programmable features as originally specified. Any all-IP system shall employ standards based signaling, instrument powering and redundant call servers in each District Building served by the system. See Section 273123 for additional details.

R. Provide centralized PABX and phone instrument power with a minimum of two (2) Busy-Hour standby capabilities for all PABX equipment. IP Based systems shall also be provided with two (2) Busy-Hour standby capabilities for all powered Switches or Patch Panels located in each Telecommunications Room (TR). Connect the Central Power Supplies to Building Emergency Power when available.

S. All IP Instruments and power sources shall be IEEE 802.3af compliant.

T. All PABX systems shall support IP Inter-building trunking (H.323 or SIP) and the attachment of IP Instruments such as IP Phones, PDAs, Soft Phones and 802.11 Phones.

U. As a minimum, the Call Accounting shall include date, time, duration of call, extension number, account code (if applicable) and number dialed along with software export features to standard spread sheets.

1.8 ATTENDANT CONSOLE TERMINAL

A. Minimum of 32 Character LCD Display.

B. Display day, date and time.

C. Display call durations.

D. Display caller name and extension/telephone number and incoming caller-ID information.

E. Hands free, Full-Duplex, Speakerphone.

F. Shall have a system display panel capable of showing all system extension numbers and their status and capable of extending calls via single touch operation.

G. Provide a minimum of two (2) consoles per building for load sharing and redundancy.

1.9 ADMINISTRATIVE DISPLAY DIGITAL VOICE TERMINAL

A. Provide one administrative phone for all administrative areas, conference rooms, small group rooms, nurse/health office, and special needs rooms.

B. At least sixteen characters display window.

C. At least sixteen programmable keys.

D. Hands free, Full-Duplex Speakerphone.

E. Display caller name and extension/telephone number.

F. Message Waiting Lamp.

G. Pre-programmed E-911 button that automatically puts the phone into a hands-free mode, and initiates a 3-way conference call with the central console, as well as the local 911 center.

1.10 STANDARD DISPLAY DIGITAL VOICE TERMINAL

A. Provide one standard 8 button phone for all classrooms, labs, general offices, and other areas not covered above in section 1.9.

B. At least sixteen characters display window.

C. At least eight (8) programmable keys.

D. Hands free, Speakerphone. Full Duplex required if One Way Paging Variance is utilized.

E. Display caller name and extension/telephone number.

F. Message Waiting Lamp.

G. Pre-programmed E-911 button that automatically puts the phone into a hands-free mode, and initiates a 3-way conference call with the central console, as well as the local 911 center.

1.11 CONFERENCE PHONE

A. As a minimum, provide Multi-User, Full-Duplex conference Speakerphone for Conference Rooms and/or Principal's Office.

1.12 VoWLAN PHONES

A. Provide a minimum of two Wireless VoIP (VoWLAN) Phone instruments, with carrying case and charger units.

B. Provide integral VoWLAN 802.11e QoS capability or SVP server for VoWLAN QoS.

1.13 VOICE MAIL SYSTEM

A. System shall have the following number of voice ports:
1) Minimum of 4 ports (450 students).
2) Minimum of 8 ports (650 students).
3) Minimum of 12 ports (850 students).

B. System shall have the following capacity:
1) One voice mail box per station plus 20% minimum spares.

C. System shall have an automated attendant.

D. System shall be fully integrated with IP-Enabled PABX.

E. System shall activate telephone station "message waiting" light.

F. System shall have Integrated Messaging capability. Supply based on District's requirements. Verify E-Mail Server compatibility (Exchange, Notes, Groupwise, etc.)

1.14 E-911 CONSOLE

A. System shall support Call Bridging at Console for all E-911 calls.

B. System shall provide Call Recording for E-911 Calls.

C. System shall support full NENA Compliant ANI and ALI data transmission from local Data Base to PSAP.
1) Allow the caller to be located down to the specific office/room on a particular floor of a building.

1.15 UNINTERRUPTIBLE POWER SUPPLIES (UPS)

A. Provide Dual Conversion UPS units for Main Telephone Switch, providing sufficient protection from power anomalies for two (2) busy hours.

B. Provide multiple UPS Units based on expected power load or a single large UPS Unit. Locate the multiple UPS units in the associated equipment racks or locate a larger central UPS unit in the Room.

C. Connect the UPS Units to Building Emergency Generator.

D. For buildings without a Generator, supply a four-hour (4) standby.

E. Provide shutdown connections from the UPS for graceful power down in the event of a power failure.

F. Equip the UPS Units with a twist-Lock Power cable and SNMP Management Card.

G. Connect the UPS SNMP Management to the Management VLAN.

H. Coordinate UPS voltage, circuit size, and connection requirements with the Electrical Design Professional.

1.16 INSTALLATION

A. Coordinate complete system installation, and Technology Head End Integration with District and other Technology Trades.

B. Coordinate installation and interconnect with local and long-distance Service Provider (SP). Contractor shall be responsible for all final cross connects and system Data Base loading and verification.

C. Contractor shall connect to, and interface with the in-house paging system and provide paging from any telephone handset.

D. Connect system to IP Data Network and program required VLANs and 803.11e support.

E. Interconnect with existing systems via VoIP trunking.

F. Integrate system with District's Numbering Plan.

1.17 SYSTEM PROGRAMMING

A. Contractor shall provide the District/architect with a complete set of forms for the entire system and extension features for final programming.

B. Final programming of the system shall be co-developed between the District/architect and the contractor and must be approved prior to being implemented for system tart-up.

C. tractor shall supply the "latest" software updates as part of the system configuration or ***three (3)*** years after system acceptance.

1.18 TRAINING

A. Provide a minimum of forty (40) hours of training to the District's personnel. Plan for multiple training trops to the site. Training session(s0) shall cover the following topics at a minimum:

1. System Equipment Connectivity

2. Device Configurations

3. Operations, maintenance, and upgrade procedures.

B. Training to tbe arrange with District Perconnel. 40 hours should be pread out over the length fo the warrany (Ex: 8 hours at project turnover/completion, 9 hours at 3 months, 8 hours at 6months, 8 hours at 1 year, 4 hours at 2 year, 4 hours ar 3 year.).

END OF SECTION

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SECTION 273123

IP ONLY PABX SYSTEM

GENERAL GUIDELINES

1.1 GENERAL

A. This Section defines the general design requirements for a uniform IP ONLY PABX System that shall be followed for all OFCC Technology construction projects.

B. Refer to Section 8500, Technology Systems, 27 13 13, Copper Back Bone Systems and 27 31 13, IP-Enabled PABX System for additional information.

1.2 SECTION INCLUDES

A. Central IP PABX.

B. Attendant Console Terminal.

C. Executive Display Voice Terminal.

D. Standard Display Voice Terminal.

E. Single Line Voice Terminal.

F. Voice Mail with Automated Attendant.

G. E-911 Console.

H. Uninterruptible Power Supply (UPSs).

1.3 QUALITY ASSURANCE

A. All equipment shall be UL listed.

B. Compliance with the National Electric Code.

C. Compliance with FCC rules.

D. Comply with latest NENA E-911 requirements.

1.4 SYSTEM WARRANTY

A. ***The IP PABX System and software shall be fully warranted for three (3) years from date of substantial completion by the contractor and manufacturer. If any defects are found within this warranty period, the defective system component shall be replaced at no extra cost to the Owner for parts or labor. Provide a statement of this warrant with the O&M manuals and to the Director of IT. Make available a service contract offering continuing factory authorized service of this system, after the initial warranty period.***

1.5 GENERAL REQUIREMENTS

A. Each Building's telephone system must provide the following minimum requirements:

1) Support for E-911.

a) Allow the caller to be located down to the specific office/room on a particular floor of a building.

2) Support for the following carrier and Inter-switch interfaces:

a) Digital (T-1, PRI)

b) Session Initiation Protocol (SIP)

c) Analog (POTS) lines

d) Provide carrier circuit interfaces adequate to handle ALL incoming and outgoing calls.

3) Support for Direct inward Dialing (DID).

4) Support for the following endpoints (phones/devices):

a) Digital (TDM)

b) IP (must support non-proprietary H.323 and SIP-compliant devices)

c) Analog (phones/faxes etc.)

d) Endpoints that provide "full duplex speakerphone" capability must be provided in specific rooms.

e) Provide system with capacity for all endpoints required plus 10% spare.

5) Provide support for a minimum of two (2) fax stations per building.

6) Provide UPS.

B. System to have maintenance and administration terminal and remote access capabilities.

C. A common Telephone Switching Platform shall be used across the District to insure inter-operability. In the event that the District already has an established Telephone System that meets OFCC requirements, additional buildings may be added to the District, specifying existing Vendor's system.

D. In the event that no standard system exists for the District, then the OFCC PA shall decide if the first systems bid establish a critical mass and if the multiple vendor requirement can be waived.

1.6 WORK BY LOCAL UTILITIES

A. Coordinate all work with the local and long-distance Service Providers (SPs).

1.7 IP PABX

A. The Central Switching Exchange shall be a fully-digital, IP Based PBX Telephone Switch.

B. The IP PABX must be modular in design.

C. The IP PABX shall be sized according to student population and traffic requirements and shall be equipped with carrier circuit interfaces for incoming/outgoing call lines. The minimum circuits shall be as follows:

1) One PRI or equivalent SIP trunk for up to 100 stations.

2) Two PRIs or equivalent SIP trunks for greater than 100 stations.
3) Additional PRIs or equivalent SIP trunks based on traffic requirements.
4) The use of an analog central office (CO) line interface is acceptable if system is supporting existing analog phone service and as long as adequate line capacity is provided to support call traffic. System must still include digital carrier interface for future growth.

D. The IP PABX shall be equipped with full Name and Number Caller ID functions for incoming and outgoing calls.

E. With few exceptions, the IP Only PABX system shall provide the same basic features and functionality as an IP-Enabled PABX.

F. The IP PABX must be equipped with a minimum of three (3) analog lines to the local Service Provider for E-911 services and PRI backup.

a) Allow the caller to be located down to the specific office/room on a particular floor of a building.

G. Connect the Analog Lines to a Power Failure Transfer (PFT) Unit and supply a minimum of three (3) analog phones, located in the Central Office Area for emergency operation.

H. The common control units for the IP PABX shall be fully duplicated.

I. The media gateways and other ancillary devices shall be distributed across a minimum of at least two (2) units for redundancy. For example, analog interfaces, PRI interfaces, etc. shall be duplicated.

J. For single building configurations, the duplicate Common Control Units, media gateways and other common devices shall all be located in the Main Equipment Room.

K. For multiple building configurations, consideration shall be given to distributing the common control units and media gateways between two buildings.

L. When an IP PABX system is deployed across the District, all carrier circuits and Voice mail and other common Services shall be centralized – a minimum of two central locations is required.

M. Design the District-Wide system to provide for Least-Cost Routing and Toll-Bypass when applicable. Supply additional PRI circuits as required.

N. All buildings shall be equipped with a survivable remote unit that shall continue to provide basic call processing for users via the back-up analog lines. Voice mail will not be required during a WAN Link cut between a remote building and a Core Building.

O. When the Wide Area Network permits, remote buildings shall be configured in such a fashions as to “dual-home” on the two, distributed Central Processing units.

P. With few exceptions, all IP station devices shall be served by a dedicated Work Area Cable and Voice traffic shall be segregated from standard data traffic by providing dedicated 802.3af Power Over Ethernet (POE) Switches for the Voice Network.

Q. The POE switches shall follow the same design rules as the Data Network Switches, namely, one (1) dedicated GBE link to the Data Network Layer-3 Core switch per 24 10/100 ports.

R. The designer shall adjust the quantity of L-3 Core switch ports and associated fiber and UPS units to accommodate the additional POE switches.

S. All IP Phone instruments shall be 802.3af powered from POE Ethernet switches.

T. Due to the advanced features available on some IP Phones, consideration shall be given to locating selected IP instruments on desktops rather than wall mounting the units.

U. Consideration shall be given to supplying additional call processing software to enable user desk-top PCs to interoperate with the IP PABX advanced SIP based presence features (audio and video conferencing, integrated messaging, etc.).

V. Connections between the Data Network and the voice network shall be made via a vendor supplied firewall device.

W. As a minimum, the Call Accounting shall include date, time, duration of call, extension number, account code (if applicable) and number dialed along with software export features to standard spread sheets.

X. The IP PABX telephone system must have the following minimum features:

1) Access Codes.
2) Attendant's Console.
3) Automatic Location Identifier (ALI).
4) Automatic Number Identification Support (ANI).
5) Call Accounting Software and Hardware.
6) Call Conferencing.
7) Call Forwarding on Busy.
8) Call Forwarding External Calls
9) Call Forwarding Internal Calls.
10) Call Hold.
11) Call Pickup.
12) Call Screening.
13) Dialed Number Identification Service (DNIS).
14) Direct Inward Dialing (DID).
15) Distinctive ring tones.
16) Do Not Disturb
17) E-911 and latest NENA support. ***Allow the caller to be located down to the specific office/room on a particular floor of a building.***
18) E-911 Call Recording and Bridging to E-911 Central Console.
19) FCC Registration.
20) Full Caller ID – Incoming/Outgoing.
21) Full duplex, Digital Display, Speaker Phones.
22) Hands Free Intercom – Phone-to-Phone.
23) IEEE 802.3af compliant VoIP Power

24) Least Cost Routing.
25) Maintenance and Administration Terminal.
26) Malicious Call Trace/Hold.
27) Message Waiting Lamp.
28) Paging Interface (minimum 6 zones).
29) Minimum of eight (8) Pre-program buttons.
30) PRI/T-1 Trunking.
31) Remote diagnostics.
32) SIP Signaling Protocol
33) Standards Based, VoIP Phone Support.
34) Support wireless 802.11 VoWLAN phones
35) System Speed Dial.
36) Unified Messaging.
37) VoIP Trunking – H.323 and SIP.

Y. The IP PABX shall be dimensioned to support a minimum ABH traffic capacity of 7.0 ccs per line.

Z. Inter-Building Trunks (Links) between Systems shall be designed using T-1 Lines, PRI Lines or VoIP Trunking. A minimum capacity of 23 inter-building links shall be provided. Dimension all Trunks based on a minimum of P=0.01 Grade of Service.

AA. When a high-speed WAN connection exists, use a VoIP connection between buildings.

BB. Provide IEEE 802.3af compliant Power Injectors/switches for all VoIP Phone instruments.

CC. Each District Building's IP PABX shall be capable of complete stand-alone operation (with the exception of centralized voicemail) in the event that the Inter-Building Trunks (Links) are not operational. Calling operation shall be limited only by the external links (trunks) available,

DD. District-Wide Systems shall function as a single system with Common Features, Centralized Voice Mail, and Centralized Call Detail Recording with a single record per call and the ability for Centralized Attendant Service for the entire District.

EE. When more than one building per District is involved, all incoming and outgoing calls shall be routed over PRI Line(s) connected to a Central IP-Enabled PABX. The Central IP-ENABLED PABX capacity shall be dimensioned to handle all current and planned District buildings.

FF. IP PABX units shall employ a hardened Operating System that is not susceptible to Internet Computer Viruses.

GG. IP PABX units shall be provided with a minimum of 10% spare line/station capacity at initial installation.

HH. The all IP Based system shall maintain the same high level of functionality, redundancy and programmable features as originally specified. Any all-IP system shall employ standards based signaling, instrument powering and redundant call servers in each District Building served by the system.

II. Provide centralized PABX and phone instrument power with a minimum of two (2) Busy-Hour standby capabilities for all PABX equipment. IP Based systems shall also be provided with two (2) Busy-Hour standby capabilities for all powered Switches or Patch Panels located in each Telecommunications Room (TR). Connect the Central Power Supplies to Building Emergency Power when available.

JJ. All IP Instruments and power sources shall be IEEE 802.3af compliant.

KK. All PABX systems shall support IP Inter-building trunking (H.323 or SIP) and the attachment of IP Instruments such as IP Phones, PDAs, Soft Phones and 802.11 Phones.

1.8 ATTENDANT CONSOLE TERMINAL

A. Minimum of 32 Character LCD Display.

B. Display day, date and time.

C. Display call durations.

D. Display caller name and extension/telephone number and incoming caller-ID information

E. Hands free, Full-Duplex, Speakerphone.

F. Shall have a system display panel capable of showing all system extension numbers and their status and capable of extending calls via single touch operation.

G. Provide a minimum of two (2) consoles per building for load sharing and redundancy.

H. Optional soft consoles should be considered by the designer for the attendant.

1.9 ADMINISTRATIVE DISPLAY IP VOICE TERMINAL

A. Provide one administrative phone for all administrative areas, conference rooms, small group rooms, nurse/health office, and special needs rooms.

B. At least sixteen characters display window.

C. At least sixteen programmable keys.

D. Hands free, Full-Duplex Speakerphone.

E. Display caller name and extension/telephone number.

F. Message Waiting Lamp.

G. Pre-programmed E-911 button that automatically puts the phone into a hands-free mode, and initiates a 3-way conference call with the central console, as well as the local 911 center.

H. IEEE 802.3af powered.

1.10 STANDARD DISPLAY DIGITAL VOICE TERMINAL

A. Provide one standard 8-button phone for all classrooms, labs, general offices, and other areas not covered in section 1.9 above.

B. At least sixteen characters display window.

C. At least eight (8) programmable keys.

D. Hands free, Speakerphone. Full Duplex required if One Way Paging Variance is utilized.

E. Display caller name and extension/telephone number.

F. Message Waiting Lamp.

G. Pre-programmed E-911 button that automatically puts the phone into a hands-free mode, and initiates a 3-way conference call with the central console, as well as the local 911 center.

H. IEEE 802.3af powered.

1.11 CONFERENCE PHONE

A. At a minimum, provide Multi-User, Full-Duplex conference Speakerphone for Conference Rooms and/or Principal's Office.

1.12 VoWLAN PHONES

A. Provide a minimum of two Wireless VoIP (VoWLAN) Phone instruments, with carrying case and charger units.

B. Provide integral VoWLAN 802.11e QoS capability or SVP server for VoWLAN QoS.

1.13 VOICE MAIL SYSTEM

A. System shall have the following number of voice ports:
1) Minimum of 4 ports (450 students).
2) Minimum of 8 ports (650 students).
3) Minimum of 12 ports (850 students).

B. System shall have the following capacity:
1) One voice mailbox per station plus 20% minimum spares.

C. System shall have an automated attendant.

D. System shall be fully integrated with the IP PABX.

E. System shall activate telephone station "message waiting" light.

F. System shall have Integrated Messaging capability. Supply based on District's requirements. Verify E-Mail Server compatibility (Exchange, Notes, Groupwise, etc.)

1.14 E-911 CONSOLE

A. System shall support Call Bridging at Console for all E-911 calls.

B. System shall provide Call Recording for E-911 Calls

C. System shall support full NENA Compliant ANI and ALI data transmission from local Data Base to PSAP. ***Allow the caller to be located down to the specific office/room on a particular floor of a building.***

1.15 UNINTERRUPTIBLE POWER SUPPLIES (UPS)

A. Provide Dual Conversion UPS units for call processing equipment, providing sufficient protection from power anomalies for two (2) busy hours.

B. Provide multiple UPS Units based on expected power load or a single large UPS Unit. Locate the multiple UPS units in the associated equipment racks or locate a larger central UPS unit in the Room.

C. Connect the UPS Units to Building Emergency Generator when available.

D. For buildings without a Generator, supply a four-hour (4) standby.

E. Provide shutdown connections from the UPS for graceful power down in the event of a power failure.

F. Equip the UPS Units with a twist-Lock Power cable and SNMP Management Card.

G. Connect the UPS SNMP Management to the Management VLAN.

H. Coordinate UPS voltage, circuit size, and connection requirements with the Electrical Design Professional.

1.16 INSTALLATION

A. Coordinate complete system installation, and Technology Headend Integration with District and other Technology Trades.

B. Coordinate installation and interconnect with local and long-distance Service Provider (SP). Contractor shall be responsible for all final cross connects and system Data Base loading and verification.

C. Contractor shall connect to, and interface with the in-house paging system and provide paging from any telephone handset.

D. Connect system to IP Data Network and program required VLANs, Firewall and 803.11e support.

E. Interconnect with existing systems via VoIP trunking.

F. Integrate system with District's Numbering Plan.

1.17 SYSTEM PROGRAMMING

A. Contractor shall provide the District/architect with a complete set of forms for the entire system and extension features for final programming.

B. Final programming of the system shall be co-developed between the District/architect and the contractor and must be approved prior to being implemented for system start-up.

C. Contractor shall supply the "latest" software updates as part of the system configuration for ***three (3)*** years after system acceptance.

1.18 TRAINING

A. Provide a minimum of forty (40) hours of training to the District's personnel. Plan for multiple training trips to the site. Training session(s) shall cover the following topics at a minimum:

1. System Equipment Connectivity

2. Device Configurations

3. Operation, maintenance, and upgrade procedures.

B. Training to be arranged with District personnel. 40 hours should be spread out over the length of the warranty (Ex: 8 hours at project turnover/completion, 8 hours at 3 months, 8 hours at 6 months, 8 hours at 1 year, 4 hours at 2 years, 4 hours at 3 year).

C. Training to occur in maximum of 2 hour increments per personnel or groups of personnel.

D. Consider requiring Contractor to provide manufacturer training vouchers for a portion of the training, which are valid during the warranty period.

E. Training shall be by certified manufacturer instructor.

F. Training schedule shall be coordinated with District personnel and their needs.

G. Training plan, time line, and agenda shall be provided to District IT personnel and signed off by District and Contractor.

H. Warranty certificate and agreement shall be provided to District IT personnel at initial training session.

I. Provide a digital video copy of the training sessions

END OF SECTION

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SECTION 274119

VIDEO DISPLAY EQUIPMENT

GENERAL GUIDELINES

1.1 GENERAL

A. This Section defines the general design requirements for uniform Interactive Video Display Equipment that shall be followed for all OFCC Technology construction projects.

B. Refer to Section 8500, Technology Systems, and Section 8600, Electrical Systems, for additional information.

1.2 SECTION INCLUDES

A. VIDEO DISPLAY EQUIPMENT
1. Flat Panel Monitor Mounts
2. Flat Panel Monitors
3. Projector Mounts
4. Ultra-Short Throw Interactive Projector
5. Large Venue Projector
6. Interactive Flat Panel Display - Optional

B. CLASSROOM INTERACTIVE EQUIPMENT
1. Interactive Tablets
2. Student Response System
3. Document Camera
4. Webcam

1.3 QUALITY ASSURANCE

A. All equipment shall be UL listed.

B. All equipment and Installation Practices shall comply with the latest ANSI/NFPA-70 National Electric Code.

C. All equipment and Installation Practices shall comply with the Local Electric Code.

D. All equipment and Installation Practices shall comply with the latest InfoComm International Installation Handbook.

E. All equipment and Installation Practices shall comply with the latest BICSI® Telecommunications Distribution Methods Manual (TDMM).

F. All equipment shall comply with the latest ANSI TIA/EIA-568, 569, 606, 607, 862, standards as applicable.

1.4 SYSTEM WARRANTY

A. The Video Display Equipment Systems and associated software shall be warranted by the contractor for a period of three (3) years from date of substantial completion.

1.5 FLAT PANEL MONITORS AND PROJECTOR MOUNTS

A. Provide wall type flat panel mounts with appropriate forward tilt, or fully articulating arm, as required. Provide appropriate provisions for electrical outlet and A/V cables.

B. Provide Ceiling or Wall Mounts for projectors with appropriate provisions for electrical outlet and A/V cables.

C. Utilize security/theft-deterrent mounting hardware on all projectors, displays and mounts as required.

1.6 INTERACTIVE PROJECTORS

A. Ambient light considerations shall be coordinated with the Architect and Electrical Engineer/Lighting Designer to produce a minimum contrast ratio of 10:1. This often requires blocking of daylighting and dimming of electric lights to produce no more than 10-14 vertical foot candles (108-151 lux) on the projection surface.

B. Provide high resolution video/data projectors for each classroom, laboratory, and media center.

C. Conference Rooms may be equipped with either a small venue projector or a flat-panel TV/Monitor***.***

D. Ultra-short throw interactive projectors are required in classrooms. They shall be capable of being interfaced with any interactive technology in the classrooms.
   1. Verify ADA requirements are met for mounting locations.

E. The aspect ratio of projectors shall be 16:9 or 16:10. Aspect ratios of 4:3 should be used only to accommodate legacy equipment.

F. Provide all projectors with an Ethernet control interface, either through direct connection or via Ethernet-to-RS-232 adaptor. Provide global central management control/tracking software.

G. Small Venue (Classroom/Labs/Small Rooms) Interactive Projectors
   1. The projector shall produce a minimum of 3000 ANSI Lumens for standard projectors or 2500 ANSI Lumens for ultra-short throw projectors.
   2. It shall have a minimum native resolution of 1280 x 800 and be capable of displaying resolutions up to 1080p (720p).
   3. Inputs/Outputs – Shall consist of the following:
      a. HDMI
      b. Computer / component video: D-sub 15 pin
      c. Composite video: RCA
      d. Audio in x 3: RCA (L and R), Mini stereo
      e. Variable audio out: Mini stereo

f. LAN networking: RJ-45
g. Serial: RS-232c
h. Monitor out: D-sub 15 pin
i. USB Type B (USB display, mouse, interactivity)
j. USB Type A (USB memory/document camera)
k. Wireless port 802.11 b/g/n/ac
l. Microphone port
m. EDID capable and HDCP compliant

4. Shall be connected to classroom sound reinforcement system for sound
5. Shall be able to use any interactive software (open architecture)
6. ***Shall be capable of interfacing wirelessly with mobile devices within the classroom.***

H. LARGE VENUE (STUDENT DINING) PROJECTORS

1. The projector shall produce a minimum of 6000 ANSI Lumens.
2. It shall have a minimum native resolution of 1920 x 1200 and be capable of displaying resolutions up to 1080p.
3. Inputs/Outputs – Shall consist of the following:
   a. HDMI
   b. Computer / component video: D-sub 15 pin
   c. Composite video: RCA
   d. Audio in x 3: RCA (L and R), Mini stereo
   e. Variable audio out: Mini stereo
   f. LAN networking: RJ-45
   g. Serial: RS-232c
   h. Monitor out: D-sub 15 pin
   i. USB Type B (USB display, mouse, interactivity)
   j. USB Type A (USB memory/document camera)
   k. Wireless port 802.11 b/g/n/ac
   l. Microphone port
   m. EDID capable and HDCP compliant.
4. Provide a lift system in lieu of a mount, allowing multiple height positions for storage, projection and service. As required.
5. Provide either front or rear screen projection based on District/Architect preferences and/or good projection system design.
6. Coordinate screen (size and type) specifications to provide an integrated design based on best practices and project-specific factors.
7. OFCC baseline funding is for only 1 projector in each large venue area.

1.7 FLAT PANEL TV/MONITOR

A. The Flat Panel TVs/Monitors shall be equipped with a QAM 181-channel tuner and shall have minimum native resolution of 1080p without the use of scan-converters.

B. The minimum Flat Panel TV/Monitor shall be 32 inches.

C. Provide Flat Panel TV/Monitor for Public viewing in Entrances, Corridors and/or Reception areas, small conference/meeting rooms, and Small Self-Contained Classrooms.

D. Provide Flat Panel TV/Monitor Units with Ethernet control connection and central management software.

E. Provide an Ethernet or wireless connection to Digital Media Management System.

1.8 OPTIONAL EQUIPMENT AND SYSTEMS (not baseline)

A. INTERACTIVE TABLETS
1. Considerations and guidelines:
a) Tablets should be specified based on each school's curriculum needs.
b) Assessment should be done about licensing and number of users
c) Charging stations/policies should be considered
d) Considerations regarding the iPad
1) iPads have lower transmit power (10dBm)
2) iPads use a single spatial stream with ***802.11ac***. They are unable to do channel bonding, limiting the link rate to a maximum of 65Mbps
3) iPads have dual band support. They can operate on both 2.4GHz and 5GHz frequencies. They default to the 5GHz band.
2. Recommended screen size is 7" – 12"
3. Touch screen
4. ***Cellular*** Wi-Fi optional
5. Wireless connectivity to all other classroom A/V equipment (interactive projector, etc.)
6. Minimum resolution 1280 x 600
7. Minimum processor 1GHz
8. Minimum storage 16GB
9. Minimum battery life 9 hours

B. STUDENT RESPONSE SYSTEM
1. Should have a full keyboard with direction pad and hot keys
2. Wireless range minimum of 328ft (100m)
3. Operates on batteries or charge by USB connectivity
4. Communication through wireless connection to computer with host software
5. All licenses should be included in specification

C. DOCUMENT CAMERA
1. Minimum 2.0 megapixels
2. Full autofocus lens
3. 3x digital zoom
4. Up to 30 fps live video capture
5. USB 2.0 minimum interface
6. Windows and Mac compatible
7. Open architecture to use multiple application software
8. Capture both digital and printed material

D. WEBCAM
1. Full 1080p live video
2. Minimum of 2 Mbps upload/download
3. H.264 video compression

4. Autofocus lens
5. Built-in mic with auto noise reduction
6. Automatic low-light correction
7. USB 2.0 interface
8. Tri-pod ready

E. A/V CONTROL SYSTEM
1. Full user control of program source device(s), projector, and lights through either web-based application or touch panel.
2. System diagnostics and scheduled operation of media devices via web-based application.

F. Interactive Flat Panel Display (Classrooms/Labs)
1. Backlit LED/LCD display, contrast ratio 3000:1, 3 year warranty.
2. Full HD-1080p with multi-touch (pen or finger) functionality.
3. Inputs/Outputs - Shall consist of the following:
a. HDMI
b. Computer / component video : D sub 15 pin
c. Composite video
d. Audio in x 3 : RCA (L and R), Mini stereo
e. Audio out : RCA (L and R)
f. LAN networking: RJ-45
g. Serial : RS-232C
h. AV input/output: DVI-D
i. USB
j. Wireless connectivity : 802.11 b/g/n/ac
k. EDID capable and HDCP compliant
4. Shall be connected to classroom sound reinforcement system for sound.
5. Shall be able to use any interactive software (open architecture).
6. Shall be able to interface wirelessly with mobile classroom devices (tablets, iPads, etc.).
7. Provide either wall mount or portable cart unit as coordinated with the Design Professional and District.
8. Installer shall be authorized service dealer of the unit.
9. Coordinate District operating system platform with specified manufacturers.
10. Provide integral surge suppression protection with the unit.
11. Technology Designer to determine size of the IFPD based on room size and application.

1.9 INSTALLATION
A. Mount Projectors and Flat Panel TV/Monitors using manufacturer's recommended hardware.
B. Connect Devices to IP Network for Central Control.
C. Adjust all Projectors for proper focus, keystone correction and display size.
D. Install all associated software monitoring and control programs.

1.10 TESTING
A. Verify picture and sound quality on all A/V inputs.
B. Test all associated software control programs.
C. The devices and associated software systems shall be tested end-to-end complete.

1.11 TRAINING

A. Provide a minimum of forty (40) hours of training to the District's personnel. Plan for multiple training trips to the site. Training session(s) shall cover the following topics at a minimum:
   1. System Equipment Connectivity
   2. Device Configurations
   3. Operation, maintenance, and upgrade procedures.

B. Training to be arranged with District personnel. 40 hours should be spread out over the length of the warranty (Ex: 8 hours at project turnover/completion, 8 hours at 3 months, 8 hours at 6 months, 8 hours at 1 year, 4 hours at 2 years, 4 hours at 3 year).

C. Training to occur in maximum of 2 hour increments per personnel or groups of personnel.

D. Consider requiring Contractor to provide manufacturer training vouchers for a portion of the training, which are valid during the warranty period.

E. Training shall be by certified manufacturer instructor.

F. Training schedule shall be coordinated with District personnel and their needs.

G. Training plan, time line, and agenda shall be provided to District IT personnel and signed off by District and Contractor.

H. Warranty certificate and agreement shall be provided to District IT personnel at initial training session.

I. Provide a digital video copy of the training sessions.

END OF SECTION

SECTION 274125

DIGITAL MEDIA MANAGEMENT SYSTEM

GENERAL GUIDELINES

1.1 GENERAL

A. This Section defines the general design requirements for a uniform Digital Media Management System that shall be followed for all OFCC Technology construction projects.

B. Figure 1 describes Typical Digital Media Management System.

C. Refer to Section 8500, Technology Systems, and Section 8600, Electrical Systems, for additional information.

1.2 SECTION INCLUDES

A. DIGITAL MEDIA MANAGEMENT SYSTEM
   1. Digital Video On-Demand System.
   2. Digital Video Control and Scheduling System.
   3. Video Bulletin Board System.
   4. Video Camera System.
   5. Digital Video Source System.

1.3 QUALITY ASSURANCE

A. All equipment shall be UL listed.

B. All equipment and Installation Practices shall comply with the latest ANSI/NFPA-70 National Electric Code.

C. All equipment Installation Practices shall comply with the Local Electric Code.

D. All equipment shall comply with the latest ANSI-J-STD-607 Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications Standard.

E. All equipment and Installation Practices shall comply with the latest BICSI® Telecommunications Distribution Methods Manual (TDMM).

F. All equipment shall comply with the latest ANSI TIA/EIA-568, 569, 606, 607, 862, standards.

1.4 SYSTEM WARRANTY

A. The Digital Media Management System and software shall be fully warranted for three (3) years from date of substantial completion by the contractor and manufacturer. If any defects are found within this warranty period, the defective system component shall be replaced at no extra cost to the Owner for parts or labor. Provide a statement of this warrant with the O&M manuals and to the Director of IT. Make available a service contract offering continuing factory authorized service of this system, after the initial warranty period.

B. Provide advanced replacement for all Digital Media Management Equipment for the three (3) year-period.

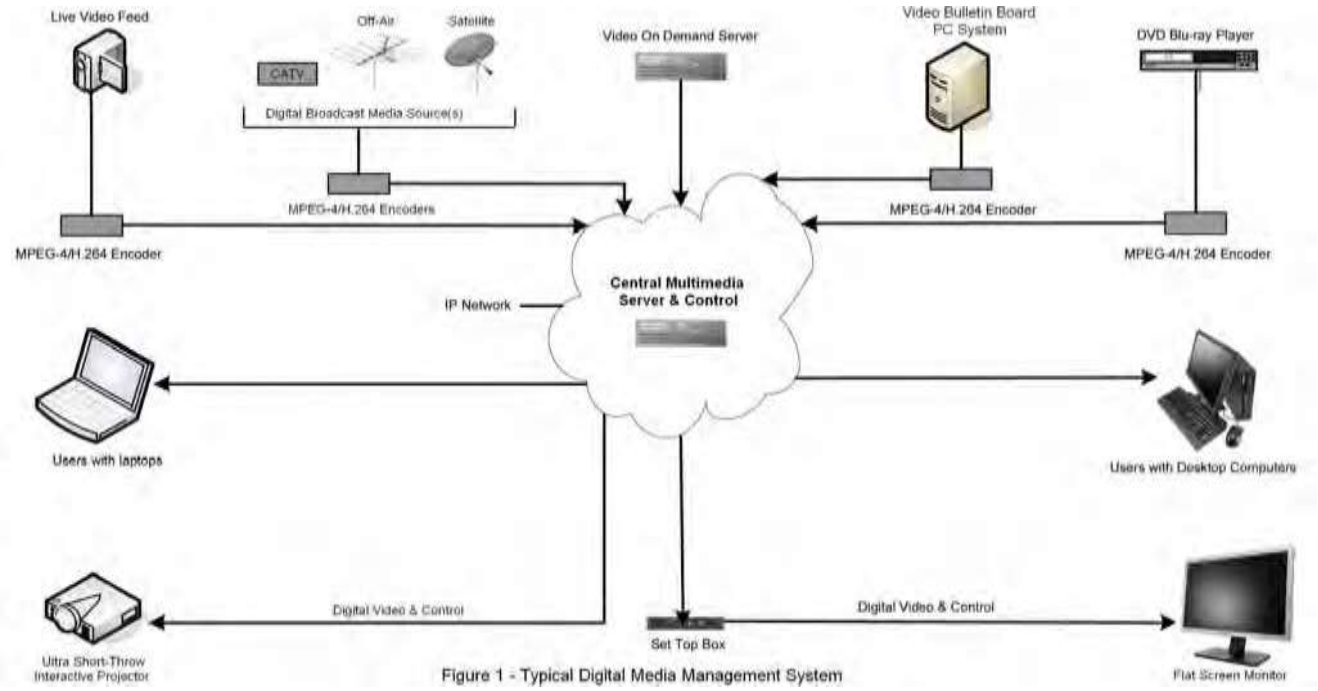


Figure 1 – Typical Digital Media Management System

1.5 DIGITAL VIDEO ON DEMAND SERVER

A. GENERAL

1. The system shall include a centrally based media retrieval system consisting of a video server-based, on-demand, MPEG-4, H.264 streaming video delivery system.
2. System shall include a video billboard message and information system delivered over the network or via Digital Decoders.
3. Control of the Central Media System components shall be via a WEB Browser interface from a PC or from a Digital Set-Top-Box.
4. The Digital Media Management System shall provide remote access to centrally stored digital video sources. The system shall transmit the video as a streaming data file format (H.264 or MPEG-4) over the Ethernet IP Network.
5. The system shall also be capable of direct access to the Internet (MPEG-4 /H.264). Program the required VLANs and provide sufficient 100/1000 Ethernet Ports for connection of all associated devices.
6. Classrooms may be equipped with Set-Top-Box (STB) for receiving streamed and pre-recorded Digital Video Signals. The STB shall be connected to the associated Classroom Projector and Audio System.
7. Provide Central Control System for Projectors for turning units on/off, selecting inputs and streaming scheduled program sources. Unit should turn all Projectors off at end of day.
8. Playback of the Videos at classroom and Lab PCs shall be through a standard WEB Browser interface using a standard Media Player such as Windows Media Player, Real Player or Apple Quick-Time.

B. DIGITAL VIDEO SERVER - VOD

1. Supply a centrally located MPEG-4 and H.264 Video Server Unit consisting of a PC based, Digital Video on Demand Server connected to the Network Electronics on a separate Video VLAN.
2. Consider supplying one large VOD Server per District when WAN bandwidth permits.
3. The Digital Video Server shall support True Video-on-Demand (VOD), Near-Video-on-Demand (NVOD), and Subscription-Video-on-Demand (SVOD).
4. The Digital Video Server shall have a scalable output from a minimum of 25 to 200 – 3 Mbps digital video streams.
5. The Digital Video Server shall have fault-tolerant, RAID storage with minimum capacity of 200 hours with hot-swappable drives.
6. The Digital Video Server shall be connected to the local area network through a minimum of one (1) Gigabit Ethernet connection.
7. Size the VOD Server based on District Video Storage requirements.
8. Hosted service can be utilized as long as all required features are provided.

1.6 DIGITAL VIDEO CONTROL AND SCHEDULING SYSTEM

A. The Video Control and Scheduling System shall provide a simple interface to easily locate available Live and On Demand media assets on Windows PCs, Macs, and Set Top Boxes.

B. Users shall be able to navigate and search for specific videos, select the video, and it immediately begins playing. For On Demand videos, users shall have full Fast Forward and Rewind capabilities.

C. The Video Control and Scheduling System shall provide a calendar-based scheduling system that shall allow users to quickly and easily schedule Live Broadcasts from MPEG encoders, Stored Broadcasts from Video on Demand servers, Recordings, and Conferences. Scripting functionality shall also allow users to set up custom schedules.

1.7 VIDEO BULLETIN BOARD SYSTEM ***- BASELINE***

A. Provide a PC based Bulletin Board system consisting of a Pentium-4 PC, minimum 2.0 GHz, equipped with minimum of 1 Gb of RAM, minimum of a 80 Gb, 7200 RPM Hard Drive, 15 inch Color Monitor/Panel, Multi-output Digital Video Card, Microsoft Windows XP-Pro or later, and Microsoft Office 2010 or later (BBS Software will consist of Power Point Presentations), and PC Anywhere Remote Control Software.

B. Connect Digital Video and Audio output of Bulletin Board PC to A/V MPEG-4/H.264 Encoder input for streaming of Bulletin Board Broadcasts to PCs and Set Top Boxes.

C. Connect the Bulletin Board PC to Network Electronics via a 1 Gb Ethernet Connection.

D. Digital messaging can be part of the Digital Media Management System.

1.8 VIDEO CAMERA SYSTEM ***- BASELINE***

A. Provide 1 digital Video Camera with a wheeled tripod for remote origination of video broadcasts, and announcements. Equip each camera with a dual MPEG 4/H.264 Encoder Unit for broadcasting low and high bit rate digital streams.

B. It shall be possible to broadcast the portable camera signal across the IP Network to Monitors, Projectors and/or PCs in the school or any of the other schools within the District, and simultaneously record the signal if desired. The Camera can be used for Video Announcements, recording of lessons and/or events or as a point-to-point link between any two (2) schools.

1.9 VIDEO BLU-RAY SYSTEM ***- BASELINE***

A. Provide 1 Blu-Ray player located in the Media Center for live streaming and recording. Equip each unit with a dual MPEG 4/H.264 Encoder Unit for broadcasting low and high bit rate digital streams.

1.10 DIGITAL BROADCAST MEDIA SOURCE SYSTEM ***- BASELINE***

A. Provide 6-12 channels of digital broadcast media sources. Connect sources to A/V MPEG-4/H.264 encoder input for streaming to the network.

B. The Technology Designer shall coordinate with the District to determine applicable digital broadcast media sources, such as specific CATV channels, off-air channels and satellite channels, as can be incorporated within the budget.

1.11 INSTALLATION

A. Contractor shall install and program all Digital Video Distribution Equipment and establish all necessary VLANs as required.

1.12 LABELING

A. Cables, jacks, system components, etc. shall be labeled according to ANSI/EIA/TIA-606 specifications and in coordination with the District.

B. All Video Cables shall be equipped with a self-laminating, wrap-around, machine printed label at both ends of the cable.

1.13 TESTING

A. Video Wiring system and associated systems shall be tested end-to-end complete.

1.14 TRAINING

A. Provide a minimum of forty (40) hours of training to the District's personnel. Plan for multiple training trips to the site. Training session(s) shall cover the following topics at a minimum:
   1. System Equipment Connectivity
   2. Device Configurations
   3. Operation, maintenance, and upgrade procedures.

B. Training to be arranged with District personnel. 40 hours should be spread out over the length of the warranty (Ex: 8 hours at project turnover/completion, 8 hours at 3 months, 8 hours at 6 months, 8 hours at 1 year, 4 hours at 2 years, 4 hours at 3 year).

C. Training to occur in maximum of 2 hour increments per personnel or groups of personnel.

D. Consider requiring Contractor to provide manufacturer training vouchers for a portion of the training, which are valid during the warranty period.

E. Training shall be by certified manufacturer instructor.

F. Training schedule shall be coordinated with District personnel and their needs.

G. Training plan, time line, and agenda shall be provided to District IT personnel and signed off by District and Contractor.

H. Warranty certificate and agreement shall be provided to District IT personnel at initial training session.

I. Provide a digital video copy of the training sessions

J. MPEG-4 encode and place a copy of training video on VOD server.

END OF SECTION

SECTION 275121

STUDENT DINING / AUDITERIA SOUND REINFORCEMENT SYSTEM – HIGH SCHOOL

GENERAL GUIDELINES

1.1 GENERAL

A. Refer to Section 8500, Technology Systems, for additional information.

1.2 SECTION INCLUDES

A. Sound Reinforcement System

B. Stage/Production Intercom System

C. Assistive Listening System

D. Monitor/Effects Foldback System

E. Backstage Monitor/Cue System

1.3 QUALITY ASSURANCE

A. NFPA 70 - National Electrical Code.

B. Underwriter's Laboratory.

C. TIA/EIA-607 Telecommunications Grounding.

D. Eleventh Edition (or latest) BICSI Telecommunications Distribution Methods Manual (TDMM).

E. Americans with Disabilities Act (ADA).

F. Federal Communications Commission Part 15.

G. Sound System Engineering (Davis & Patronis) – 3rd Edition 2006.

H. Audio Systems Design and Installation (Giddings) 1990.

1.4 SYSTEM WARRANTY

A. The Student Dining/Auditeria Sound Reinforcement System shall be warranted by the Contractor for a period of ***three (3)*** years from date of substantial completion.

1.5 RELATED SECTIONS

A. Specification section 271543–Audio-Video Communications Horizontal Transport System
B. Specification section 274119 – Video Display Equipment

1.6 MATERIALS

A. Stationary Main Equipment Cabinet with the following rack mounted equipment:
   1. Mixer/Preamplifier
   2. Power Amplifier(s)
   3. Digital Signal Processor(s)
      a. RS-232 Interface for Configuration and Tuning
      b. Equalization Filters – graphic and/or parametric
      c. Compressor/Limiter
      d. Digital Delay for cluster alignment (if applicable)
      e. High and Low Pass and Shelving Filters
      f. Feedback Suppression (may be incorporated in DSP or a stand-alone unit)
      g. Crossover (if bi-amplified speaker system is utilized)
      h. Selectable scene presets
   4. AM/FM radio tuner
   5. Assistive Listening Transmitter (provide with ADA-compliant quantity of receivers)
   6. Monitor/Effects Foldback System amplification and signal processing, including feedback eliminators and equalization
   7. Sequencing AC Power Control System
   8. Passive or Active thermal control
   9. Microphone termination/splitting panel in Main Equipment Cabinet

B. Program Source Cabinet
   1. i-Pod Docking Station
   2. Wireless microphone receivers (minimum qty. 4) and antenna distribution system. Provide with handheld and/or lavaliere microphones.
   3. CD/CD-R/CD-RW/MP3 Player
   4. Digital audio recording device.
   5. Production Intercom Wireless Base Station – Provide with a minimum of four (4) wireless beltpacks and headsets
   6. Input/output jack panel
   7. AC power distribution panel

C. House Speaker Options:
   1. Point source speaker or speaker cluster suspended from structure.
   2. Speaker cluster with delayed satellite speakers.
   3. Distributed full range speakers.
   4. Sub Woofer(s) – (optional)

D. Monitor Speakers – floor wedge or stand-mounted – minimum qty. 2. Provide with rubber-jacketed speaker cables.

E. Distributed Jackplates:
   1. Microphone jackplates (XLR-F connectors).
   2. Monitor/Effects speaker jackplates (Speakon style).
   3. Multi-pin send/return connectors at mixing locations in Control Room and at rear of audience seating area.

F. Multi-pair “snake cable” with individually shielded pairs, connectorized at both ends.

G. Direct box(es) for insertion of line level and laptop sound card signals into microphone jacks.

H. Mixing Console – Minimum requirements: 24-microphone input channels; 2-stereo line level input channels; stereo and mono output busses; 4-aux output busses

I. Hanging microphones – for use over stage (minimum qty. 2).
1. Microphones, microphone stands, cords, and connectors.

J. Handheld, lavaliere or boundary microphones. (minimum qty. 2) Include floor or desk stands and cords.

1.7 INSTALLATION

A. Install and balance system. Adjust all sound levels for desired operation levels and evenness of coverage.

B. Adjust all wireless equipment and verify coverage areas.

C. Check polarity of all input jacks, signal chains, and speakers.

D. Check gain structure.

E. Connect FM Tuner to external, building mounted FM Antenna Distribution System. Ground antenna in accordance with NEC and TIA/EIA-607.
–OR-
Receive radio reception from Distributed Broadband RF system.

F. Ground equipment cabinet and associated equipment to cabinet-mounted telecommunications grounding buss bar in accordance with NEC and TIA/EIA-607.

G. Install in accordance with manufacturer's installation instructions.

1.8 PERFORMANCE TESTING

A. Frequency response: 80Hz – 14kHz +/- 3 dB.

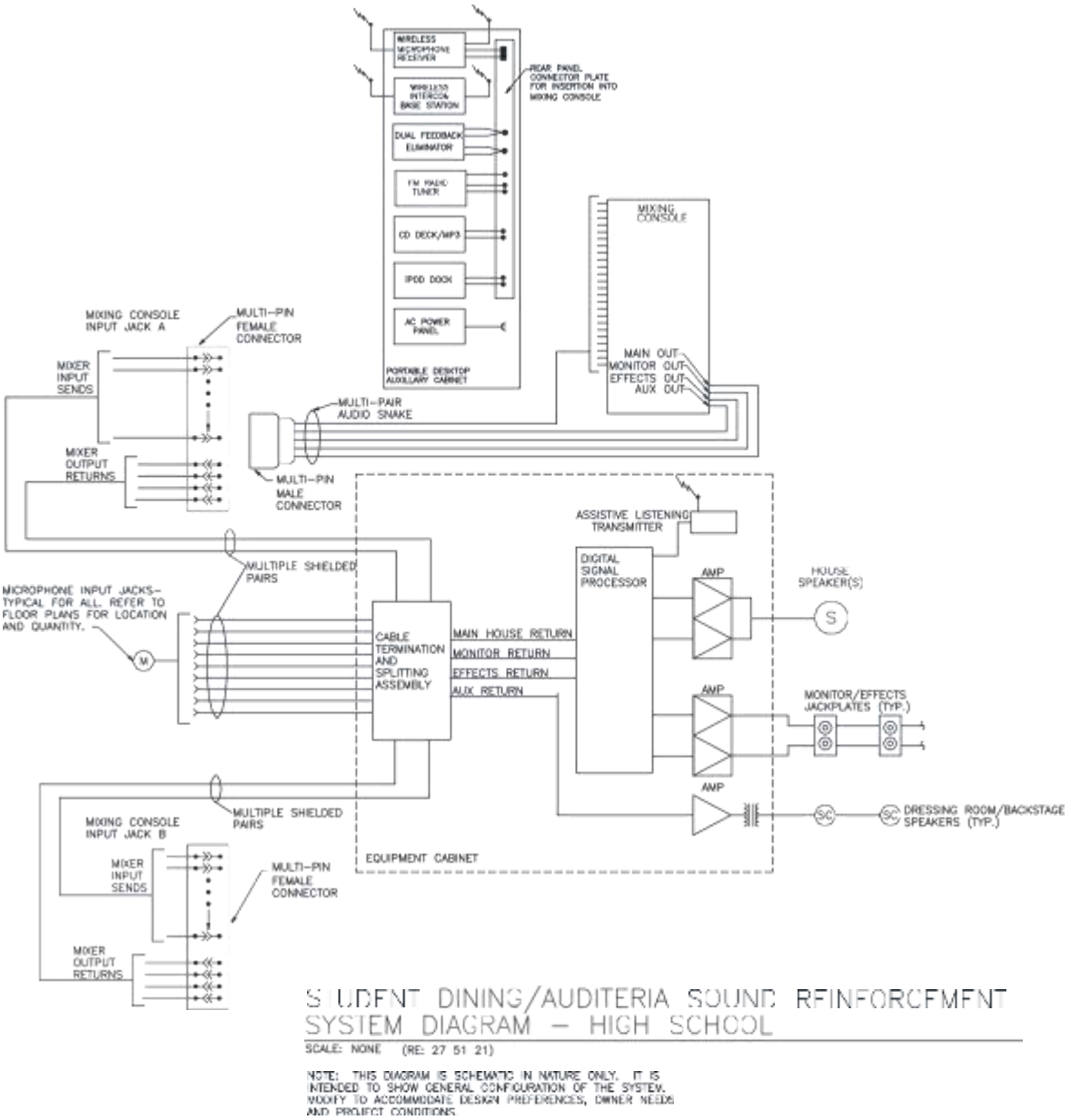
B. Loudness: At least 96dB-SPL program level with an additional 6 dB Crest factor.

C. Evenness of coverage: Variation of less than +/- 3dB (400Hz to 4000Hz) at all seats.

1.9 TRAINING

A. Provide eight (8) hours training for District's personnel on the operation and maintenance of the system.

B. Provide ***a digital video*** copy of all training.



STUDENT DINING/AUDITERIA SOUND REINFORCEMENT SYSTEM DIAGRAM – HIGH SCHOOL

SCALE: NONE (RE: 27 51 21)

NOTE: THIS DIAGRAM IS SCHEMATIC IN NATURE ONLY. IT IS INTENDED TO SHOW GENERAL CONFIGURATION OF THE SYSTEM. MODIFY TO ACCOMMODATE DESIGN PREFERENCES, OWNER NEEDS AND PROJECT CONDITIONS.

END OF SECTION

SECTION 275122

STUDENT DINING / CAFETERIA SOUND REINFORCEMENT SYSTEM

GENERAL GUIDELINES

1.1 GENERAL

A. Refer to Section 8500, Technology Systems, for additional information.

1.2 SECTION INCLUDES

A. Sound Reinforcement System

B. Assistive Listening System

1.3 QUALITY ASSURANCE

A. NFPA 70 - National Electrical Code.

B. Underwriter's Laboratory.

C. TIA/EIA-607 Telecommunications Grounding.

D. Eleventh Edition (or latest) BICSI Telecommunications Distribution Methods Manual (TDMM).

E. Americans with Disabilities Act (ADA).

F. Federal Communications Commission Part 15.

G. Sound System Engineering (Davis & Patronis) – 3rd Edition 2006.

H. Audio Systems Design and Installation (Giddings) 1990.

1.4 SYSTEM WARRANTY

A. The Student Dining/Cafeteria Sound Reinforcement System shall be warranted by the contractor for a period of ***three (3)*** years from date of substantial completion.

1.5 RELATED SECTIONS

A. Specification Section 271543–Audio-Video Communications Horizontal Transport System

B. Specification Section 274119 – Video Display Equipment

1.6 MATERIALS

A. Stationary Main Equipment Cabinet with the following rack mounted equipment:
1. Mixer/Preamplifier (minimum of 8 channels)
2. Power Amplifier(s)
3. Digital Signal Processor(s)
4. RS-232 Interface for Configuration and Tuning
5. Equalization Filters – graphic and/or parametric
6. Compressor/Limiter
7. Digital Delay for cluster alignment (if applicable)
8. High and Low Pass and Shelving Filters
9. Feedback Suppression (may be incorporated in DSP or a stand-alone unit).
10. Crossover (if bi-amplified speaker system is utilized)
11. Selectable scene presets
12. AM/FM radio tuner
13. i-Pod Docking Station
14. CD/CD-R/CD-RW/MP3 Player
15. Digital audio recording device
16. Wireless microphone receivers (Minimum Qty. 1) and antenna distribution
17. Assistive Listening Transmitter (provide with ADA-compliant quantity of receivers)
18. Sequencing AC Power Control System
19. Passive or Active thermal control

B. Speaker Options:
1. Point source speaker or speaker cluster suspended from structure.
2. Speaker cluster with delayed satellite speakers.
3. Distributed full-range speakers.

C. Distributed Jackplates
1. Microphone input jackplates (XLR-F connectors).
2. Balanced, auxiliary-input, jack plate assemblies.

D. Microphones, microphone stands, cords, and connectors (minimum qty. 4).

1.7 INSTALLATION

A. Install and balance system. Adjust all sound levels for desired operation levels and evenness of coverage.

B. Adjust all wireless equipment and verify coverage areas.

C. Check polarity of all speakers and adjust all microphone and source input levels.

D. Connect FM Tuner to external, building mounted FM Antenna and Distribution System. Ground Antenna in accordance with NEC and TIA/EIA-607.
–OR-
Receive radio reception from Distributed Broadband RF system as specified in another spec section.

E. Ground equipment cabinet and associated equipment to cabinet-mounted telecommunications grounding busbar in accordance with NEC and TIA/EIA-607

F. Install in accordance with manufacturer's installation instructions and recommendations.

1.8 PERFORMANCE TESTING

A. Frequency response: 80Hz – 14kHz +/- 3 dB.

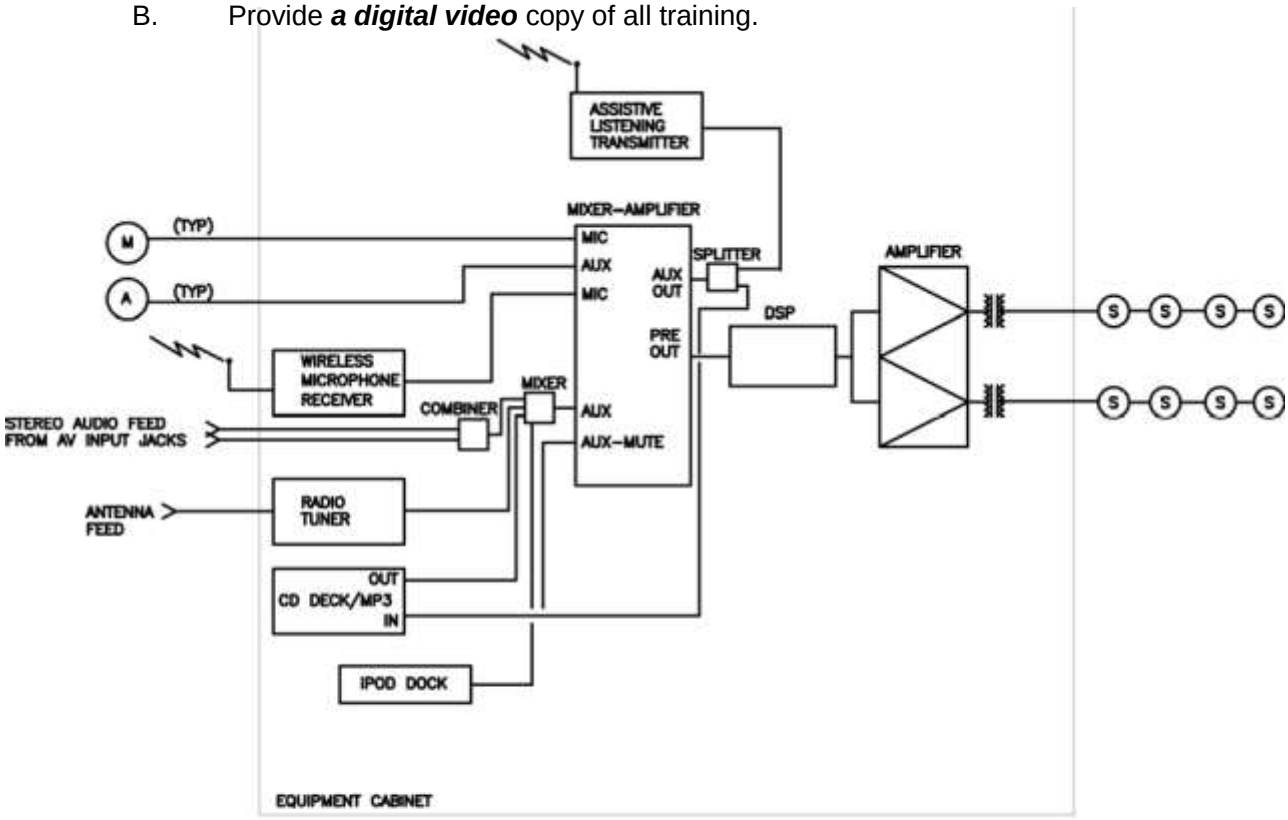
B. Loudness: At least 90 dB-SPL program level with an additional 6 dB Crest factor.

C. Evenness of coverage: Variation of less than +/- 3dB (400Hz to 4000Hz) at all seats.

1.9 TRAINING

A. Provide eight (8) hours training for District's personnel on the operation and maintenance of the system.

B. Provide ***a digital video*** copy of all training.



STUDENT DINING/CAFETERIA SOUND REINFORCEMENT SYSTEM DIAGRAM

SCALE: NONE (RE: 27 51 22)

NOTE: THIS DIAGRAM IS SCHEMATIC IN NATURE ONLY. IT IS INTENDED TO SHOW GENERAL CONFIGURATION OF THE SYSTEM. MODIFY TO ACCOMMODATE DESIGN PREFERENCES, OWNER NEEDS AND PROJECT CONDITIONS.

END OF SECTION

SECTION 275123

CENTRAL SOUND AND PAGING SYSTEM

GENERAL GUIDELINES

1.1 GENERAL

A. This section defines the general design requirements for a uniform Central Sound and Paging System that shall be followed for all OFCC Technology construction projects.

B. The basis of design is a full-function, microprocessor-based, two-way intercommunications/zoned paging/program distribution system interfaced with and operated by the telephone system (specified elsewhere).

C. An optional one-way zoned paging system, interfaced and operated by the telephone system (specified elsewhere) shall require an OFCC variance.

D. Refer to Section 8500, Technology Systems, for additional information.

1.2 SECTION INCLUDES

A. Central Sound and Paging System and all related components.

1.3 QUALITY ASSURANCE

A. NFPA 70 – National Electrical Code

B. Underwriter's Laboratory

C. TIA/EIA-607 Telecommunications Grounding

D. Eleventh Edition (or latest) BICSI Telecommunications Distribution Methods Manual (TDMM)

E. Americans with Disabilities Act (ADA)

F. Federal Communications Commission Part 15

G. Sound Systems Engineering (Davis & Patronis) – 3rd Edition 2006

H. Audio Systems Design and Installation (Giddings) 1990

1.4 SYSTEM WARRANTY

A. ***The Central Sound and Paging System shall be fully warranted for three (3) years from date of substantial completion by the contractor and manufacturer. If any defects are found within this warranty period, the defective system component shall be replaced at no extra cost to the Owner for parts or labor. Provide a statement of this warrant with the O&M manuals and to the Director of IT. Make available a service contract offering continuing factory authorized service of this system, after the initial warranty period.***

1.5 RELATED SECTIONS

A. Specification section 275313 – Clock Systems

B. Specification section 273113 – IP-Enabled PABX System
OR Specification section 273123 – IP-Only PABX System

1.6 MICROPROCESSOR-BASED TWO-WAY INTERCOM / PAGING / PROGRAM DISTRIBUTION SYSTEM (Base Design)

A. PABX System Interface

B. Administrative communications console – located in main office or at equipment headend

C. Microprocessor-based with RS-232 Interface for setup and/or control

D. Minimum eight (8) paging and time tone distribution zones

E. Internal time-tone schedule programming and software

F. Synchronization with clock system

G. Input signal prioritization

H. Dedicated home-run speaker circuits from each classroom or special function room (gymnasiums, dining rooms, multi-purpose rooms, exterior spaces, etc.). Call button cabling is included in baseline system whether the call button is installed or not. Extend to speaker location if call button is not installed.

I. Base Line - Call origination switches or handsets in each classroom with annunciator display in central school reception office. Variance required if District elects not to include. Technology Designer to review system with District, determine need for conduit/box rough-ins for future if District elects not to include in project via variance.

1.7 ONE-WAY ZONED PAGING SYSTEM (Optional System Requires Variance)

A. PABX System Interface.

B. Microprocessor-based, zoned paging/program distribution system

C. Minimum of six (6) paging zones

D. Distribution of class-change time tones as scheduled by Clock System

E. Input signal prioritization

F. One-Way Zoned Paging System Options:

1. High impedance, constant voltage system with centrally located power amplifiers and passive speakers with 25-volt transformers. Each classroom speaker circuit is to be individually wired and extended to head end equipment. Corridor and common area speakers are to be grouped according to zones.

2. Low-voltage, amplified speakers with central power supplies and star-wired CAT3 cabling system terminated on 110-style cross-connect blocks, located on the backboard in main Equipment Room (ER). Each speaker wired with dedicated, individual home-run cable. Use pair 1 for paging signal and pairs 2-4 for power.

G. Central paging power supplies based on system load. Connect to Main Equipment Room (ER) UPS unit, powered by building emergency generator circuit(s).

1.8 COMPONENTS COMMON TO ALL SYSTEMS:

A. PROGRAM SOURCE CABINET - Locate a wall-mounted or desktop cabinet in the central school reception office area and place within the cabinet:
1. i-Pod Docking Station (optional)
2. Weather radio and associated antenna (optional)
3. CD player or changer
4. AM/FM radio connected to the building antenna/RF distribution system
5. Monitor speaker panel for program cueing and preview
6. Connect audio outputs to audio inputs on the paging adapter (when applicable)

B. EMERGENCY/EVACUATION ALARM TONE PANEL
1. Locate in central school reception office area – either as a stand-alone wall-mounted device or within Program Source Cabinet.
2. Minimum of three (3) clearly labeled switches to activate distinct tones: EMERGENCY, EVACUATION, ALL-CLEAR.
3. Assign highest priority level

C. ALL-CALL PAGING MICROPHONE
1. Locate in central school reception office area. Use of receptionist's telephone handset is permissible, if acceptable to the school.

D. Locate a minimum of one (1) paging speaker or horn in all building rooms, including Mechanical areas. Base the quantity of speakers/horns on the required signal level and the size of the area to be covered.

E. Speaker and horn types:
1. Flush-mounted ceiling speakers with all metal protective dome enclosures and ceiling bridge support.
2. Surface-mount wall or ceiling speakers
3. Compression driver paging horns in gymnasiums, shop areas, mechanical rooms, exterior of building (weather-proof type) and other areas with high ambient sound levels.
4. Wall mounted volume controls in meeting rooms and other District specified areas.

1.9 INSTALLATION

A. Install and balance the paging system volume levels according to ambient noise levels.

B. Integrate with Telephone System PABX for access to zone paging and intercom (if applicable) functions.

C. Establish building paging zones as directed by the School District.

D. Provide programming and setup of paging zones, signal priorities, and bell (time tone) schedule.

E. Connect to building antenna (if applicable) and ground in accordance with NEC and TIA/EIA-607.

F. Install in accordance with manufacturer's installation instructions and recommendations.

1.10 TRAINING

A. Provide a minimum of forty (40) hours of training to the District's personnel. Plan for multiple training trips to the site. Training session(s) shall cover the following topics at a minimum:

1. System Equipment Connectivity
2. Device Configurations
3. Operation, maintenance, and upgrade procedures.

B. Training to be arranged with District personnel. 40 hours should be spread out over the length of the warranty (Ex: 8 hours at project turnover/completion, 8 hours at 3 months, 8 hours at 6 months, 8 hours at 1 year, 4 hours at 2 years, 4 hours at 3 year).

C. Training to occur in maximum of 2 hour increments per personnel or groups of personnel.

D. Consider requiring Contractor to provide manufacturer training vouchers for a portion of the training, which are valid during the warranty period.

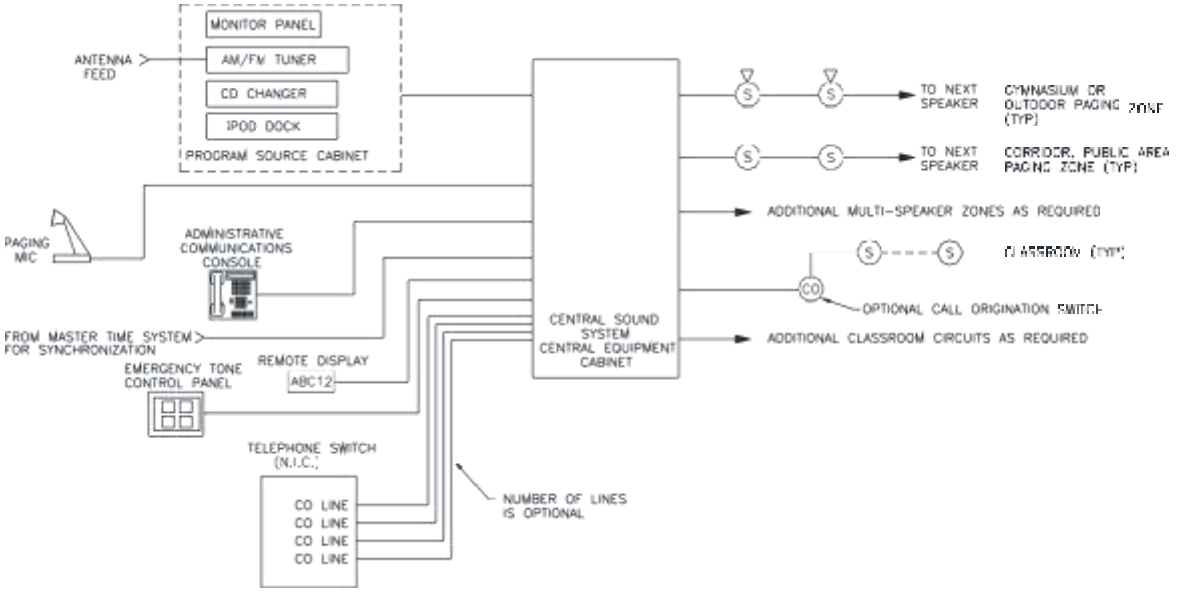
E. Training shall be by certified manufacturer instructor.

F. Training schedule shall be coordinated with District personnel and their needs.

G. Training plan, time line, and agenda shall be provided to District IT personnel and signed off by District and Contractor.

H. Warranty certificate and agreement shall be provided to District IT personnel at initial training session.

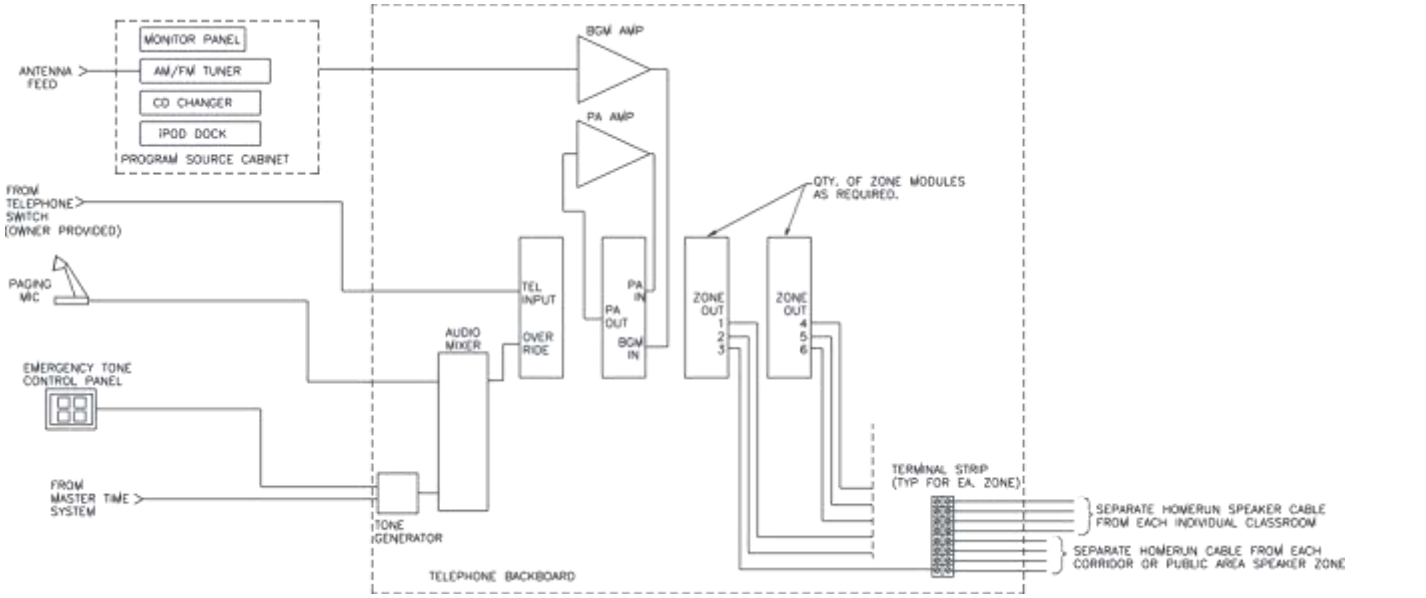
I. Provide a digital video copy of the training sessions.



CENTRAL SOUND/INTERCOM SYSTEM DIAGRAM (BASELINE SYSTEM)

SCALE: NONE (RE: 27 51 23A)

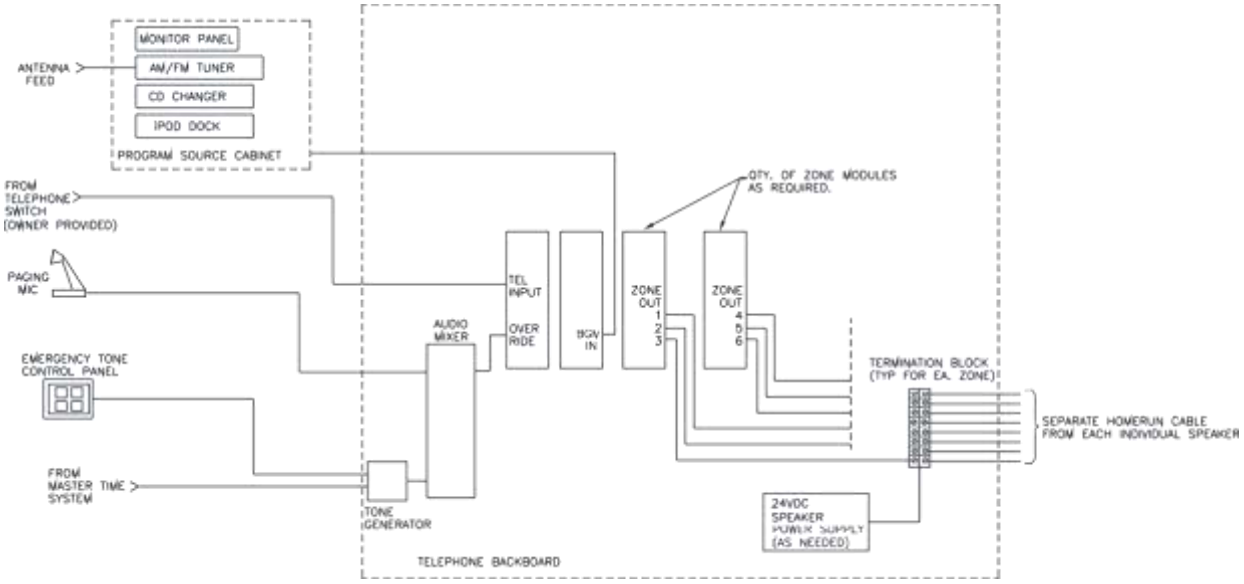
NOTE: THIS DIAGRAM IS SCHEMATIC IN NATURE ONLY. IT IS INTENDED TO SHOW GENERAL CONFIGURATION OF THE SYSTEM. MODIFY TO ACCOMMODATE DESIGN PREFERENCES, OWNER NEEDS AND PROJECT CONDITIONS.



CENTRAL SOUND PAGING/PROGRAM DISTRIBUTION SYSTEM DIAGRAM – PASSIVE SPEAKERS

SCALE: NONE (RE: 27 51 23B) (OPTIONAL - REQUIRES VARIANCE)

NOTE: THIS DIAGRAM IS SCHEMATIC IN NATURE ONLY. IT IS INTENDED TO SHOW GENERAL CONFIGURATION OF THE SYSTEM. MODIFY TO ACCOMMODATE DESIGN PREFERENCES, OWNER NEEDS AND PROJECT CONDITIONS.



CENTRAL SOUND PAGING/PROGRAM DISTRIBUTION SYSTEM DIAGRAM – POWERED SPEAKERS

SCALE: NONE (RE: 27 51 23C) (OPTIONAL - REQUIRES VARIANCE)

NOTE: THIS DIAGRAM IS SCHEMATIC IN NATURE ONLY. IT IS INTENDED TO SHOW GENERAL CONFIGURATION OF THE SYSTEM. MODIFY TO ACCOMMODATE DESIGN PREFERENCES, OWNER NEEDS AND PROJECT CONDITIONS.

END OF SECTION

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SECTION 275124

GYMNASIUM SOUND REINFORCEMENT SYSTEM

GENERAL GUIDELINES

1.1 GENERAL

A. This section defines the general design requirements for a uniform Gymnasium Sound Reinforcement System that shall be followed for all OFCC Technology construction projects – High School, Middle School, and Elementary School facilities.

B. The variations as related to school type are defined in Parts 2 and 3 of this guideline.

C. Refer to Section 8500, Technology Systems, for additional information.

1.2 SECTION INCLUDES

A. Gymnasium Sound Reinforcement System and all related components.

1.3 QUALITY ASSURANCE

A. NFPA 70 - National Electrical Code.

B. Underwriter's Laboratory.

C. TIA/EIA-607 Telecommunications Grounding.

D. Eleventh Edition (or latest) BICSI Telecommunications Distribution Methods Manual (TDMM).

E. Americans with Disabilities Act (ADA).

F. Federal Communications Commission Part 15.

G. Sound System Engineering (Davis & Patronis) – 3rd Edition 2006.

H. Audio Systems Design and Installation (Giddings) 1990.

1.4 SYSTEM WARRANTY

A. The Gymnasium Sound Reinforcement System shall be warranted by the contractor for a period of ***three (3)*** years from date of substantial completion.

1.5 MATERIALS

A. Stationary Main Equipment Cabinet with the following rack mounted equipment:
   1. Mixer/Preamplifier
   2. Power Amplifier(s)
   3. Digital Signal Processor(s)
      a) RS-232 Interface for Configuration and Tuning
      b) Equalization Filters – graphic and/or parametric
      c) Compressor/Limiter
      d) Digital Delay for cluster alignment
      e) High and Low Pass and Shelving Filters
      f) Feedback Suppression (may be incorporated in DSP or a stand-alone unit)
      g) Crossover (if bi-amplified speaker system is utilized)
      h) Selectable scene presets
   4. AM/FM radio tuner
   5. Digital audio recording device.
   6. Assistive Listening Transmitter (provide with ADA-compliant quantity of receivers)
   7. Sequencing AC Power Control System
   8. Passive or Active thermal control

B. Mobile Equipment Cabinet shall contain the following equipment for mic level signal insertion into a wall or floor mounted microphone jack:
   1. Rack-mounted mixer with mic level output
   2. Wireless microphone receiver with handheld and/lor lavaliere microphone
   3. CD/CD-R/CD-RW/MP3 Player
   4. i-Pod Docking Station
   5. Input/output jack panel
   6. AC power distribution panel
   7. Note: In Middle and Elementary School Gymnasium systems, the mobile equipment cabinet may be eliminated with the associated components being located in the Stationary Equipment Cabinet.

C. Speaker cluster or distributed speakers suspended from structure.
   1. Middle School and Elementary School Gymnasium speaker systems shall provide even coverage of both the entire floor area and seating areas.
   2. High School Gymnasium speaker systems shall provide switchable speaker zones as follows: Home Bleachers, Visitors Bleachers, Floor, and Mezzanine (where applicable). The zone selection shall be performed via selector switches in the Stationary Equipment Cabinet.

D. Microphone input jack at scorer's table.

E. Distributed mic/aux level input jacks on end walls –OR- mic level input jacks only (provide with aux/line level-to-microphones level direct box(es).

1.6 INSTALLATION

A. Install and balance system. Adjust all sound levels for desired operation levels and evenness of coverage.

B. Adjust all wireless equipment and verify coverage areas.

C. Check polarity of all speakers and adjust all microphone and source input levels.

D. Connect FM Tuner to external, building mounted FM Antenna and Distribution System. Ground Antenna in accordance with NEC and TIA/EIA-607. –OR- Receive radio reception from Distributed Broadband RF system as specified in another spec section.

E. Ground equipment cabinet and associated equipment to cabinet-mounted telecommunications grounding buss bar in accordance with NEC and TIA/EIA-607.

F. Install in accordance with manufacturer's installation instructions and recommendations.

1.7 PERFORMANCE TESTING

A. Frequency response: 100Hz – 14kHz +/- 3 dB

B. Loudness: High School Varsity Gym: At least 100dB-SPL program level with an additional 6dB Crest factor; Middle, Elementary School and Auxiliary Gym: At least 90dB-SPL program level with an additional 6 dB Crest factor

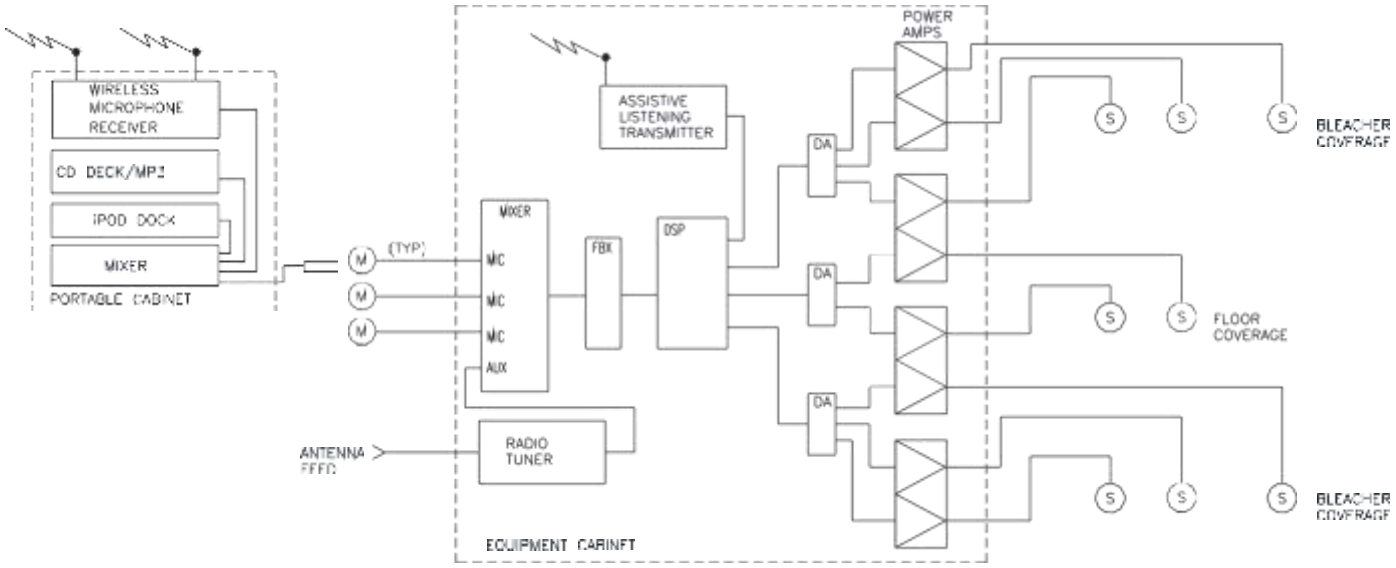
C. Evenness of coverage: Variation of less than +/- 3 dB (400Hz to 4000Hz) at all seats.

1.8 TRAINING

A. Provide minimum eight (8) hours training for District's personnel on the operation and maintenance of the system.

B. Provide ***a digital video*** copy of all training.

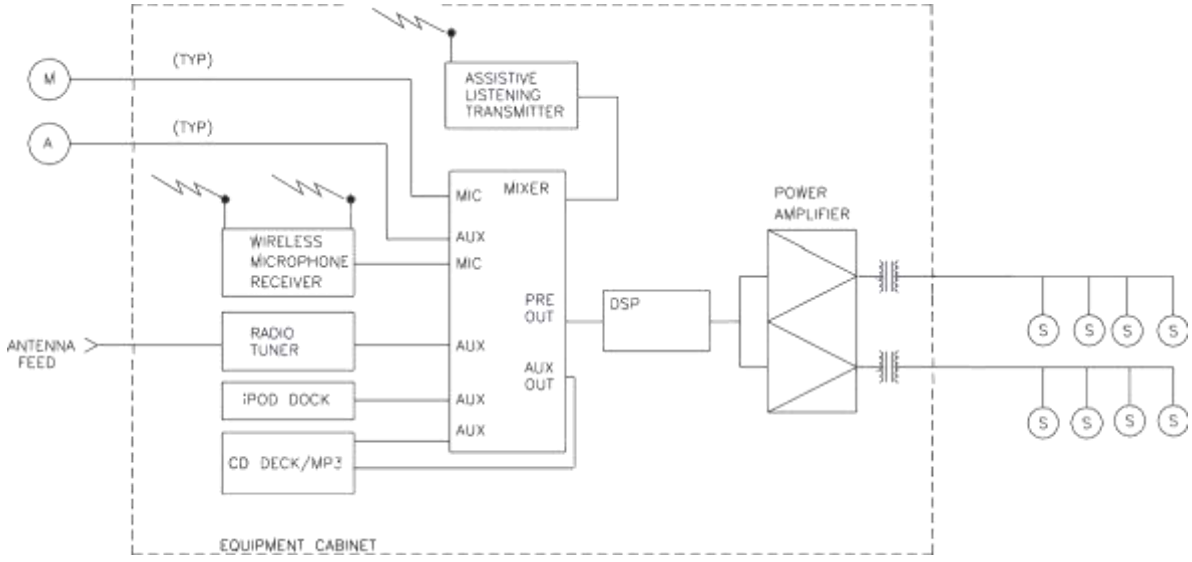
(See diagrams on next page)



HS GYMNASIUM SOUND SYSTEM DIAGRAM

SCALE: NONE (RE: 27 51 24A)

NOTE: THIS DIAGRAM IS SCHEMATIC IN NATURE ONLY. IT IS INTENDED TO SHOW GENERAL CONFIGURATION OF THE SYSTEM. MODIFY TO ACCOMMODATE DESIGN PREFERENCES, OWNER NEEDS AND PROJECT CONDITIONS.



MS/AUX GYMNASIUM SOUND SYSTEM DIAGRAM

SCALE: NONE (RE: 27 51 24B)

NOTE: THIS DIAGRAM IS SCHEMATIC IN NATURE ONLY. IT IS INTENDED TO SHOW GENERAL CONFIGURATION OF THE SYSTEM. MODIFY TO ACCOMMODATE DESIGN PREFERENCES, OWNER NEEDS AND PROJECT CONDITIONS.

END OF SECTION

SECTION 275125

MUSIC ROOM AUDIO PROGRAM PLAYBACK SYSTEM - MIDDLE SCHOOL

GENERAL GUIDELINES

1.1 GENERAL

A. Refer to Section 8500, Technology Systems, for additional information.

1.2 SECTION INCLUDES

A. Music room sound system and components for playback of audio program material.

1.3 QUALITY ASSURANCE

A. NFPA 70 - National Electrical Code.

B. Underwriter's Laboratory.

C. TIA/EIA-607 Telecommunications Grounding.

D. Eleventh Edition (or latest) BICSI Telecommunications Distribution Methods Manual (TDMM).

E. American with Disabilities Act.

F. Federal Communications Commission Part 15.

G. Sound System Engineering (Davis & Patronis) – 3rd Edition 2006.

H. Audio Systems Design and Installation (Giddings) 1990.

1.4 SYSTEM WARRANTY

A. The Sound System shall be warranted by the contractor for a period of ***three (3)*** years from date of substantial completion.

1.5 MATERIALS

A. Mobile or permanently mounted main equipment rack.
   1. Stereo Mixer or Source Selection Device – rack-mounted.
   2. Dual channel Amplifier.
   3. Dual channel octave band equalizer.
   4. CD/CD-R/CD-RW/MP3 Player.
   5. i-Pod Docking Station.
   6. Input Jack panel for insertion of external sources.

B. Wall mounted or tripod mounted speakers – stereo pair.

C. Wall-mounted speaker jack plate – for connection of amplifier in mobile rack to permanently-mounted speakers.

1.6 INSTALLATION

A. Install and balance system volume levels.

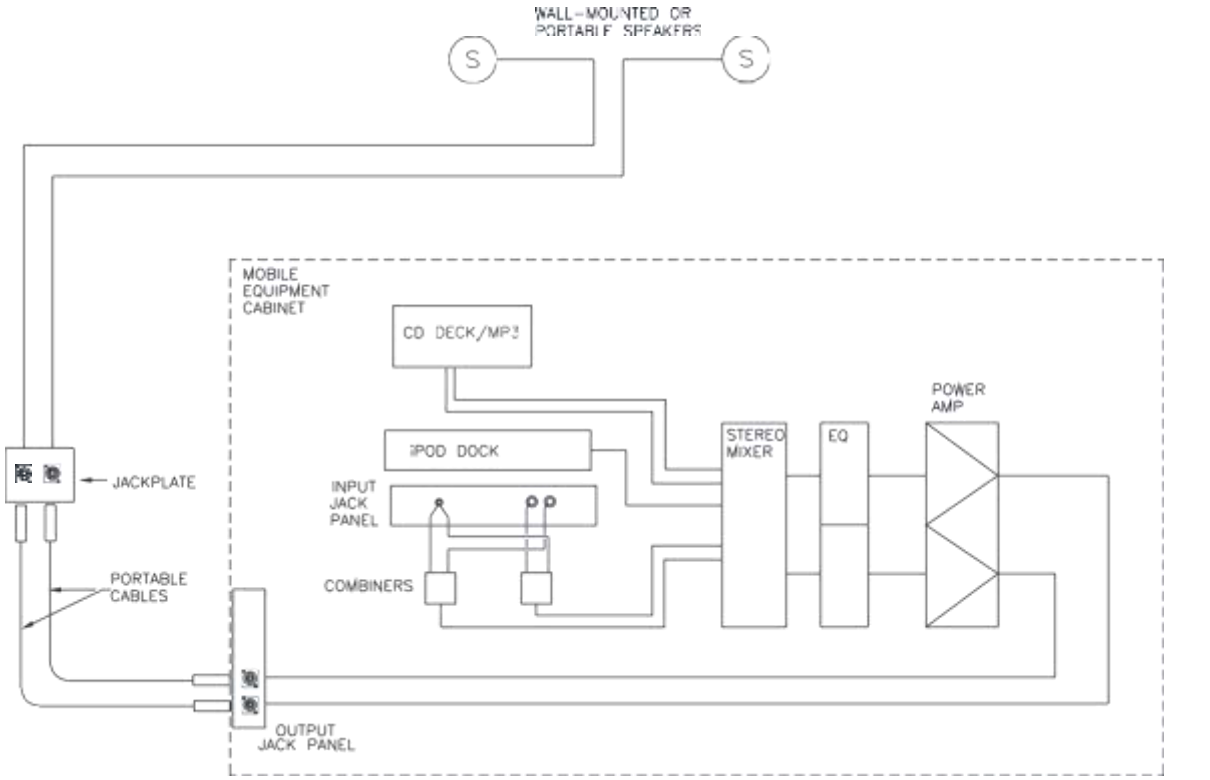
B. Check polarity of all speakers.

C. Install in accordance with manufacturer's installation instructions and recommendations.

1.7 TRAINING

A. Provide four (4) hours training for District's personnel on the operation and maintenance of the system.

B. Provide ***a digital video*** copy of all training.



NOTE: SINGLE MOBILE EQUIPMENT CABINET SHARED BETWEEN VOCAL & INSTRUMENTAL ROOMS.

NOTE: THIS DIAGRAM IS SCHEMATIC IN NATURE ONLY. IT IS INTENDED TO SHOW GENERAL CONFIGURATION OF THE SYSTEM. MODIFY TO ACCOMMODATE DESIGN PREFERENCES, OWNER NEEDS AND PROJECT CONDITIONS.

MS MUSIC ROOM PLAYBACK SYSTEM DIAGRAM

SCALE: NONE (RE: 27 51 25)

END OF SECTION

SECTION 275126

MUSIC ROOM AUDIO RECORDING/PLAYBACK SYSTEM - HIGH SCHOOL

GENERAL GUIDELINES

1.1 GENERAL

A. Refer to Section 8500, Technology Systems, for additional information.

1.2 SECTION INCLUDES

A. Music room sound system and components for recording and playback of audio program material.

1.3 QUALITY ASSURANCE

A. NFPA 70 - National Electrical Code.

B. Underwriter's Laboratory.

C. TIA/EIA-607 Telecommunications Grounding.

D. Eleventh Edition (or latest) BICSI Telecommunications Distribution Methods Manual (TDMM).

E. American with Disabilities Act.

F. Federal Communications Commission Part 15.

G. Sound System Engineering (Davis & Patronis) – 3rd Edition 2006.

H. Audio Systems Design and Installation (Giddings) 1990.

1.4 SYSTEM WARRANTY

A. The Sound System shall be warranted by the contractor for a period of ***three (3)*** years from date of substantial completion.

1.5 MATERIALS

A. Mobile or permanently mounted main equipment rack.
   1. Stereo microphone mixer/pre-amplifier – rack-mounted.
   2. Recording Input patch panel for insertion of external microphones or mixing consoles.
   3. Stereo program playback mixer or source selection device – rack-mounted.
   4. Program source, playback patch panel for insertion of external playback devices.
   5. Dual channel amplifier.
   6. Dual channel, octave band equalizer.
   7. CD/CD-R/CD-RW/MP3 Player

8. i-Pod Docking Station.
9. Digital audio recording device
10. Stereo hanging and/or floor stand microphones as required.

B. Wall mounted or tripod mounted speakers – stereo pair.

C. Wall mounted speaker jack plate – for connection of amplifier in mobile rack to permanently mounted speakers.

1.6 INSTALLATION

A. Install and balance system volume levels.

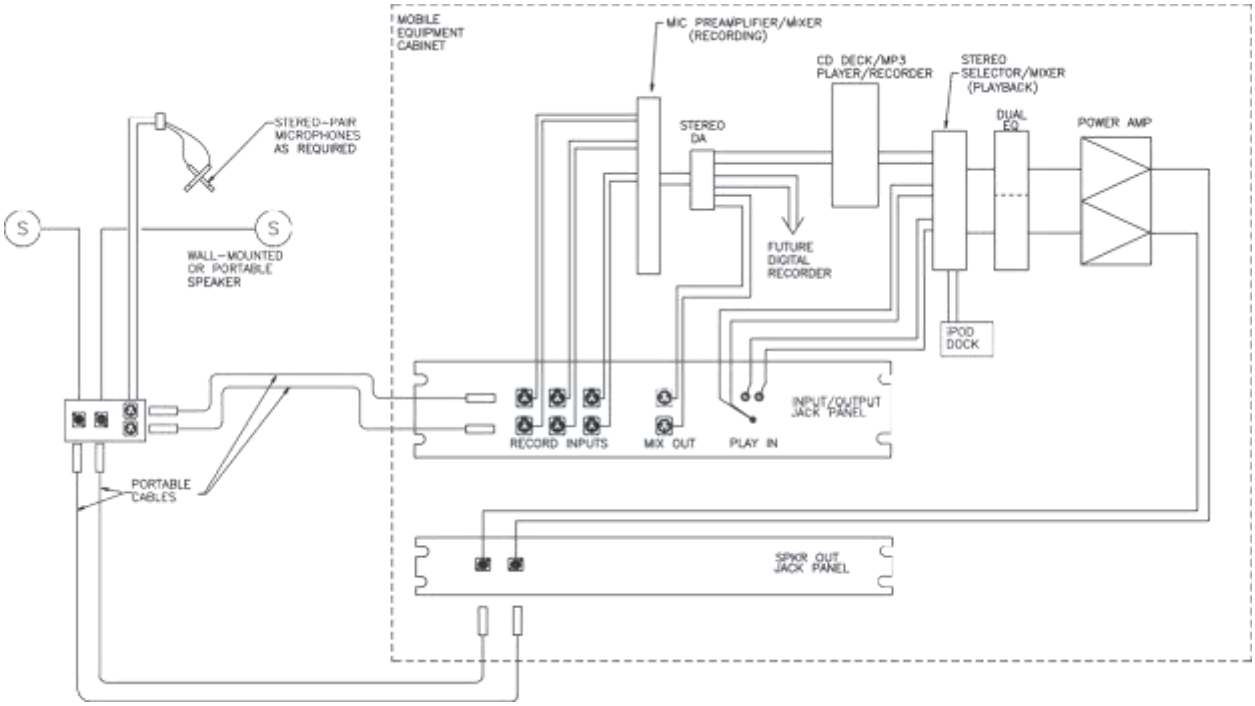
B. Check polarity of all speakers and microphones.

C. Install in accordance with manufacturer's installation instructions and recommendations.

1.7 TRAINING

A. Provide four (4) hours training for District's personnel on the operation and maintenance of the system.

B. Provide ***a digital video*** copy of all training.



HS MUSIC ROOM RECORD/PLAYBACK SYSTEM DIAGRAM

SCALE: NONE (RE: 27 51 26)

NOTE: THIS DIAGRAM IS SCHEMATIC IN NATURE ONLY. IT IS INTENDED TO SHOW GENERAL CONFIGURATION OF THE SYSTEM. MODIFY TO ACCOMMODATE DESIGN PREFERENCES, OWNER NEEDS AND PROJECT CONDITIONS.

END OF SECTION

SECTION 275127

CLASSROOM SOUND REINFORCEMENT SYSTEM

GENERAL GUIDELINES

1.1 GENERAL

A. This Section defines the general design requirements for a uniform Classroom Sound Reinforcement System that shall be followed for all OFCC Technology construction projects.

B. Refer to Section 8500, Technology Systems for additional information.

1.2 SECTION INCLUDES

A. Classroom sound reinforcement system and components.

1.3 QUALITY ASSURANCE

A. NFPA 70 – National Electrical Code.

B. Underwriter's Laboratory.

C. Latest ANSI TIA/EIA-568, 569, 606, 607 Standards and Eleventh Edition (or later).

D. Eleventh Edition (or latest) BICSI Telecommunications Distribution Methods Manual (TDMM).

E. American with Disabilities Act.

F. Federal Communications Commission Part 15.

1.4 SYSTEM WARRANTY

A. The Sound System shall be warranted by the contractor for a period of ***three (3)*** years from date of substantial completion.

1.5 CLASSROOM SOUND REINFORCEMENT SYSTEM

A. IR or RF Receiver/Amplifier, equipped with:
   1. Minimum of 30-Watts RMS Watts total output.
   2. Minimum of 50-20 KHz frequency response.
   3. Two (2) wireless microphone input channels with individual volume controls.
   4. Tone Controls or Equalizer.
   5. Minimum of three (3) auxiliary line inputs with individual volume controls.
   6. Minimum of one (1) line output for optional ADA, wireless headphone system.
   7. System Power Supply.
   8. Power Switch.
   9. Minimum of two (2) wireless microphone frequencies.
   10. Minimum of one (1) ceiling-mounted, Infrared sensor or RF antenna with plenum rated cabling.

11. One (1) Lavaliere or collar microphone, with NiMH rechargeable batteries and charger.
12. One (1) Handheld microphone, with NiMH rechargeable batteries and charger.
13. Minimum of four (4) acoustical ceiling mounted, 360-degree dome speakers with all metal acoustical back enclosure and ceiling tile bridge, minimum 15-Watt capacity and minimum of 65-20KHz frequency response.
14. Receiver/Amplifier must be capable of being placed in Instructor's casework or cabinet mounted with no loss of infrared signal strength.
15. Unit must provide uniform pickup from the Instructor's microphone throughout the classroom.
16. Provide means for the central paging system to mute or override the classroom sound reinforcement system when a central page occurs.
17. Both IR or encrypted RF technologies are acceptable, providing transmission does not interfere with reception in other rooms. Multi-channel, encrypted RF systems shall provide auto frequency selection.

B. Optional – Provide quantity of two (2) FM/Bluetooth Assisted Listening Systems interfacing with Classroom Sound Reinforcement System per school building.

1.6 INSTALLATION

A. Install in accordance with manufacturer's installation instructions.

B. Per Speaker, provide minimum of 16 AWG, CMP rated speaker wire. Wire gauge based on cable lengths and power ratings.

C. Route speaker wires through associated faceplate Space speakers in classroom to provide uniform coverage.

D. For rooms using Overhead Mounted Projectors:
1. Provide a wall bracket/shelf for mounting Infrared Receiver/Amplifier or mounted in cabinet or casework.
2. Provide Line Level cabling from Instructor's PC, DVD/Blu-Ray Unit and MPEG Set-Top-Box Line Outputs to Auxiliary Line Inputs on Infrared Receiver/Amplifier.
3. Balance and adjust all volume levels.
4. Check uniform polarity of speakers.

E. Add additional speakers and infrared sensors in large classrooms, as required, to maintain complete coverage.

F. Classroom Sound Reinforcement system shall be installed in all classrooms/labs for K-12.

G. Classroom Sound Reinforcement system shall be integrated with the classroom A/V system.

1.7 TRAINING

A. Provide four (4) hours training for District's personnel on the operation and maintenance of the system.

B. Provide ***a digital video*** copy of all training.

END OF SECTION

SECTION 275313

CLOCK SYSTEMS

GENERAL GUIDELINES

1.1 GENERAL

A. This Section defines the general design requirements for a uniform Building-wide Synchronized Clock System that shall be followed for all OFCC Technology construction projects.

B. The options are defined in Parts 2 and 3 of this guideline.

C. Refer to Section 8500, Technology Systems, for additional information.

1.2 SECTION INCLUDES

A. Master Clocks, Secondary Clocks and accessory components.

1.3 QUALITY ASSURANCE

A. NFPA 70 – National Electrical Code

B. Underwriter's Laboratory

C. TIA/EIA-607 Telecommunications Grounding

D. *Eleventh* edition (or latest) BICSI Telecommunications Distribution Methods Manual (TDMM)

1.4 SYSTEM WARRANTY

A. The Clock System shall be warranted by the Contractor for a period of ***three (3)*** years from date of substantial completion.

1.5 RELATED SECTIONS

A. Specification Section 275123 - Central Sound and Paging System

1.6 GENERAL

A. Synchronized with the United States Atomic Clock via GPS receiver with external antenna, NTP Internet connection, or CDMA.

B. Self-correcting for Daylight Savings Time changes.

C. Analog Secondary Clocks:
1. 12" diameter minimum, surface-mounted.
2. Metal hour, minute, and second hands with impact resistant molded plastic case.

3. Corridors: Double-faced, securely mounted perpendicular to wall or ceiling mounted.
4. Gymnasiums: 15” diameter minimum. Provide wire guards in gymnasiums, auxiliary gymnasiums, and locker rooms.

D. Digital Secondary Clocks:
1. 2.3” height minimum, 4-digit, 7-segment LED display with metal case.
2. Corridors: Double-faced with perpendicular wall or ceiling mount.
3. Gymnasiums: 4” height minimum, 4-digit, 7-segment LED display with metal case. Provide wire guards in gymnasiums, auxiliary gymnasiums, and locker rooms.
4. Optional Text Messaging capability.

E. Master Clock with software-programmable, integral building bell schedule and audible tone generator with selectable tones to provide class change tones to input of Central Sound System.
1. Minimum of four (4) selectable, pre-programmed class change schedules, easily selectable from the main school office.
2. Manual activation of audible tone from the main school office.
3. Permanent or periodic temporary RS-232 connection to PC fordata download update of class change schedules.
4. NOTE: Where Central Sound Systems with built-in tone generator and programmable bell schedule function are utilized, the Master Clock need only to be able to synchronize time with the Central Sound System headend processor.

1.7 WIRELESS CLOCK SYSTEMS

A. Battery-operated - minimum 5-year battery life

B. Provide RF transmitters and antennas, as required to provide complete building-wide coverage.

1.8 WIRED CLOCK SYSTEMS

A. Low-voltage power – 24V or less

B. Central or distributed power supplies as required

C. Optional IEEE 802.3af, Power Over Ethernet (POE) connectivity

1.9 INSTALLATION

A. Securely mount the clocks flush on the walls in classrooms and office areas.

B. Connect tone generator output to input of Central Sound System if function is not provided by that system.

C. Synchronize time with the Central Sound System master clock if the tone generation and program schedule functions are provided by that system.

D. Program initial bell schedules as provided by the Owner.

E. Located schedule selection and manual bell activation functions in main school office.

1.10 TRAINING

A. Provide four (4) hours training for School/District personnel on the operation, programming, and maintenance of the system.

B. Provide ***a digital video*** copy of all training.

END OF SECTION

DIVISION 28

ELECTRONIC SAFETY AND SECURITY

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DIVISION 28: ELECTRONIC SAFETY AND SECURITY

281300 Access Control System
281600 Intrusion Detection System
282300 Video Surveillance System
282600 Area of Refuge Intercommunication System
283111 Digital, Addressable Fire-Alarm System

SECTION 281300

ACCESS CONTROL SYSTEM

GENERAL GUIDELINES

1.1 GENERAL

A. This Section defines the general design requirements for a uniform Access Control System that shall be followed for all OFCC Technology construction projects.
B. Refer to Sections 8500, Technology Systems, 28 16 00 Intrusion Detection System, and 28 23 00 Video Surveillance System for additional information.

1.2 SECTION INCLUDES

A. Integrated Security Management (ISM) System
B. Uninterruptible Power Supply (UPS).

1.3 QUALITY ASSURANCE

A. National Fire Protection Association.
B. NFPA 730 – Guide for Premises Security
C. NFPA 731 – Standard for the Installation of Electronic Premises Security Systems
D. National Electric Code.
E. American with Disabilities Act.
F. Underwriter's Laboratory.
G. Latest ANSI TIA/EIA-568, 569, 606, 607 Standards and Eleventh Edition (or later).
H. BICSI Telecommunications Distribution Methods Manual (TDMM).

1.4 SYSTEM WARRANTY

A. ***The Access Control System and software shall be fully warranted for three (3) years from date of substantial completion by the contractor and manufacturer. If any defects are found within this warranty period, the defective system component shall be replaced at no extra cost to the Owner for parts or labor. Provide a statement of this warranty with the O&M manuals and to the Director of IT. Make available a service contract offering continuing factory authorized service of this system after the initial warranty period***.

1.5 GENERAL

A. Furnish a new Integrated Security Management (ISM) system that provides a simple and easy-to-use graphical user interface.

B. The system shall provide local ***and remote*** operational control of all access points and alarm sensors.

C. The ISM System client and server software shall be used in conjunction with intelligent controllers to provide a distributed access control and alarms monitoring system.

D. In the event of a communications failure between the host server and the remote controllers, the controllers shall continue to make local access control decisions and save all transactions in memory until communications are restored. At that time the controller shall upload all stored transactions to the Central Server.

E. When a District has more than one building, the Central Server shall be located in one of the District's buildings and the other buildings shall be attached to the Central Server via the Wide Area Network. All buildings in the District shall interface to the Central Server and Control Consoles.

F. The ISM System shall seamlessly integrate the functions of Access Control, Alarm Monitoring and Response, Digital Video Imaging and Badge Design/Creation, and Visitor Management.

G. Access Readers supporting various technologies shall provide data from proximity card presentations via a door control unit that includes the electrical interface to the reader as well as inputs for door sensors and relays for outputs.

1.6 HARDWARE FEATURES

A. MODULAR SYSTEM DESIGN

1. Device Control Modules shall be located in the Telecommunications Rooms (TRs) and connected to the Building Controller via hardwired bus connections or via an Ethernet TCP/IP Network.

2. The Building Controller shall be located in the Main Equipment Room (ER) and connected to the Central Server via an Ethernet TCP/IP connection over the District's Wide Area Network (WAN). All WAN communication shall be AES encrypted.

3. Individual IP-based door control modules may be field located at the door.

B. ELEVATOR CONTROL, AS APPLICABLE

1. The system shall have the ability to provide elevator access control by (1) using a card reader to activate the elevator call button, (2) using a card reader in the cab to activate the correct floor selection button, or (3) a combination of both of these functions.

2. Each cardholder shall then have floor permissions assigned as part of the normal access rights. The system shall provide outputs to the elevator controls to verify which floors are authorized for each cardholder. The system shall be capable of tracking which floor was enabled/selected by that person

C. AVAILABILITY AND DISASTER RECOVERY

1. The system shall automatically synchronize any distributed databases.

2. The system shall be capable of having a redundant or clustered Central Server.

4. In the event of loss of communications with the Central Server, the Building Control Units shall revert to a survivable remote operation and continue operation until communications is restored.

1.7 SOFTWARE FEATURES

A. PERMISSIONS

1. The system shall support multiple Operator permission levels.

B. VIDEO IMAGING AND ID BADGE PRINTING

1. The system shall incorporate video imaging as a fully integrated function to customize access control cards by printing an identity badge directly onto the card.

2. The badge design and image capture capabilities shall combine with the latest technology card printers to allow the production of an ID badge pass for each cardholder at the time of registration.

3. For each cardholder both a facial image and a signature shall be able to be captured, or imported, and stored as part of the card record.

5. A comprehensive integrated badge design and printing facility shall also be provided, allowing an unrestricted number of custom badge layouts to be defined then saved with a suitable description as a reference.

6. When creating a new card record a badge preview screen shall also be included that displays the specific card's details on the selected badge design to allow confirmation prior to requesting the badge to be printed.

7. Each new cardholder record shall have the option to be flagged for future printing. Cards flagged in this manner shall be easily recalled at a later stage and processed for output to the printer in a single action.

8. The ISM System shall support any manufacturer's ID badge printer with a ***current*** Microsoft ***platform*** (depending on the workstation configuration) compatible printer driver.

9. Provide one (1) Video Camera and Badging system per District.

C. VIDEO VERIFICATION

1. Depending on the District's needs, a Video Imaging option shall be available to provide a monitoring screen that will automatically display the stored image for a card when used at a reader.

2. This screen shall operate in conjunction with a live video input from a CCTV camera viewing the selected access point, allowing the operator to verify that each card offered is in fact being used by the person to whom it was issued.

3. ***Optional -*** This screen shall also be frozen and printed to provide a hard copy evidence of any abuse observed by the operator. For District's with high security access points, the system shall be configured to not grant access until the operator has verified the stored and live images are the same person, with the door release being controlled by the system operator.

D. REPORT GENERATION

1. Extensive history reporting shall be a standard integrated feature and shall include the ability to review all system alarms, access control activity, and operator actions. These reports shall be made available for review via the operator's display screen, a printer, or to another disk media. Extensive sort parameters shall include by any of the "Personal Details" fields or Titles, for example, by "Department", and only Names commencing with "Sm*".

2. The system shall also support generation of reports detailing the system operation such as:

a. Cards on site.

b. Hours on site.

c. Cardholders with access to each door.

d. Access rights of each cardholder.

e. System Configuration.

f. Scheduled and Conditional Commands defined.

g. System operator transaction history.

3. It shall be possible to replay video clips associated with events by directly interacting with the report as published to the computer screen.

E. ADDITION OF CARDHOLDERS TO THE SYSTEM DATABASE

1. The system shall provide a means of assigning access control rights to each cardholder. Access control rights determine which access points are accessible to the cardholder based on date and time of day.

2. The software shall also provide an ALTERNATE set of Access rights to a cardholder on a temporary basis. The change may be initiated at any time by an authorized operator, or automatically between specified dates. This shall provide the ability of automatically changing a card's rights between a specified date range, after which the card will revert to its normal Doors and Times. Alternate access rights shall be able to be configured for multiple date ranges.

3. Each cardholder shall either be associated with standard door timings, for door release, door open and door pre-held or be given extended timings for disabled persons or someone who has to push a cart.

4. The system shall permit individual Access Rights or Group Access Rights to be assigned.

F. CARDHOLDER DETAILS

1. Cardholder information shall include first and last name, card number, PIN code and valid period to provide automatic expiration. Each cardholder record shall also incorporate at least 50 user-defined personal data fields, independent of user-defined fields for visitor management.

2. Data base synchronization utilities shall be provided to synchronize the Access Control Database with the District's HR database. Removing an individual from the District's HR database shall automatically be queued for removal from the Access Control Database.

G. LOCATOR

1. This feature shall provide a quick method of locating cardholders by displaying the last 10-25 valid history events along with the time, date and access point used. This information shall be available for an individual or group of persons by name, card number or by personal data.

H. CARD WATCH FEATURE

1. It shall be possible to easily track any individual as they move around a large site by selecting a card watch. As the person uses their access control card, the system shall have the ability to automatically notify the operator of the person's presence at each location.

I. MASTER CARD MODE

1. Master card mode authority shall be assigned to special cardholders, such as building maintenance, principals, etc. These features should be enabled on a per reader basis. This shall allow a person when vacating an area or building to change the reader's mode of operation from normal access control to Master Card Out operation.

2. When in this condition only persons with Master card privileges shall gain access through the door, all non-Master card users are rejected regardless of their card's current access rights.

3. This special feature shall be activated/deactivated by the Master cardholder, using a card presentation followed by a special code entered via the reader's keypad.

J. AUTOMATIC HOLIDAY OVERRIDE

1. The software shall be able to be programmed by the operator to recognize special or holiday dates, which in turn can be linked to operational changes in how the site is to be managed on these specific days.

2. This feature shall notify a system operator of individual holiday dates up to seven days prior ***to provide*** a useful check on the date's current validity.

3. Multiple types of holiday dates shall also be provided so that partial school days or early closing requirements on specific dates can be accommodated.

K. ALARM MANAGEMENT

1. The system shall provide flexible alarm management.

2. The system shall support the ability to selectively choose alarms to acknowledge and/or clear.

3. Each alarm shall be capable of linking video from the CCTV digital video recorders for incident playback – fully integrated system.

4. An alarm monitor display shall support the display of alarm statistics.

5. Alarms shall be capable of being routed to specific client machines by time of day or day of week.

6. Unacknowledged alarms shall be capable of being routed to alternate client or Email address based on age and priority of alarm.

7. The display of reader door alarms shall be automatically enabled or disabled by the use of timed commands, either by reader or by a group of readers.

L. GRAPHICAL SITE MAPS

1. To further enhance the presentation to the operator, the system shall have the ability to import and use graphical maps. Individual building Maps shall be linked together using a tiered tree structure. To speed the location of an incident, each map level shall contain a clearly visible indicator as to which sub map the operator should select next to find the device that is in alarm.

2. The status of readers, doors, monitor points and auxiliary outputs shall be requested from any map by simply selecting the icon representing the device and its current state will be displayed.

3. Maps shall be created using standard office tools such as Paint® or drawing packages such as AutoCAD®. It shall be possible to import drawings in the following formats: JPEG, Bitmap, Windows metafile or DXF. The maps shall be prepared by the Contractor for the District.

4. Icons representing access points, monitoring points, switching outputs, alarm inputs, CCTV cameras or intercom call stations shall be placed on any map at the required location in a drag and drop manner.

5. It shall be possible to define on the map the location of readers, access doors, alarm-monitored points, output switching relays, CCTV cameras, Digital Video Recorder Cameras, Intercom call stations and alarm panel devices.

6. The map display shall allow the operator to switch the video display of any defined CCTV camera to any defined CCTV monitor. The map display shall allow the display of stored and live Digital Video Clips – fully integrated system.

7. The map display shall include the option to group and display similar devices as a single icon. Once devices are grouped it shall be possible to change their status. For example, it shall be possible to unlock/lock all Building or District entrance doors by executing a single command from the map display.

M. MANUAL AND AUTOMATIC COMMANDS

1. The system shall provide for both manual and automated commands. For example it shall be possible to schedule a command to automatically lock/unlock all doors at a specified time.

N. USER CODE MODE

1. The System shall support the ability to put a keypad-equipped reader into User Code Mode. This feature shall allow a cardholder to gain access by entering a valid card's number at a reader keypad, therefore not requiring the holder to carry a card.

2. User code mode shall be enabled on a per reader basis.

O. VISITOR MANAGEMENT **-** OPTIONAL

1. Visitor Management shall be incorporated as an optional feature of software, as coordinated with the School District's requirements. Operators shall be able to pre-enroll visitors. Any operator with visitor permissions assigned ***has*** the ability to pre-enroll visitors.

2. Visitor time of arrival and time of departure shall be tracked by the system. This feature shall be available even if a visitor is not issued a card or card number in the system.

3. The System shall support an optional driver's license scanner including optical character recognition to ease data entry.

4. The System shall support capture of a business card image.

5. The system shall include the ability to monitor the occupancy of an area.

P. WINDOWS DAYLIGHT SAVING AUTO ADJUSTMENT

1. The system shall support automatic Daylight Savings Time Adjustment.

Q. HISTORY ARCHIVE AND SYSTEM BACK UP

1. The system shall allow on line archiving of history logs, along with database back up of system configuration and cardholder details. This function shall be able to be automated to occur without intervention at a pre-set time.

R. SMART CARD ENCODING

1. The system shall provide the ability to encode contactless smart cards with access control information.

2. On a timed or manual basis the system shall be configurable to allow entry using the smart card only, thereby raising or lowering the level of security as required.

S. DIGITAL VIDEO MONITORING AND CCTV MATRIX SWITCH CONTROL OPTION

1. For larger Districts, the system shall provide an option to interface to a CCTV matrix switcher. This component shall allow an operator with appropriate privileges to display any available video source on any available video monitor.

T. DATA IMPORT/EXPORT

1. The system shall support a data import/export ability to permit the District to bulk-load employee information at the beginning of a school year.

U. BUILDING CONTROL MODULE

1. The system shall provide a Building Control Module, to allow the definition of one or more building controls, each used to control a separate HVAC or other building system. Readers and/or motion detector inputs shall be able to be used to determine the occupancy of the area represented by the building control – a fully integrated solution.

2. The Building Control Module shall support standard BACnet communications to project the current status of building controls, monitor points, doors and the last alarm generated to third-party building systems.

3. The system shall allow manual commands to interface with (turn on or off) building controls through the BACnet protocol. It shall be possible to issue these commands from on-screen graphical maps or plans of the building.

4. The system shall allow scheduled commands to interface with (turn on or off) building controls through the BACnet protocol. It shall be possible to issue these commands automatically at any time of the day, any day of the week or holiday dates.

5. The system shall allow conditional commands to interface with (turn on or off) building controls through the BACnet protocol. It shall be possible to issue these commands automatically depending on another event occurring. For example, a cardholder could use a "card command" at an access control reader to switch an HVAC system on or off.

6. It shall be possible to view the current status of a building control from the View/Status screen in the System software.

7. The system shall allow the definition of groups of building controls, which enables, for example, a single command to switch on several building controls in one operation.

V. E-MAIL ALARMS

1. The System shall support the ability to automatically e-mail alarm condition messages.

W. INTERCOM INTEGRATION OPTION

1. The system shall support a serial or other high-level connection to an intercom system. The intercom system shall be accessed by users through a call station -- typically installed outside the building at doors, parking barriers, etc.

2. Visitors or other personnel generally ask permission to gain entry at the intercom call stations.

X. INTRUSION DETECTION SYSTEM INTEGRATION

1. The System shall support a high-level (serial interface) to an intrusion detection system (IDS). The IDS shall be UL 1076 listed. The System shall support events to be recorded and displayed from the IDS system on the alarm management screen and in the transaction history reports – fully integrated system.

1.8 CARD READERS

A. Furnish Card Readers at all Controlled Access Entrances, Elevators, Food Storage areas and Technology Rooms, as required by the District.

B. All Card Readers shall be Proximity Type (no Card swipe type readers) as required by the District.

C. Card readers ***may*** include a keypad for duress entry or PIN Number entry.

1.9 POWER SUPPLIES

A. All system Power supplies shall be centrally located in the Technology Rooms and connected to the Technology Room Generator Powered, UPS units.

1.10 INSTALLATION

A. The Administrator Terminal shall be connected to the remote terminals before connecting to any card reader processors.

B. The Contractor shall coordinate with the District's locksmith if converting from mechanical to electric locks.

C. The Contractor shall install the appropriate cable from the CPU to readers, door contacts, request-to-exit devices, and electric locks at each door and/or gate.

D. All communications cables shall be kept away from power circuits.

E. The Contractor shall install the power supply(s) for electric locks in locations where they will not interfere with other operations.

F. The Contractor shall do nothing to modify a UL. rated door or frame that would void the UL label or fire rating.

G. All cables shall be labeled with self-laminating, machine-printed, wrap-around labels.

H. Review and coordinate door hardware characteristics and integration requirements with the Design Professional.

1.11 INITIAL PROGRAMMING AND CONFIGURATION

A. Contractor shall provide initial programming and configuration of the Integrated Security Management (ISM). Programming shall include defining hardware, doors, monitor points, clearance codes, time codes, door groups, alarm groups, operating sequences, camera call-ups, and the like. Input of all program data shall be by Contractor. Contractor shall consult with Security Consultant and District to determine operating parameters.

B. The Contractor shall develop and input system graphics, such as maps and standby screens. The District shall provide floor plan ***record ("as-built")*** drawings as the basis for the creation of maps. Development of maps shall include the creation of icons for all doors, monitor points, and tamper circuits. Owner shall provide floor plan ***record ("as-built")*** drawings, in the form of AutoCAD .DWG or .DXF files, as the basis for the creation of maps.

C. The District, with the cooperation and assistance of Contractor, will input the cardholder data for each access card.

D. The system shall be configured with a minimum of 1 user license per building.

1.12 TRAINING

A. Provide a minimum of forty (40) hours of training to the District's personnel. Plan for multiple training trips to the site. Training session(s) shall cover the following topics at a minimum:

1. System Equipment Connectivity

2. Device Configurations

3. Operation, maintenance, and upgrade procedures.

B. Training to be arranged with District personnel. 40 hours should be spread out over the length of the warranty (Ex: 8 hours at project turnover/completion, 8 hours at 3 months, 8 hours at 6 months, 8 hours at 1 year, 4 hours at 2 years, 4 hours at 3year.)

C. Training to occur in maximum of 2 hour increments per personnel or groups or personnel.

D. Consider requiring Contractor to provide manufacturer training vouchers for a portion of the training, which are valid during the warranty period.

E. Training shall be by certified manufacturer instructor.

F. Training schedule shall be coordinated with District personnel and their needs.

G. Training plan, time line, and agenda shall be provided to District IT personnel and signed off by District and Contractor.

H. Warranty certificate and agreement shall be provided to District IT personnel at initial training session.

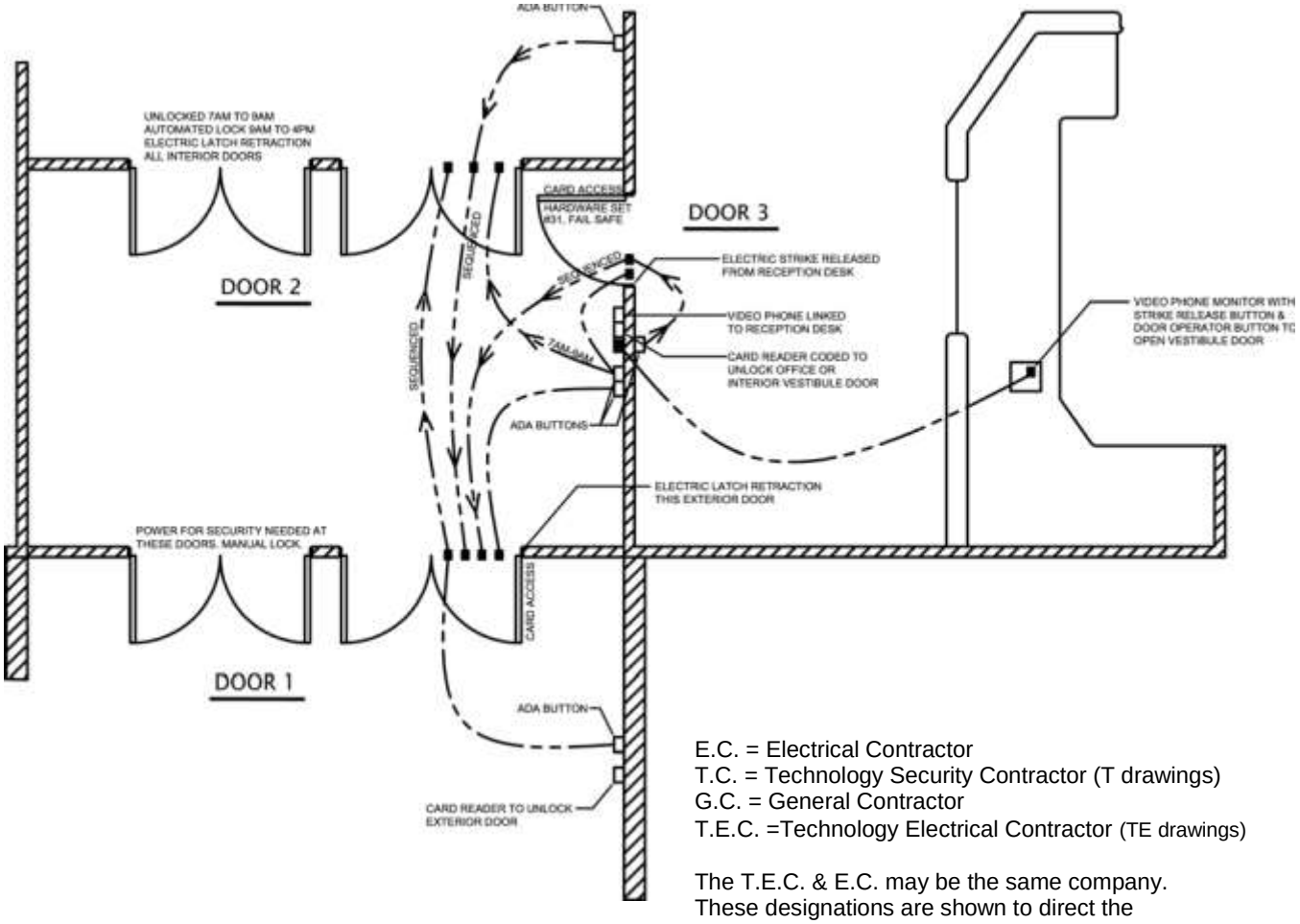
I. Provide a digital video copy of the training sessions.

1.13 SEQUENCING

A. The following figures provide recommendations for the sequencing and operation of the Access Control for the building's main doors. Suggested breakdown of tasks by trade are also provided. The Designer should consult with the District to determine final operating parameters.

(please see following diagrams)

DOOR OPERATING SEQUENCE DIAGRAM



E.C. = Electrical Contractor
T.C. = Technology Security Contractor (T drawings)
G.C. = General Contractor
T.E.C. =Technology Electrical Contractor (TE drawings)

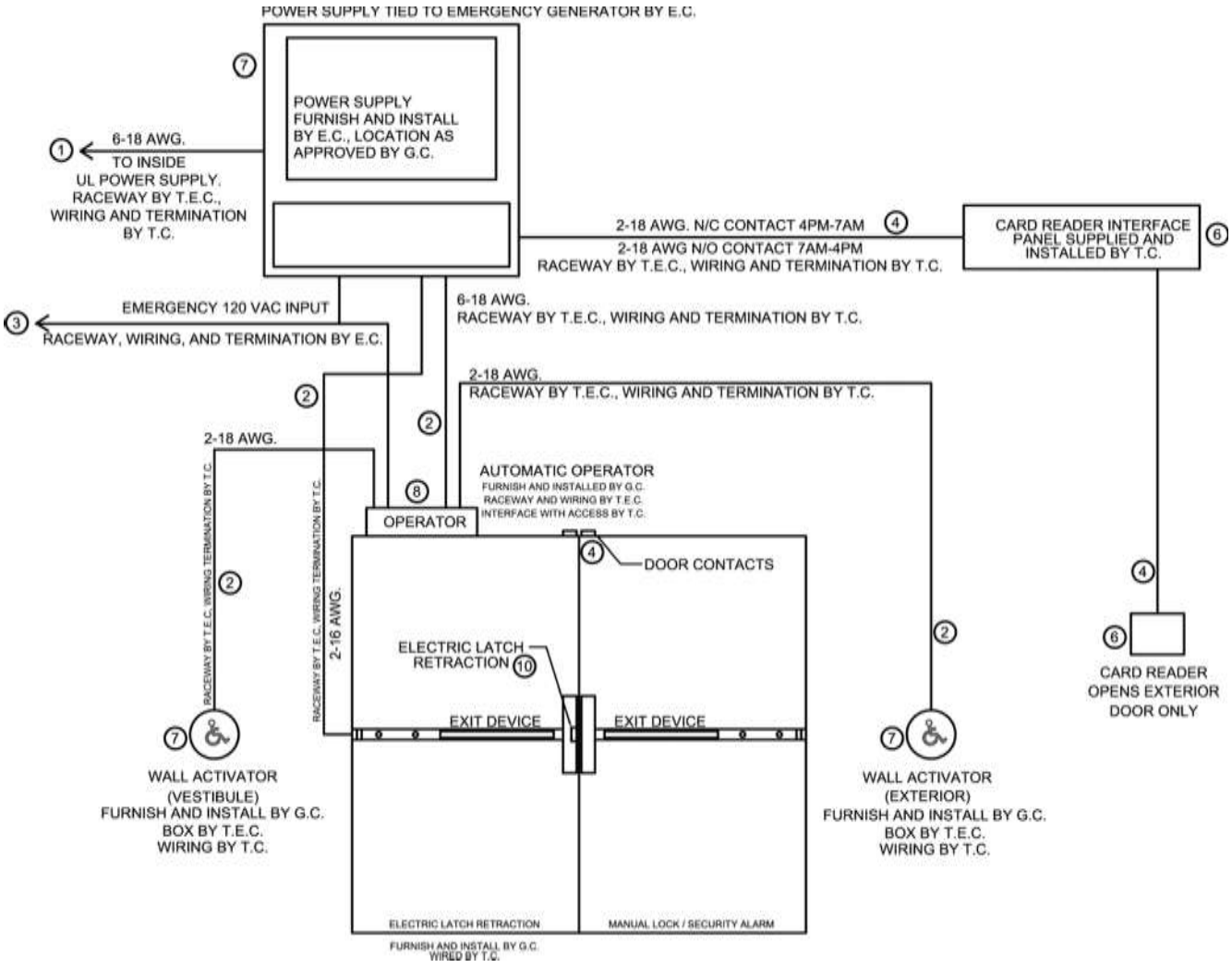
The T.E.C. & E.C. may be the same company. These designations are shown to direct the contractor(s) to the appropriate support documents.

NOTES:

1. Pathway by T.E.C; wire and termination by E.C.
2. Pathway, wire, and termination by T.E.C.
3. All by E.C.
4. Pathway by T.E.C.; wire and termination by T.C.
5. Card reader coded to unlock vestibule to office door 3. Pathway by T.E.C.; device, wire, and termination by T.C.
6. Device furnished and installed by T.C.
7. Device furnished and installed by G.C.
8. Device furnished and installed by G.C.; access interface by T.C.
9. Pathway by T.E.C.; device, wire, and terminaton by T.C.
10. Device furnished and installed by G.C.; access interface by T.C.
11. Video phone monitor with strike release button to open vestibule door 3.
12. Video phone linked to reception desk. Pathway by T.E.C.; device, wire, and termination by T.C.
13. Doors on the operating diagram are a typical standard schematic only. The number of doors and size of openings vary per project. Consult with door sheets of the architectural, electrical, and technology drawings.
14. Door power supply tied to emergency generator.

15. See door elevation diagrams for contractor responsibilities.

TYPICAL DOOR 1



Door 1:

Push plates needed for assisted access to and from vestibule 7 a.m. – 4 p.m.

Card reader access to unlock door 4 p.m.-1 a.m. weekdays and weekends.

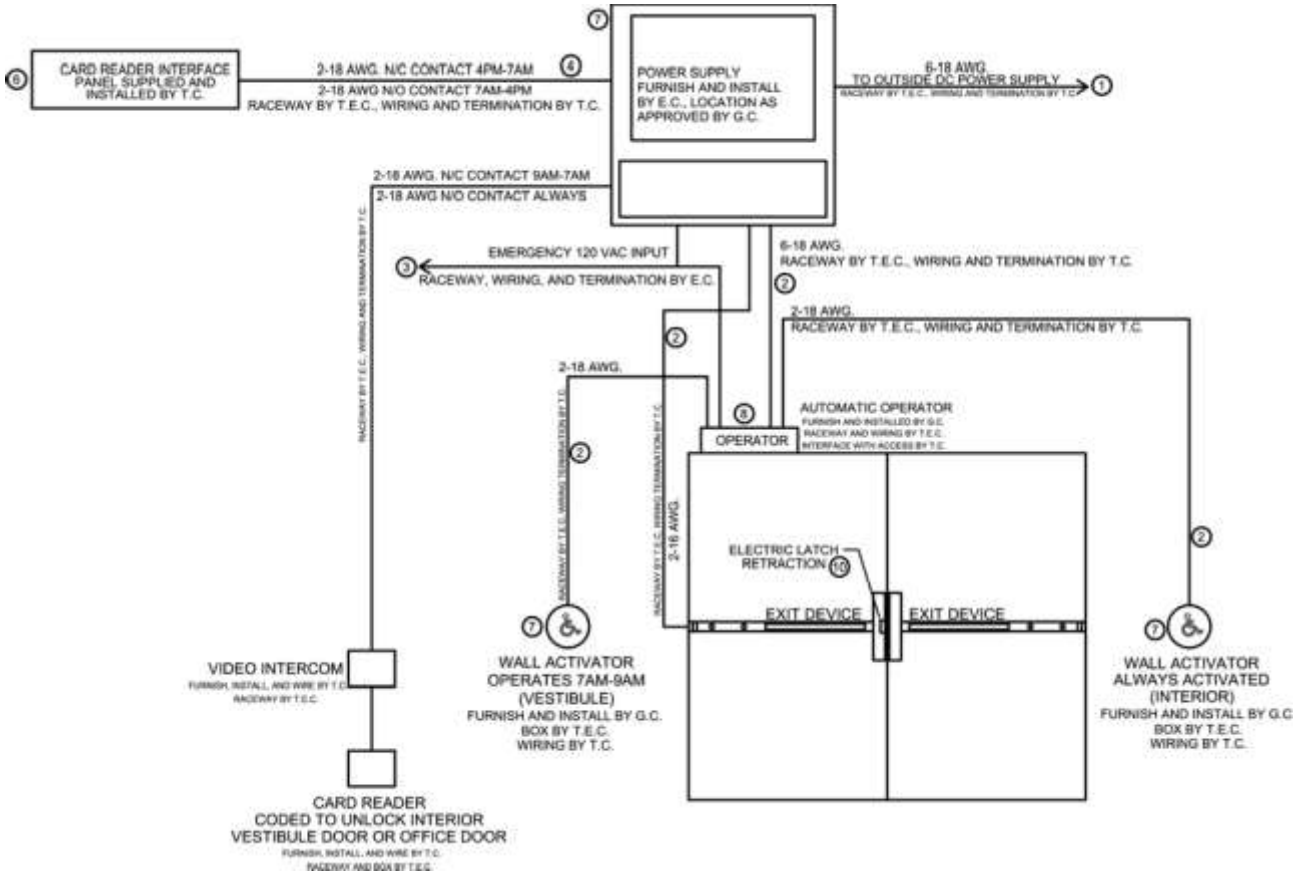
Only one door has power for card reader and push plates. All others need security power.

All other doors are manually locked 4 p.m.-7 a.m. They will open from inside vestibule via panic devices.

All exterior doors have security breach alarm hardware.

All components should be installed in one location as designated by G.C., 8” above ceiling (typical).

TYPICAL DOOR 2



Door 2:

This door will be unlocked between 7 a.m.-9 a.m. and both push plates will work.

After 9 a.m. the door will be locked and the vestibule push plate will not work but the interior push plate will still unlock the panic bar and open the door.

There will need to be one set of contacts to the inside door to control the locking and unlocking of the panic bar between 7 a.m.-9 a.m.

This door can be opened by card reader at all times.

All interior vestibule doors have electric latch retraction and are connected to building security.

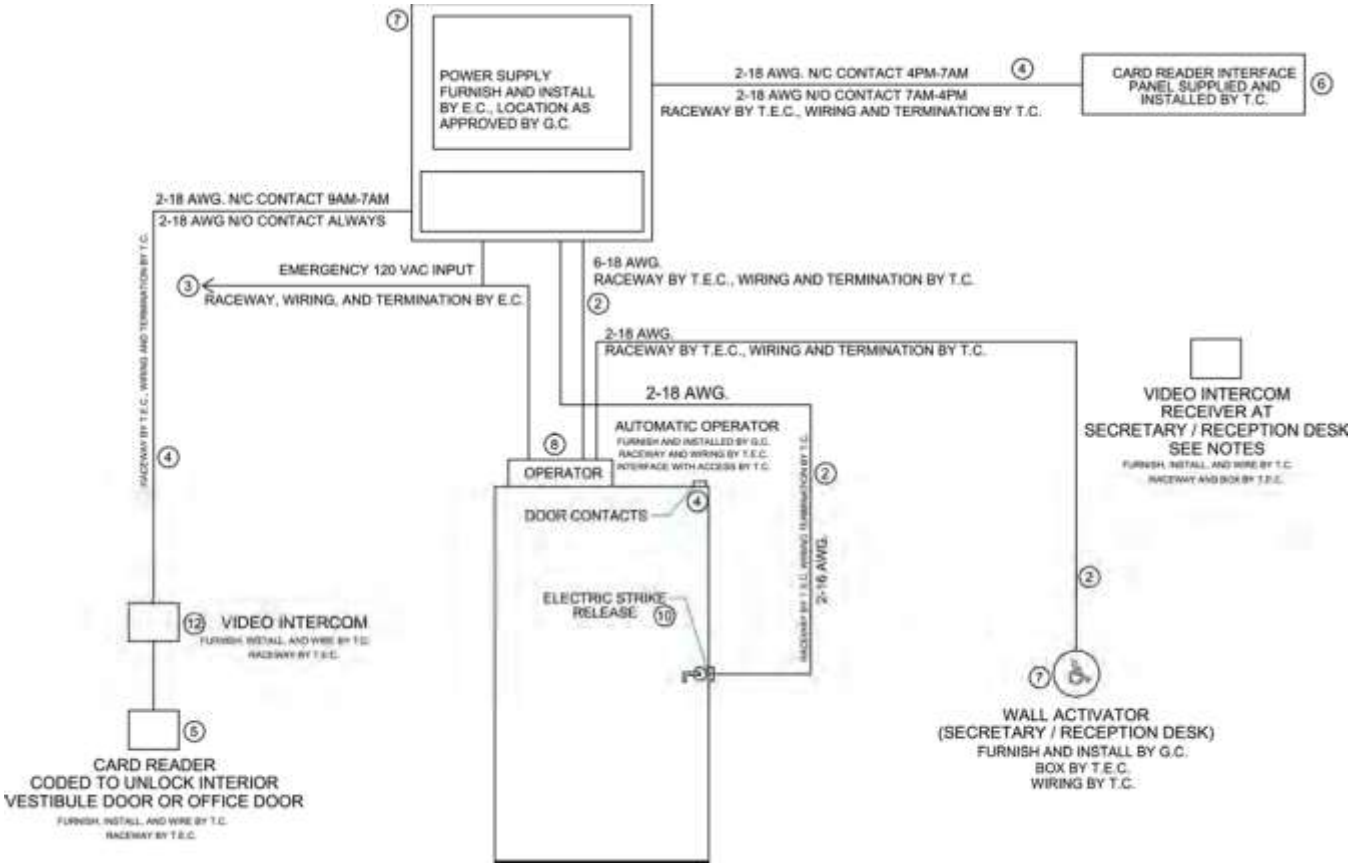
All interior vestibule doors lock from 9 a.m.-4 p.m.

All interior doors can be opened from inside the building at all hours via panic hardware.

Lock out of doors can be overridden during fire drills or other events.

All components shall be installed in one location as designated by G.C., 8" above ceiling (typical).

TYPICAL DOOR 3



Door 3:

This door is locked at all times.

Entry is only allowed via card reader or by push plate located at the office personnel's desk.

Visitors must first be identified at the video intercom located in the vestibule by the office personnel through their video receiver.

There is a push plate inside the office to let visitors out when they are leaving.

There are no push plates inside the vestibule to let people into the office.

All visitors must be identified prior to gaining access to the rest of the building.

The security/receptionist has control over releasing the door strike to unlock the door or releasing the strike and activating automatic door operator, depending on which button is pressed on the intercom receiver.

All components should be installed in one location as designated by G.C., 8" above ceiling (typical).

END OF SECTION

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SECTION 281600

INTRUSION DETECTION SYSTEM

GENERAL GUIDELINES

1.1 GENERAL

A. This Section defines the general design requirements for a uniform Intrusion Detection System that shall be followed for all OFCC Technology construction projects.

B. Refer to Sections 8500, Technology Systems, 28 13 00 Access Control ***System*** and 28 23 00 Video Surveillance ***System*** for additional information.

1.2 SECTION INCLUDES

A. Intrusion Detection System.

B. Uninterruptible Power Supply (UPS).

1.3 QUALITY ASSURANCE

A. National Fire Protection Association.

B. NFPA 730 – Guide for Premises Security

C. NFPA 731 – Standard for the Installation of Electronic Premises Security Systems

D. National Electric Code.

E. American with Disabilities Act.

F. Underwriter's Laboratory.

G. Latest ANSI TIA/EIA-568, 569, 606, 607 Standards and Eleventh Edition (or later).

H. BICSI Telecommunications Distribution Methods Manual (TDMM).

I. UL 1610 -- Central-Station Burglar-Alarm Units.

J. UL 1023 -- Standard for Safety Household Burglar-Alarm System Units.

K. UL 609 -- Standard for Safety Local Burglar Alarm Units and Systems.

L. UL 365 -- Standard for Safety Police Station Connected Burglar Alarm Units and Systems.

M. UL 985 -- Household Fire Warning System Units.

N. Products -- Factory Mutual approved.

1.4 SYSTEM WARRANTY

A. The Intrusion Detection System and software shall be fully warranted for three (3) years from date of substantial completion by the contractor and manufacturer. If any defects are found within this warranty period, the defective system component shall be replaced at no extra cost to the Owner for parts or labor. Provide a statement of this warranty with the O&M manuals and to the Director of IT. Make available a service contract offering continuing factory authorized service of this system after the initial warranty period.

1.5 SYSTEM OPERATION

A. Upon entering a valid access code via a system control keypad, the system shall disarm the applicable zones, disarm the alarm system, and log the transaction pertaining to time, date, and user.

B. The Intrusion Detection System shall provide the following functions:

1. A system control panel, control keypads, magnetic door contacts, motion sensors, and alert sirens.

2. Provide interconnection to the District provided dedicated telephone connection for monitored response to after-hours alarms. Consider cellular backup system.

3. Provide interconnection to the central control panel for monitoring all applicable doors with door contacts.

4. System shall be fully integrated with the building's Access Control and CCTV System.

5. The System shall be integrated with the building lighting system and shall activate the corridor lights and other selected areas in the event of alarm activation.

6. The System shall be supervised, i.e. power failure, line cuts and communication failures shall signal the monitoring station(s) of the problem.

7. The fire system flow and tamper points shall be attached to the system.

8. The System shall provide monthly reports, detailing as a minimum:

a. Alarm System usage.

b. Door Openings.

c. Door Closings.

d. Alarm Conditions.

C. The System shall be programmed to accept individual access codes from authorized employees. Codes shall not be shared.

1.6 EXTERIOR ENTRANCE / EXIT DOOR

A. KEYPAD

1. A keypad shall be mounted within six (6) feet of the entrance on the inside of the facility.

2. The keypad shall utilize a minimum of a two (2) line, 32-character LCD display and an integral multi-tone speaker.

3. The keypad shall contain an internal diagnostics program allowing for system troubleshooting without disabling the system.

4. The keypad shall allow for the use of three dedicated keys to function as panic keys.

5. Keypads shall have a keypad activated duress code feature.

6. All keypads shall be interfaced with the Control Panel.

B. DOOR CONTACT

1. A magnetic door contact switch shall be installed at each exterior door to provide door open/closed status to the system.

2. The contact switch shall be installed recessed into the doorframe where applicable.

C. CENTRAL CONTROL PANEL

1. Provide one Central Control Panel, which shall be equipped with a lock and transparent door panel.

2. The Central Control Panel shall provide the required input zones, operate on 24V D.C., indicate ground fault, and activate audio and visual devices.

3. The Central Control Panel shall have a battery charging system and battery(s).

4. Connect the Central Control Panel to the Main Equipment Room, generator powered, UPS Units.

5. Provide necessary auxiliary contacts (alarm and trouble), for sending signals to the digital communication system.

6. Provide necessary auxiliary contacts to power the exterior bell.

7. The Central Control Panel shall provide a telephone digital communication actuation and supervisory circuit.

8. Connect Central Control Panel to the District provided telephone line(s).

D. P.I.R. MOTION SENSOR ***- Optional***

1. The Technology Designer shall verify requirements of motion sensors with the school district.

2. The system ***type*** shall be passive infrared motion detectors.

3. The sensors shall be microprocessor controlled and contain a false alarm protection feature.

4. The sensors shall provide a minimal coverage pattern of 50 feet by 50 feet to 120 feet by 12 feet based on interchangeable lenses. Select lenses based on coverage area required.

5. Short, medium and long-range motion detectors shall be selected as required to suit the area to be covered.

6. The sensors shall be capable of mounting either on a ceiling, wall surface or in a corner.

7. ***Consider sensor installations*** on all floors of the facility, in corridors and all rooms with outside access.

8. ***Consider*** each entry point backed up by Motion Detectors.

9. Consider motion detectors in computer labs.

10. Locate motion detectors to provide full coverage and minimize false alarms.

11. Provide single or dual technology motion detectors based on application.

12. Dual Technology sensors shall employ both Microwave and Passive Infrared.

E. ALARM SIREN

1. The system shall be provided with an external alarm siren(s) (horn) and strobe light as required.

2. The alarm sirens and strobes shall be housed in a tamper proof, weather resistant metal enclosures.

1.7 INSTALLATION

A. The system wiring and installation shall comply with all applicable codes and drawings, and shall be installed in accordance with the manufacturer's recommendations.

B. All wiring shall be color-coded and labeled at each end with self-laminating, machine-printed labels.

C. All wiring shall be installed in metallic raceways and shall comply with the latest edition of the National Electric Code (NEC).

1.8 MOUNTING HEIGHTS

A. All mounting heights shall comply with the Americans with Disability Act (ADA).

B. Mount Motion Detectors to provide maximum coverage, and minimal false alarms. Do not obstruct viewing angle.

1.9 TRAINING

A. Provide a minimum of four (4) hours training on the operation of the system.

B. Provide ***a digital video*** copy of all training.

END OF SECTION

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SECTION 282300

VIDEO SURVEILLANCE SYSTEM

GENERAL GUIDELINES

1.1 GENERAL

A. This Section defines the general design requirements for a uniform Video Surveillance System that shall be followed for all OFCC Technology construction projects.

1. Figure ***1*** describes a Typical District-Wide ALL IP CCTV System.

2. Refer to Sections 8500, Technology Systems, 28 13 00 Access Control ***System*** and 28 16 00 Intrusion Detection ***System*** for additional information.

1.2 SECTION INCLUDES

A. Integrated Video Surveillance System

B. Uninterruptible Power Supply (UPS).

1.3 QUALITY ASSURANCE

A. National Fire Protection Association.

B. NFPA 730 – Guide for Premises Security

C. NFPA 731 – Standard for the Installation of Electronic Premises Security Systems

D. National Electric Code.

E. American with Disabilities Act.

F. Underwriter's Laboratory.

G. FCC Class B.

H. NEMA Type 4AX.

I. NEMA Type 1.

J. NTSC/EIA.

K. ISO/IEC 14496-2 MPEG-4.

L. H.264.

M. Latest ANSI TIA/EIA-568, 569, 606, 607 Standards and Eleventh Edition (or later).

N. BICSI Telecommunications Distribution Methods Manual (TDMM).

1.4 SYSTEM WARRANTY

A. The Video Surveillance System and software shall be fully warranted for three (3) years from date of substantial completion by the contractor and manufacturer. If any defects are found within this warranty period, the defective system component shall be replaced at no extra cost to the Owner for parts or labor. Provide a statement of this warranty with the O&M manuals and to the Director of IT. Make available a service contract offering continuing factory authorized service of this system after the initial warranty period.

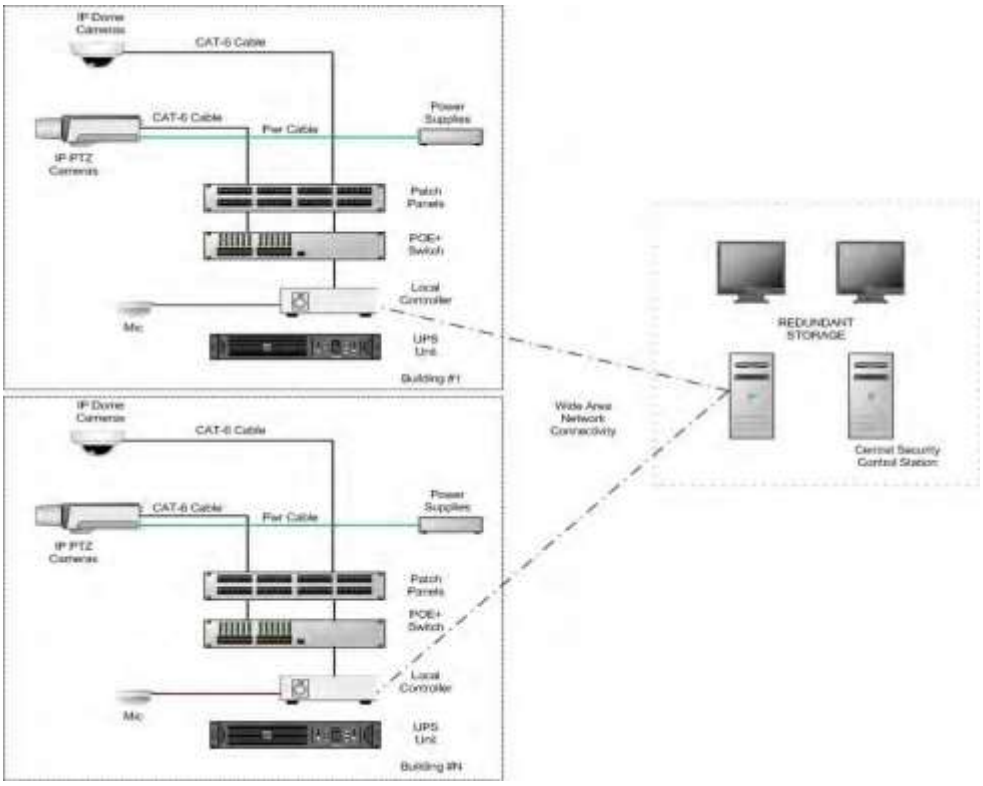

Figure ***1*** – Typical District-Wide ALL IP CCTV System

1.5 GENERAL

A. Furnish a new Integrated Video Surveillance System that provides a simple and easy-to-use graphical user interface.

B. The system shall provide local and central operational control and viewing of all cameras

C. Provide ALL IP System as shown in Figure 1 above.

D. All IP systems provide minimum ***2*** mega pixel technology that permits greater image resolution and detail, and enable advanced video analysis and recognition technologies.

E. ***All*** Designs shall use IP for new Cameras, POE+ Ethernet Switches and Local ***NVR*** units per building.

F. When a District has more than one building, the Video Management Server and Remote Viewing Station may be located in one of the District's buildings and the other buildings may be attached to the Central Server via the Wide Area Network. All buildings in the District shall have local recording NVR units and interface to the Central Server and Control Consoles and shall function as a single unified system.

G. The Video Surveillance System shall seamlessly integrate with the Access Control and Intrusion Detection Systems.

H. The Systems shall be located in the Main Equipment Room (ER) and connected to generator-powered UPS Units. Backup power shall be provided for both cameras and recording equipment.

I. Provide sufficient cameras to cover the entire school and surrounding lots.

J. As a minimum provide fixed focus camera coverage for:
1. All entrances/exit doors.
2. Hallways.
3. Restroom entrance/exit doors.
4. Loading docks.
5. Kitchen areas.
6. Lunch lines.
7. Cafeteria.
8. Auditoriums.
9. Playgrounds.
10. Bus pickup/delivery.
11. Parking lots.
12. Athletic Areas.

K. PTZ cameras, while optional, should be considered for the following areas:
1. Outside building corners.
2. Parking lots.
3. Playgrounds.
4. Bus Drop-Off.
5. Building Services Areas.

L. Mount external cameras to the side of the building for most situations. Use pole mounting for special circumstances, as required.

M. Connect a minimum of one building mic to the CCTV Recording system. Locate the Mic in the Central Office area (typical). Connect the audio output from the building paging system to the CCTV recorder. Consider connecting the audio output from the PABX E911 calling system to the CCTV recorder.

N. Systems shall be monitored with an HDTV monitor in the Central Office area. Supply monitors based on system camera requirements. If required by the owner, post the appropriate signs advising the public that audio/video recording is taking place in the facility.

1.6 CAMERAS

A. ***Minimum HD resolution (1280 x 720), progr*****essive scan**

B. All cameras shall be contained in smoked-dome, impact and vandal-resistant enclosures. Consider bulletproof enclosures for high crime areas.

C. Compatible lenses specific to each placement and required field of view will be used. In addition, MPIX cameras require specialized MPIX compatible lenses.

D. Typical ***interior*** lenses range from ***2.8-12mm; typical exterior lenses range from 5-50mm.***

E. Coordinate lens type with CCD sensor size.

F. Place multiple cameras in hallways and avoid single cameras covering a long hallway.

G. Limit camera spacing to 75 feet maximum.

H. Camera placement guidelines:

1. Avoid backlight (this problem can occur when attempting to capture an image from behind a window, etc.). Utilize wide dynamic range cameras in these applications.
2. Always use auto iris lenses for outdoor applications.
3. Avoid direct sunlight – try to position the camera the same direction as the sun.
4. Avoid viewing too much sky – it results in too much contrast.
5. Avoid reflections.

I. Cameras shall have integral motion detectors for changing the frame per second recording rate, depending on system set up.

J. Coordinate placement of all cameras with District and a Qualified Security Professional.

K. All cameras shall be equipped with an auto-iris, automatic gain control and automatic white balance.

L. All cameras shall be centrally powered from associated Telecommunication Room***,*** generator powered, UPS Unit.

M. All exterior PTZ cameras shall be contained in a pendant or recessed 180 degree style, vandal proof, exterior enclosure with integral heater module. Verify enclosure style with the Design Professional.

N. All PTZ cameras shall meet the following minimal features:
1. 22X Optical Zoom, 10X Digital Zoom.
2. Window Blanking.
3. 64 Presets.
4. 0.5° Preset Accuracy.

5. 140°/second Pan Speed.
   a) Rotating Discreet Liner.
   b) One Dynamic Window Blanking Area.
   c) Proportional Pan and Tilt.
   d) Programmable Zoom Speeds.
   e) 360 Degree scan.
   f) Day/Night Operation.
      1) 0.08 lux at ½ sec shutter (Color).
      2) 0.30 lux at 1/60 sec shutter (B/W).
      3) 0.013 lux at ½ sec shutter (B/W).
   g) 30 fps – NTSC.

O. Provide fiber-optic interfaces for all external, pole-mounted cameras.

P. All IP cameras shall meet the following minimal features:
1. Powered via 802.3af Power-Over Ethernet (POE+) using standard Category 6 cable.
2. Optional additional power for External PTZ cameras.
3. MPEG-4, MJPEG, and H.264 video compression. Minimum dual stream.
4. Audio capabilities with optional mic.
5. Optional DSP for video intelligence and recognition techniques.
6. Removable storage slot (Micro SD) with minimum 4GB memory.
7. Digital Pan/Zoom.
8. CCD sensor – 1/2-inch minimum.
9. Integrated PZT control over one Category-5e cable.
10. IR Cut Filter for low-light conditions.
11. SNMP support for management.
12. HTTPS for encrypted Communications.
    a) Built-in Web Server.
    b) Fixed IP address.
    c) 30 fps – at full resolution.

1.7 NETWORK VIDEO RECORDER (NVR)

A. New installations shall use Network Video Servers (NVS).

B. The NVR shall provide a high quality, recorder capable of storage and playback of images from all cameras at full resolution and frame rate. The NVR shall support new IP cameras with ONVIF compliance. ***NVR quantity and size guidelines are based upon bandwidth, not quantity of cameras.***

C. The NVR shall be able to record full-screen video images continuously, upon motion detection, or according to a time schedule to its internal hard drives.

D. The NVR shall have the capability to simultaneously record, archive background images, and allow multiple user network viewing and playback with no loss of performance.

E. Internal NVR hard drives shall provide for 30 days of storage at an average rate of 7.5 fps per camera, full HD resolution.

F. All recording to the hard drive shall have a digital signature applied to the disk file including time, date and camera info.

G. The ***NVR*** shall support simultaneous audio recording and playback on at least one channel in real time.

H. The ***NVR*** shall have video motion search to allow recorded searches on the hard disks, based on movement in a particular area of the image.

I. The ***NVR*** shall provide a list of the activity events that occurred within a defined area.

J. The ***NVR*** shall have a standard Ethernet connection and The Ethernet connection shall allow live and recorded viewing on a networked PC using a manufacturer's Network Viewer or via web pages over a standard Internet browser.

K. The ***NVR*** shall support file export of digitally signed images over the network.

L. The ***NVR*** shall provide a user-friendly, paged menu system that is controlled from the face of the ***NVR*** and viewable ***through a KVM switch. Each NVR shall be connected to a multi-port, IP enabled KVM with integrated flip up monitor/keyboard/mouse.***

M. The ***NVR*** central Viewing station shall be completely integrated with the Intrusion Detection and Access Control Systems.

1.8 REMOTE VIDEO SERVERS

A. Remote Video Servers shall have the following minimum features:

B. Store and Forward capability - Store data at the edge of the LAN/WAN and only forward over the network when required.

C. Event based recording for intrusion or access control activity.

D. Provide local storage of video streams in the event of WAN communication failure to the Central Storage Servers.

E. Complete control over frame rate, video resolution and other settings on a timed and trigger basis.

F. ***All current*** compression ***technologies.***

G. Integrated with Access Control and Intrusion Detection Systems.

H. PTZ support.

I. Motion detection support.

J. Integrated web server for configuration.

K. Video loss alarm capability.

1.10 IP VIDEO DECODERS

A. In all IP installations, any place where ***remote*** video is to be provided for local viewing, a multi-stream decoder (minimum 2x2 image per display) will be required.

B. A local PC, running the CCTV remote view software and connected to the local monitor, can also be utilized for this purpose.

1.11 INSTALLATION

A. The system wiring and installation shall comply with all applicable codes and drawings, and shall be installed in accordance with the manufacturer's recommendations.

B. All wiring shall be color-coded and labeled at each end with self-laminating, machine-printed labels.

C. All wiring and component installations shall comply with the latest edition of the National Electric Code (NEC).

1.12 TRAINING

A. Provide a minimum of forty (40) hours of training to the District's personnel. Plan for multiple training trips to the site. Training session(s) shall cover the following topics at a minimum:

1. System Equipment Connectivity

2. Device Configurations

3. Operation, maintenance, and upgrade procedures.

B. Training to be arranged with District personnel. 40 hours should be spread out over the length of the warranty (Ex: 8 hours at project turnover/completion, 8 hours at 3 months, 8 hours at 6 months, 8 hours at 1 year, 4 hours at 2 years, 4 hours at 3 year).

C. Training to occur in maximum of 2 hour increments per personnel or groups of personnel.

D. Consider requiring Contractor to provide manufacturer training vouchers for a portion of the training, which are valid during the warranty period.

E. Training shall be by certified manufacturer instructor.

F. Training schedule shall be coordinated with District personnel and their needs.

G. Training plan, time line, and agenda shall be provided to District IT personnel and signed off by District and Contractor.

H. Warranty certificate and agreement shall be provided to District IT personnel at initial training session.

I. Provide a digital video copy of the training sessions.

END OF SECTION

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SECTION 282600

AREA OF REFUGE INTERCOMMUNICATION SYSTEM

1.1 General

A. This section defines the general design requirements for an ADAAG compliant Area of Refuge Assistance Intercommunications System that shall be followed for all OFCC Technology projects where applicable.

B. Coordinate requirements and device locations with the project architect.

1.2 Section Includes

A. Area of Refuge Intercommunication System

1.3 Quality Assurance

A. National Fire Protection Association

B. National Electric Code

C. American with Disabilities Act

D. Underwriter's Laboratory

E. Products – Factory Mutual approved

1.4 System Warranty

A. The Area of Refuge Intercommunication System shall be warranted by the contractor for a period of ***three (3) years*** from date of substantial completion.

1.5 System Operation

A. The Area of Refuge Intercommunication System is used to call for assistance from Areas of Refuge as defined in the Americans with Disabilities Act.

B. When a call is placed from a remote station, it is annunciated at the master station with both audible and visual signals and displayed on an alpha-numeric display. The alpha-numeric display shall indicate the name and location of the calling station. Once a call is acknowledged at the Master Station, the remote station provides visual and audible confirmation. The Master Console controls the direction of the talk circuit.

C. A call may only be canceled from the Master Console after it has been acknowledged. After the call has been canceled from the Master Console, the indicators extinguish and communication is terminated.

D. The Master Console may initiate audio communication with a Remote Call Station at any time by dialing the station number on its keypad or by pressing the button associated with the station. The Master Console may also page a group of Remote Call Stations to broadcast evacuation information. In the event of circuit trouble with any Remote Call Station, the Master Console will display the location and number of the station and “Trouble.”

1.6 System Head-end

A. Provide a multi-station, ADAAG compliant Area of Refuge Assistance 2-way intercommunications system. System shall consist of a wall mounted master station and remote call in stations as indicated on the drawings. The System shall be micro-processor based and utilize multiplexing technology.

1.7 Call in Stations

A. The call in stations shall utilize common bus architecture with no home runs. Multiple stations and masters may be on one main.

B. The station has a flush mounting for standard electrical multi-gang wall box, weather/vandal resistant 11-gauge brushed stainless steel panel with tamperproof hardware, speaker/microphone for voice communication, a call button and two LED indicator. The panel resists damage from common cleaning agents. Supervision of the station is indicated at the Master Console.

1.8 Master Station

A. Ultra compact console with spill-proof keypad, backlit display panel, low-light readability, alpha-numeric display of station number and name, handset privacy or hands-free communication, auto-answer by lifting handset or scroll to any call, group voice page, digital volume keys, call tones with mute for calls in progress, programmable station name.

B. Master station may be either desk mounted or flush wall mounted with appropriate hardware.

1.9 Telephone Interface

A. Telephone Interface – the PBX telephone interface connects a call from a remote station to a PBX telephone system. The interface allows calls from remote stations to be forwarded to outside telephones. Interface is used in conjunction with the Master Station

1.10 Installation

A. The system wiring and installation shall comply with all applicable codes and drawings, and shall be installed in accordance with the manufacturer’s recommendations.

B. All wiring shall be color coded and labeled at each end with self-laminating, machine printable labels.

C. All wiring shall be installed in metallic raceways from rough-in boxes to above accessible ceilings. Cabling installed open above accessible ceilings shall be supported with manufacturers and approved cable support systems and shall comply with the latest edition of the National Electric Code (N.E.C.).

D. All equipment shall follow manufacturer's guidelines for mounting heights and installation methods.

1.11 Testing

A. Verify proper operation of system

1.12 Training

A. Provide a minimum of ***four (4)*** hours training including system programming, trouble shooting and basic operation.

B. Provide a digital video copy of all training.

END OF SECTION

SECTION 283111

DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for fire-alarm control unit, manual fire-alarm boxes, system smoke detectors, heat detectors, notification appliances, magnetic door holders, remote annunciator, addressable interface device, and digital alarm communicator transmitter.

1.2 QUALITY ASSURANCE

A. NFPA 70 - National Electrical Code

B. Underwriter's Laboratory

1.3 FIRE-ALARM CONTROL UNIT

A. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864 and listed and labeled by an NRTL.

B. Addressable initation devices that communicate device identity and status.

C. Addressable control circuits for operation of mechanical equipment.

D. Alphanumeric Display and System Controls

E. Circuits:
1. Initiating device, notification appliance, and signaling line circuits: NFPA 72, Class B.

F. Elevator Recall:
1. Smoke detectors shall initiate automatic elevator recall.

G. Heat detectors in alarm installed in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay.

H. Door hold-open devices that are controlled by smoke detectors at doors in smoke barrier walls shall be connected to fire-alarm system.

I. Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.

J. Primary Power: 24-V dc obtained from a 120-V emergency generator branch circuit and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory and digital alarm communicator transmitters shall be powered by 24-V dc source.

K. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
1. Batteries: Sealed lead calcium
2. Capacity: Comply with NFPA 72

1.4 MANUAL FIRE-ALARM BOXES

A. Single-action mechanism, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.

1.5 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:
   1. Comply with UL 268; operating at 24-V dc, nominal.
   2. Detectors do not require resetting or readjustment after actuation to restore them to normal operation. Integral visual-indicating light: LED type indicating detector has operated and power-on status.

B. Photoelectric Smoke Detectors:
   1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.

C. Duct Smoke Detectors: Photoelectric type complying with UL 268A.
   1. Detector address shall be accessible from fire-alarm control unit and shall be able identify the detector's location within the system and its sensitivity setting.

1.6 HEAT DETECTORS

A. Heat Detectors: Comply with UL 521.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 degrees Fahrenheit or a rate of rise that exceeds 15 degrees Fahrenheit per minute unless otherwise indicated.

C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 degrees Fahrenheit.

1.7 NOTIFICATION APPLIANCES

A. Horns: Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol.

B. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with a clear polycarbonate lens.

C. Flashing shall be in a temporal pattern, synchronized with other units.

1.8 NOTIFICATION APPLIANCE CIRCUIT POWER SUPPLY UNITS

A. Power-limited design, complying with UL 864 and listed and labeled by an NRTL.

B. Primary Power: 24-V dc obtained from a 10-v emergency generator branch circuit and a power-supply module.

C. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
   1. Batteries: Sealed lead calcium.
   2. Capacity: Comply with NFPA 72

1.9 MAGNETIC DOOR HOLDERS

A. Units equipped for wall mounting complete with matching doorplate.

B. Electromagnet: Requires no more than 3 W to develop 25-lbf holding force.

1.10 REMOTE ANNUNCIATOR

A. Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.

B. Alphanumeric display with LED indicating lights.

1.11 NON-ELECTRIC GRAPHIC ANNUNCIATOR

A. Framed plexiglass floor plan display with room numbers assigned by Owner.
   1. Color image printed on the reverse side of a polycarbonate Lexan laminated to a a rigid backing with a removable adhesive for future replacement.
   2. Graphics shall show location of fire-alarm control unit, “YOU ARE HERE”, detection devices and nomenclature.
   3. Mounting: Adjacent to remote annunciator.

1.12 ADDRESSABLE INTERFACE DEVICE

A. Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.

B. Integral Relay: Capable of providing a direct signal to the following:
   1. Elevator controller to initiate elevator recall.
   2. Circuit-breaker shunt trip for power shutdown.
   3. Theatrical lighting controller for panic lighting.
   4. Heating, ventilating, and air-conditioning equipment controllers for power shutdown.
   5. Smoke dampers for closing.
   6. Magnetic door holders, electric locks, coiling doors and grilles for releasing.
   7. Building management system for equipment shutdown and alarm notification.

1.13 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632 and be listed and labeled by an NRTL.

1.14 DEVICE GUARDS

A. Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection in gymnasiums and locker rooms.

1.15 EQUIPMENT INSTALLATION

A. Comply with NFPA 72 for installation of fire-alarm equipment.

B. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch.

C. Mounting height of appliances shall comply with Americans with Disability Act.

D. Grounding: Ground fire-alarm control unit and associated circuits.

E. Wiring shall be installed in conduit in compliance with Allowable Conduit Schedule in section 260533.

END OF SECTION

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SECTION 311000

SITE CLEARING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for removal of vegetation at the site, including stripping of sod and soil for site clearing.

1.2 SITE CLEARING

A. Clearing and grubbing obstructions, trees, shrubs, and other vegetation, including removal of stumps, roofs, and debris.

B. Provide temporary erosion- and sedimentation-control measures.

LEED SUGGESTIONS

2.1 As a prerequisite for LEED certification, an erosion- and sedimentation-control plan is required for the project. This plan must comply with the more stringent of either the “2003 EPA Construction General Permit” or local erosion- and sedimentation-control standards and codes. According to the EPA, the permit applies to construction sites greater than 1 acre except for smaller sites that are part of a larger common plan of development or sale. However, for LEED certification, the requirements are applied to all projects for this prerequisite.

END OF SECTION

SECTION 312000

EARTH MOVING

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for grading, excavation, embankments, and sedimentation and erosion control. Earth moving for foundations, structures, pavement, ditches, culverts, drains, and utilities.

1.2 MATERIALS

A. Satisfactory Soils: ASTM D 2487 soil classification groups ***and Geotechnical Engineer.***

B. Engineered Fill: Graded mixture of gravel, crushed stone, and sand with 90% passing a 1-1/2-inch sieve and not more than 12% passing a No. 200 sieve.

C. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

D. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

1. Aggregates used for subsurface storage of storm water or for use with underdrains shall be washed limestone, washed gravel, or river rock. In all cases the aggregates shall be 100 percent crushed.

E. Topsoil: Shall be fertile, friable, natural loam, surface soil, reasonably free of subsoil, clay lumps, brush, weeds, and other litter or stones larger than 1/2 inch.

1. Provide 6 inches minimum topsoil.

F. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; AST D 448; coarse-aggregate grading size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 passing a No. 8 sieve.

G. Sand: ASTM C33; Clean, general purpose sand, free of organic and deleterious materials.

H. Geotextiles: Subsurface drainage geotextile and separation geotextile.

I. Geogrid.

J. Controlled Low-Strength Material.

1.3 EXCAVATION

A. Explosives: Not allowed.

1.4 FIELD QUALITY CONTROL

A. Special Inspector and Testing Agency: Owner engaged.

LESSONS LEARNED

2.1 During the design process, several professionals on the Design Team might need to revise this section to coordinate Specification Sections within the project manual. Besides input from the Architect and the Geotechnical Engineer, the Civil, Structural, Mechanical, Plumbing, and Electrical Engineers might share editing and review obligations. Each Design Professional's responsibilities and scope of service depends on the agreement with the Prime Consultant or the Owner.

A. Assigning specification-review responsibility can be overlooked during the design process. Review may be inferred or expected without expressly stating this in the various agreements, particularly where the agreement is directly with the Owner. Clearly delineate the responsibilities for editing and reviewing this Section in consultants' agreements.

2.2 A dewatering system should be designed to keep the excavation continuously stable and dry. For deep excavations, ground-water extraction must be carefully controlled. For this purpose, piezometers measuring hydrostatic pressure are installed at various depths in sufficient number to detect the important piezometric water level changes resulting from removing the ground water.

2.3 Adjacent Structures: Occasionally, settlement of adjacent structures might be attributed to dewatering. Existing structures founded on weak, compressible soils or on saturated, loose sand could settle. The condition of structures, type of foundation, and water table elevations immediately adjacent to the project should be determined before dewatering. If dewatering and excavation will lower the water table significantly at such structures, underpinning precautions may be necessary.

2.4 Typically, the type of damage produced by dewatering is caused by settlement, particularly differential settlement. Settlement under walls, foundations, and stone and concrete masonry can cause cracking in these structures and in finishes. Buildings with deep foundations will usually be less affected by dewatering than those with shallow foundations; older buildings are usually more affected than newer ones.

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SECTION 321216

ASPHALT PAVING

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for base course and pavements above base course including conventional pavements for walks, roads, parking lots, and recreation areas. Also includes bituminous base courses, bituminous binder courses, and bituminous surface courses; tack coats.

1.2 QUALITY ASSURANCE

A. Road and paving materials and methods shall be in accordance with the State of Ohio Department of Transportation (ODOT), "Construction and Material Specifications", latest edition.

B. Pavement markings within public right-of-ways shall be in accordance with US Manual on Uniform Traffic Control Devices.

1.3 COMPACTED AGGREGATE

A. Aggregate base shall consist of stone, gravel, or slags with composition and gradation described as "Item 304," and conforming to requirements of 703.04 of the State of Ohio Department of Transportation (ODOT), "Construction and Material Specifications."

1.4 PAVING MATERIALS

A. Bituminous Base Course: ODOT "Item 301".

B. Binder Course Asphalt Concrete: ODOT "Item 448".

C. Surface Course Asphalt Concrete: ODOT "Item 448".

D. Tack Coat: Emulsified asphalt.

1.5 AUXILIARY MATERIALS

A. Paving Geotextile: Non-woven polypropylene.

B. Pavement-Marking Paint.

C. Wheel Stops: Precast concrete or solid, recycled plastic with galvanized-steel dowels.

1.6 FIELD QUALITY CONTROL

A. Testing: By Owner-engaged agency.

END OF SECTION

SECTION 321313

CONCRETE PAVING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for rigid cement concrete pavements above base course including conventional and modified pavements for walks, roads, parking lots, and service areas.

1.2 QUALITY ASSURANCE

A. Quality Standard: ACI 301.

1.3 MATERIALS

A. Concrete: ASTM C 150.
   1. Normal-weight aggregate.
   2. Air-entraining admixture.
   3. Color pigment (optional).
   4. Finish: Broom finish.

B. Wire Mesh: Welded plain steel wire fabric.

C. Reinforcing Bars: Deformed steel bars.

D. Fabricated Bar Mats: Steel bar or rod mats.

E. Joint Dowel Bars: Plain steel bars.

F. Detectable Warnings.

G. Fiber Reinforcement: Synthetic fiber.

1.4 FIELD QUALITY CONTROL

A. Testing: By Owner-engaged agency.

END OF SECTION

SECTION 321314

PERVIOUS CONCRETE PAVEMENT

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for pervious concrete paving.

1.2 QUALITY ASSURANCE

A. State of Ohio Department of Transportation (ODOT), “Construction and Material Specifications”.

B. ACI 522R-06 Pervious Concrete

C. ACI 522.1-08 Specification for Pervious Concrete Pavements

1.3 PRODUCTS

A. Stormwater Detention Layer or Groundwater Recharge Bed
1. Test Subgrade
   a. Field Method: ASTM D 3385.
2. Coarse Aggregate for Stormwater Detention Layer: ODOT Item 703.1, AASHTO size No. 2.
3. Choker Base Coarse Aggregate for Stormwater Detention Layer: ODOT Item 703.1, AASHTO size No. 57.
4. Impervious Liner.
5. Filter Fabric.
6. Isolation Joint Material.
7. Curing Materials.

B. Pervious Concrete Pavement
1. Cement: ASTM 150 or ASTM C 595.
2. Supplementary Cementitious Materials
   a. Fly Ash
   b. Ground Granulated Blast-Furnish Slag.
3. Admixtures
   a. Air Entraining Admixture.
   b. Chemical Admixtures
      1) Mid-range water reducing admixtures or high range water-reducing admixtures.
      2) Extended set control admixtures or water-reducing/retarding admixtures.
      3) Viscosity modifying admixtures.
4. Aggregates for Pervious Concrete: ASTM C33 and ODOT Item 703.02, No. 67, 7, 8, and 89 or 9.
5. Water.
6. Mixture Proportions: Appendix 6 of ACI 211.3R.

1.4 FIELD QUALITY CONTROL

A. Owner engaged.

LEED SUGGESTIONS

2.1 Pervious Paving: Credit for Sustainable Sites, SS 6.1 for stormwater design awards one point for stormwater management practices that reduce runoff to meet certain criteria. Pervious paving can be used as part of a stormwater management design to obtain this point.

LESSONS LEARNED

3.1 Pervious paving, also called porous paving, gap-graded paving, permeable paving, or enhanced porosity paving, can be used as part of a stormwater management design to reduce stormwater runoff and replenish aquifers.

3.2 Most concrete paving is produced from dense mixes of well-graded aggregate sizes that interlock with each other, making a stable low-porosity mass. This paving is designed to shed rather than absorb water. Pervious paving uses an open-graded aggregate mix with a large percentage of one-sized coarse aggregate, also called gap-graded or uniformly graded aggregate. Fine aggregates are typically not used in the mixes. The course of porous paving is placed over a reservoir of uniformly graded clean aggregate. Stormwater flows through the pervious paving into the reservoir, which has about 40% voids to store runoff and allow it time to infiltrate through subgrade soils.

3.3 Because paving structures that absorb or allow passage of water are fairly sophisticated systems, care must be taken in their design, detailing, and construction. If subgrades do not drain quickly enough under cold conditions, trapped water may freeze and damage paving. Passage of water may also allow more dissolved salts to reach embedded reinforcing, thereby increasing the opportunity for salt damage.

END OF SECTION

SECTION 321443

POROUS UNIT PAVING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for porous paving consisting of concrete pavers set in aggregate setting beds.

1.2 MATERIALS

A. Concrete Grid Pavers.

B. Solid Interlocking Concrete Pavers of shapes that provide openings between units.

C. Edge Restraints: Plastic or aluminum.

D. Curbs: Precast concrete.

E. Graded Aggregate for Subbase: Open graded for stormwater storage.

F. Graded Aggregate for Base: Well graded.

G. Leveling Course: Sand or crushed stone.

H. Paver Fill: Crushed stone.

LEED SUGGESTIONS

21 Porous paving can reduced stormwater runoff, compared to nonporous paving, by increasing infiltration. The effectiveness of porous paving for providing stormwater infiltration can be further increased by providing a highly porous base course, and possibly subbase, to store stormwater until the underlying soil can absorb it. Stormwater runoff carries pollutants from paved surfaces directly into streams and scours exposed soil surfaces, causing silt buildup downstream and degrading water quality. Infiltrated stormwater is filtered by subsurface soil layers, removing pollutants. It also recharges aquifers, resulting in steadier stream flows; peak flows are absorbed and then released during times of low flow. Porous paving may also help reduce heat buildup resulting from the absorption of solar energy by pavement materials, thereby helping to reduce the urban heat island effect.

22 LEED Credit SS 6.1 provides one point for stormwater management practices that reduce runoff to meet certain criteria, and LEED Credit SS 6.2 provides one point for removing suspended solids and phosphorous from stormwater runoff. Porous paving can be used as part of a stormwater management design that can obtain both of these points. LEED Credit SS 7.1 also provides a point for using an open-grid paving system that is less than 50% impervious for at least 50% of the parking lot area. Although porous pavers are more than 50% impervious, using them for more than 50% of the parking lot area can provide an equivalent pervious area, which complies with the intent of the credit.

LESSONS LEARNED

3.1 Traffic loads are usually a primary design consideration. Where light loads are expected, such as in parking areas and possibly including access aisles, grid-type pavers that will allow maximum water infiltration may prove suitable. Where heavy vehicular loads are expected such as in drive aisles, especially those that will carry frequent truck traffic, solid paving or porous paving with minimal open area may be required.

3.2 Consider snow removal needs; critical areas that must be kept clear of snow at all times might better be paved with a smooth material such as concrete or asphalt.

3.3 Subgrade preparation is also important for a successful installation. Remove vegetation and organic materials from the area to be paved. Remove soft spots containing poor subgrade material, and refill them with suitable material properly compacted. Refer to the project's geotechnical report for specific compaction requirements.

3.4 Drainage: Surface and subsurface drainage is of major importance. Exterior paving is usually sloped at least 1/4 inch per foot (2%), but porous pavers may be sloped as little as 1/8 inch per foot (1%). Porous paving should typically have at least a minimal slope so that during heavy rains, when water cannot infiltrate the paving as fast as it falls, water will not build up on the surface. Paving should be sloped away from buildings, retaining walls, and other elements capable of collecting surface water. Localities with impervious soils may require subsurface drains to allow excess water to flow out of the subbase and base course.

END OF SECTION

SECTION 321816

PLAYGROUND SURFACING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for surfaces for exterior recreational activities.

1.2 QUALITY ASSURANCE

A. Impact Attenuation: According to ASTM F 1292.

B. Accessibility of Surface Systems: According to ASTM F 1951.

C. Minimum Characteristics for Organic Loose-Fill Surfaces: According to ASTM F 2075.

1.3 PLAYGROUND SURFACE SYSTEMS

A. Provide one or a combination of the following:

1. ***Organic Loose-Fill Surface,*** Engineered Wood Fibers: Random-sized wood fibers, in manufacturer's standard fiber size, approximately 10 times larger than wide; containing no bar, leaves, twigs, or foreign or toxic materials according to ASTM F 2075; graded according to manufacturer's standard specification for material consistency for playground surfaces and for accessibility according to ASTM F 1951.
2. ***Unitary synthetic poured rubber seamless surface: Poured-in-place, two-layer system with wearing course over cushion course. Provide manufacturer's standard thickness for each layer as required for overall thickness indicated, tested for impact attenuation according to ASTM F 1292 and for accessibility according to ASTM F 1951.***
   a. ***Wearing Course: Formulation of EPDM rubber particles, with minimum of 20 percent and maximum of 26 percent of ethylene propylene-diene-saturated polymethylene main chain along with other organic and inorganic components.***
   b. ***Cushion Course: Manufacturer's standard formulation of SBR particles and polyurethane, site mixed and applied.***

B. Accessories
1. Edgings.
2. Stabilizing Mats.
3. Drainage / Separation Geotextile.
4. Weed-Control Barrier.

LESSONS LEARNED

2.1 Organic loose-fill systems include wood chips, wood mulch, and engineered wood fibers and should be installed over graded soil or compacted drainage fill with an interlayer of geotextile fabric that may also include premolded drainage matrix. The perimeter curb of the playground surface usually contains the loose material within the equipment area. Engineered wood fibers should be tested according to ASTM F 2075, Specification for Engineered Wood Fiber for Use as a Playground Safety Surface under and around Playground Equipment, for the presence of contaminants such as toxic substances and for consistently sized wood particles. Wood-based, loose-fill materials are flammable and subject to compaction, decomposition, and pulverization. This surface is less abrasive than sand and not as likely to be fouled by animals.

2.2 Manufacturers test the resilience of their products according to ASTM F 1292. Loose-fill sand, gravel, wood chips, and wood mulch are not furnished by playground surface system manufacturers, so product testing is not done for specific CH design depths. Field testing according to ASTM F 1292 can also be done at the completion of installation or periodically during the service life of the installation to verify performance.

A. The International Play Equipment Manufacturers Association provides a third-party product certification service to validate a member manufacturer's certification of compliance with ASTM F 1292.

2.3 Testing for accessibility is done according to ASTM F 1951, Specification for Determination of Accessibility of Surface Systems under and around Playground Equipment. This standard is designed to measure the amount of effort required to propel a wheelchair across the surface for straight and turning movement. The test is primarily directed at loose-fill surfaces to show comparison with the same movements over a smooth, hard surface. Some loose-fill systems will require additional surface mats over the accessible route to play equipment required by the Americans with Disabilities Act (ADA) to meet this standard. Accessible routes are also discussed in 36 CFR 1191, Americans with Disabilities Act (ADA) Accessibility Guidelines; Play Areas. Sloping surfaces should be limited to 2%.

2.4 Testing loose-fill wood systems for the presence of toxic substances such as heavy metals, metal scraps such as nails, and correct particle size is done according to ASTM F 2075. This test is done by engineered wood fiber manufacturers but is not generally conducted for wood chips or wood mulch.

END OF SECTION

SECTION 323113

FENCES AND GATES

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for fences for protective, security, and right-of-way purposes; also pipe gates.

1.2 QUALITY ASSURANCE

A. Comply with Chain Link Fence Manufacturers Institute “Product Manual”.

1.3 MATERIALS

A. Fabric: ASTM A 392, CLFM 1 CLF 2445
   1. Aluminum-coated steel, ASTM A 491, Type I, 0.40 ounce per square foot.
   2. Size: 2 inch mesh, 9 gauge steel.

C. Framework: ASTM F 1043.

D. Gates: Swinging type.
   1. Chain link pedestrian (single gate leaf) and vehicular (double gate leaf with gate keepers).
   2. Pipe gate.
   3. Mechanical yard gate.

E. Framing and Fittings: ASTM F 626.

END OF SECTION

SECTION 329200

TURF AND GRASSES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for application of seed, sod, or plants; fertilizer; lime and mulch; and maintenance until acceptance.

1.2 QUALITY ASSURANCE

A. Topsoil Analysis: Furnish a soil analysis made by a qualified independent soil testing agency stating percentages or organic matter, inorganic matter (silt, clay, and sand), deleterious material, pH, and mineral and plant nutrient content of topsoil.

1.3 MAINTENANCE

A. Begin maintenance of lawns immediately after each area is planted and continue until acceptable lawn is established, but not for less than the following periods:
1. Seeded Lawns: 60 days after date of Contract Completion.
   a. When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established at that time, continue maintenance during next planting season.
2. Sodded Lawns: 30 days after date of Contract Completion.

1.4 MATERIALS

A. Seed or Turfgrass Sod

B. Planting Soils

C. Mulch

D. Erosion-Control Materials

E. Grass-Paving Materials

LEED SUGGESTIONS

2.1 Grass paving is cellular, three-dimensional "eggcrate" matting specifically designed for locations load-bearing strength for occasional vehicular or heavy pedestrian traffic on turfgrass is anticipated. It will protect vegetation root systems from soil compaction that can restrict growth or kill plants. To obtain higher load-bearing capability, these units are often installed over a specially prepared base course as determined by the manufacturer. Load-bearing capacity can exceed 5000 psi (34.5 MPa).

2.2 Seldom-used "green-space" areas for overflow parking or fire lines are good use for grass paving. Where anticipated loads are significant or greater traction is needed, the use of concrete grid-type pavers should be considered.

END OF SECTION

DIVISION 33 UTILITIES

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DIVISION 33: UTILITIES

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331000 Water Utilities
333000 Sanitary Sewerage Utilities
334000 Storm Drainage Utilities
334600 Subdrainage

SECTION 330513

MANHOLES AND STRUCTURES

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for manufactured units and components for utility services including hydrants, manholes, meters, utility boxes, and valves.

1.2 HYDRANTS

A. Yard Hydrants: As approved by Local Fire Department.
   1. Hydrants within 20 feet of playgrounds shall be protected.

1.3 MANHOLES

A. Precast Concrete Manholes: ASTM C 478.

B. Manhole Steps: Ductile iron, cast aluminum, or steel reinforced plastic.

C. Drainage castings: Gray iron, ASTM A 48, Class 35 B to meet or exceed AASHTO axle loading specifications for specific site location, with lettering. Lettering shall be “STORM” or “SANITARY” as applicable.

1.4 METERS

A. Water Meter: AWWA C700 or utility company water meter.

B. Meter Box: Cast iron body and cover with lettering.

1.5 UTILITY BOXES

A. Valve Pits and Meter Pits: Reinforced concrete with ladder and cast iron manhole frame and cover.

1.6 VALVES

A. Nonrising stem gate valves 3 inches and larger, AWWA C500.

B. Rising stem gate valves 3 inches and larger, AWWA C500 or AWWA C509.

C. Nonrising stem gate valves 2 inches and smaller, MSS SP-80.

D. Valve Accessories: Cast iron valve boxes, curb stops, and service boxes for curb stops.

E. Tapping sleeve and tapping valve for new connections larger than 2 inches.

F. Service clamps and corporation stops for new connections 2 inches and smaller.

END OF SECTION

SECTION 331000

WATER UTILITIES

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitatitve requirements for site water distribution systems for domestic consumption, fire fighting, and irrigation.

1.2 SYSTEM PERFORMANCE REQUIREMENTS

A. Minimum Working Pressures: The following are minimum pressure requirements for piping and specialties, unless otherwise indicated:
   1. Potable Water Service: 160 psig (1100 kPa).
   2. Fire Protection Water Service: 150 psig (1035 kPa).
   3. Fire Protection Water Service, Downstream from Fire Department Connections: 250 psig (1725 kPa).

1.3 QUALITY CONTROL

A. Comply with NSF 61, “Drinking Water System Components - Health Effects,” for materials for potable water.

B. Comply with NFPA 24, “Installation of Private Fire Service Mains and Their Appurtenances,” for materials, installation, tests, flushing, and valve and hydrant supervision.

C. Water main testing shall be performed in accordance with local agency jurisdiction. Pressure testing – comply with AWWA (American Water Works Association) guidelines.

D. Utility Compliance: Comply with regulations pertaining to water distribution systems.

1.4 MATERIALS

A. Ductile Iron Pipe 4 to 12 Inches: AWWA C151, Class 52 minimum.
   1. Lining: AWWA C104, cement mortar, seal coated.
   2. Gaskets: AWWA C111.
   3. Ductile iron and cast iron fittings, AWWA C110 or AWWA C153, 250 psi minimum pressure rating; AWWA C104 cement mortar lining; AWWA C111 rubber gaskets.

B. Ductile Iron Pipe Greater Than 12 Inches: AWWA C151, Class 51 minimum.
   1. Lining: AWWA C104, cement mortar, seal coated.
   2. Gaskets: AWWA C111.
   3. Ductile iron and cast iron fittings, AWWA C110 or AWWA C153, 250 psi minimum pressure rating; AWWA C104 cement mortar lining; AWWA C111 rubber gaskets.

C. Couplings: ASTM A 126, gray iron sleeve assembly with followers, rubber gaskets, bolts, nuts, and enamel paint finish.

D. Valves
   1. Nonrising stem gate valves 3 inches and larger, AWWA C500.
   2. Rising stem gate valves 3 inches and larger, AWWA C500 or AWWA C509.
   3. Nonrising stem gate valves 2 inches and smaller, MSS SP-80.
   4. Valve Accessories: Cast iron valve boxes, curb stops, and service boxes for curb stops.
   5. Tapping sleeve and tapping valve for new connections larger than 2 inches.
   6. Service clamps and corporation stops for new connections 2 inches and smaller.

E. Anchorages
   1. Clamps, Straps, and Washers: ASTM A 506, steel.
   2. Rods: ASTM A 575, steel.
   3. Rod Couplings: ASTM A 197, malleable iron.
   4. Bolts: ASTM A 307, steel.
   5. Cast Iron Washers: ASTM A 126, gray iron.
   6. Concrete Reaction Backing: ASTM C 150, Type I Portland cement for 3000 psi, 28-day minimum compressive strength.

F. Fire Service Main Accessories
   1. Hose House: 16 gauge steel with red baked enamel finish, hoses, and nozzles.
   2. Alarm Devices: UL 753 and FM approved including water flow indicators, supervisory switches, and pressure switches.

END OF SECTION

SECTION 333000

SANITARY SEWERAGE UTILITIES

GENERAL ***GUIDELINES***

1.1 SECTION INCLUDES

A. Qualitative requirements for site sanitary sewerage construction to buildings and municipal sanitary mains.

1.2 PERFORMANCE REQUIREMENTS

A. Gravity Flow, Nonpressure Piping Pressure Ratings: At least equal to system test pressure.

B. Force Main Pressure Ratings: At least equal to system operating pressure, but not less than 150 psig (1035 kPa).

1.3 PIPE AND FITTINGS

A. Provide one of the following for Gravity Systems:
   1. PVC Sewer Pipe and Fittings: ASTM D 3034, SDR 35 for solvent cement or elastomeric gasket joints.
   2. Reinforced Concrete Sewer Pipe and Fittings: ASTM C 76, Class III, Wall B, for rubber gasket joints.
   3. ABS Sewer Pipe and Fittings: ASTM D 2751, for solvent cement or elastomeric gasket joints (4 and 6 inch only).
   4. Gaskets: Compatible with pipe materials joined.

B. Provide the following for Forced Main Systems:
   1. Piping shall be PVC D18, Class 150, C-900 AWWA piping with push-on joints. Piping and fittings shall meet ASTM D 1784 and ASTM 3139.

1.4 MANHOLES

A. Precast Concrete Manholes: ASTM C 478.

B. Manhole Steps: Ductile iron, cast aluminum, or steel reinforced plastic.

C. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, heavy duty-ductile iron with lettering.

1.5 CLEANOUTS

A. PVC with cast iron adapter.

END OF SECTION

SECTION 334000

STORM DRAINAGE UTILITIES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative Requirements for:
1. Site storm drain construction to buildings and municipal storm drainage.
2. Storm drainage piping for surface, or a combination of surface and subsurface water.
3. Structures for access to underground pipe.
4. Conduit, chambers, and units for drain pipe, catch basins, inlets, and underground water detention chambers.

1.2 PIPE AND FITTINGS

A. Provide one of the following:
1. Ductile Iron Pressure Pipe: AWWA C151, Class 52 for push-on joints.
2. Reinforced Concrete Sewer Pipe and Fittings: ASTM C 76, Class III, Wall B, for rubber gasket joints.
3. Polyvinyl Chloride (PVC): ASTM D 3034, SDR 35, or ASTM F 949 for solvent cemented or gasketed joints.
4. Aluminized Steel: Type 2 per AASHTO M36 or ASTM A 760 with gasketed joints or bell and spigot joints.
5. Polyethylene Pipe: AASHTO M252 or M294; Type S or Type SP ***or ASTM F 2648; solid or perforated.***
6. Polypropylene (PP) Corrugated Wall Stormwater Collection Chambers: ASTM F 2418.

B. For diameter greater than 24 inches, pipe shall be concrete, aluminized steel, or HDPE.

1.3 CLEANOUTS

A. Cast iron.

1.4 CATCH BASINS FOR STORM SEWERAGE SYSTEM

A. Precast Concrete Catch Basins: ASTM C 478 or ASTM C 858.

B. Catch Basin Steps: Ductile iron, cast aluminum, or steel reinforced plastic.

C. Catch Basin Frames and Grates: ASTM A 536, Grade 60-40-18, heavy-duty ductile iron.

D. PVC plastic body catch basins: H-20 DOT rated for roadway applications with a minimum 6" concrete collar and ductile iron frame and grate and meet all applicable ASTM standards and environmental regulations.

1.5 DRAINAGE STRUCTURES

A. Curb Inlets: Precast concrete, stone, or brick conforming to utility standards.

B. Outfalls for Storm Sewerage System: Cast-in-place reinforced concrete pipe, head wall apron, tapered sides, and rip rap.

C. Dry Wells for Storm Sewerage System: ASTM C 858, precast reinforced perforated concrete rings with cast-in-place concrete floor and lift-off concrete cover.

D. Slot Drain: Interlocking precast polymer concrete modular units with grates, channel caps, and related accessories.

E. Stormwater Collection Chambers: Polypropylene (PP) chambers with open bottom, buried chambers of corrugated wall construction used for collection, detention, and retention of stormwater runoff per ASTM F2418.

F. Curb inlets: PVC plastic body catch basins: H-20 DOT rated for roadway applications with a minimum 6" concrete collar and ductile iron frame and grate and meet all applicable ASTM standards and environmental regulations.

END OF SECTION

SECTION 334600

SUBDRAINAGE

GENERAL GUIDELINES

1.1 SECTION INCLUDES

A. Qualitative requirements for subdrains for interception and removal of water from pavements and structures.

1.2 SUBDRAINAGE

A. Drainage Pipe - ***Provide one of the following:***

1. Perforated PVC pipe, ASTM D 2729.
2. Perforated PE pipe, AASHTO M 252, Type SP or AASHTO M 294, Type CP.
3. Solid Wall PVC pipe, ASTM D 3034.
4. Solid Wall PE pipe, AAHSHTO M 252 or AASHTO M 294, Type S.

B. Drainage Panels: Molded-sheet, mesh fabric or net fabric drainage panels.

C. Geotextile filter fabrics.

END OF SECTION

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Only those specifications not addressed within the Ohio Facilities Construction Commission Design Manual are included within this document.

Specifications define the qualitative requirements for products, materials, and workmanship upon which the content is based. They are organized into ***50*** Divisions and ***6*** digit numbering system. Section titles have been closely coordinated with the numbering system established in CSI's ***New*** Masterformat ***2004*** Edition. In certain instances, section titles vary slightly from those recommended, but only where necessary to make them correspond more closely to text subject matter.

The specifications are no more than outlines complied to establish minimum quality requirements. They do not cover all materials required for a complete Project and do not attempt to include every possible variable, particularly where doing so would require an almost unlimited number of choices. These specifications are not to be used as bid documents.

Specifying methods include both performance (a statement of required results with criteria for verifying compliance, but without unnecessary limitations on the methods for achieving the required results) and reference standard (requirements set by authority, custom, or general consensus and are established as accepted criteria). There was no attempt to establish these specifications based on proprietary specifications which identify the desired products by manufacturer's name, brand name, model numbers, type designation, or other unique characteristics.

Section format conforms to 3 part arrangement developed by CSI and accepted by the Design Professionals to achieve uniformity in locating and organizing specification content.

Streamlined language is used where possible to describe requirements for products, systems, and processes. In these instances a generic term is punctuated by a colon and then followed by a list of requirements without a liking verb such as "shall be" or "provide" which is implied by colon.

Spelling and punctuation conform as closely as possible to current standards of usage. If conflicts occur between spellings of words in the dictionary versus industry practices, the latter takes precedence.

Minimums and maximums are defined in text only where possibility of confusion exists. Otherwise, because of the nature of this document, it shall be assumed items indicated in documents are guidelines and shall be adhered to, unless discussed with state authority.

Abbreviations included in text are defined in Chapter 1.

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INDEX OF SUPPLEMENTARY SPECIFICATIONS
(see the other Chapter 9 for specifications reference for all other sections)

033516 Concrete Floor Hardener/Sealer

060565 Slatwall Paneling

068200 Glass Fiber-Reinforced Plastic

083416 Bottom Roll Slide Hanger Doors

083436 Revolving Darkroom Doors

096000 Wood Dance Floor

099600 High Performance Coatings

112713 Dark Room Equipment

113100 Residential Appliances

116135 Pipe Grid

116615 Ballet Bars

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131900 Kennels and Animal Shelters

133413 Glazed Structures (Greenhouses)

133419 Metal Building Systems

233500 Vehicle Fume Exhaust Equipment

412223 Hoists and Cranes

END OF INDEX

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SECTION ***033516***

CONCRETE FLOOR ***HARDENER/***SEALER

PART 1 GENERAL

1.01 SUMMARY

A. ***Qualitative requirements for*** hardener finish for exposed interior concrete floors.

PART 2 PRODUCTS

2.01 MATERIALS

A. Metallic Dry-Shake Floor Hardener: Pigmented or unpigmented, factory-packaged, dry combination of Portland cement, graded metallic aggregate, rust inhibitors, and plasticizing admixture; with metallic aggregate consisting of no less than 65 percent of total aggregate content.

B. Pigmented Mineral Dry-Shake Floor Hardener: Factory-packaged, dry combination of Portland cement, graded quartz aggregate, color pigments, and plasticizing admixture. Use color pigments that are finely ground, nonfading mineral oxides interground with cement.

PART 3 EXECUTION

3.01 INSTALLATION

A. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces according to manufacturer's written instructions and as follows:

1. Uniformly apply dry-shake floor hardener at a rate of 100 lb./100 sq.ft. minimum.

2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.

3. After final floating, apply a trowel finish. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

END OF SECTION

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SECTION ***060565***

SLATWALL PANELING

PART 1 GENERAL

1.01 SUMMARY

A. ***Qualitative requirements for*** display wall and miscellaneous hardware.

PART 2 PRODUCTS

2.01 MATERIALS

A. Display Wall – "Slatwall": ¾" thick medium density fiberboard with grooves @ 3 " o.c. with aluminum "T" extrusion with milled aluminum finish. Panel Finish to be high pressure laminate.
   1. Display Wall Accessories: Provide the following:
      a. Shelf knife bracket
      b. 6 ball slant display arm
      c. Straight out display arm
      d. 14" deep tempered glass shelves

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION ***068200***

GLASS FIBER-REINFORCED PLASTIC

PART 1 GENERAL

1.01 SUMMARY

A. ***Qualitative requirements for special wall surfaces, including*** fiberglass reinforced plastic panels.

PART 2 PRODUCTS

2.01 MATERIALS

A. Wall (ceiling) panels shall be of polyester resin, reinforced with glass fiber in a random, chopped-strand mat.

1. Performance Properties:

a. Class A flamespread of less than 25, smoke developed less than 450 per ASTM E84.

b. Barcol Hardness: 35 per ASTM D 2583.

c. Meets USDA/FSIS requirements.

B. Fasteners and Accessories: Standard nylon or metal drive rivets and vinyl molding strips.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION ***083416***

BOTTOM ROLL SLIDE HANGER DOORS

PART 1 GENERAL

1.01 SUMMARY

A. ***Qualitative requirements for*** bottom roll slide hanger doors.

PART 2 PRODUCTS

2.01 MATERIALS

A. Bottom Roll Slide Hanger Doors:
   1. Frame and Panels: Galvanized steel frame and steel panels.
   2. Panel Profile: Flat
   3. Track Type: Standard track
   4. Bottom Rollers: Solid steel with tapered roller bearings and a greasable axle assembly.
   5. Operation: Power driven bottom rollers with manual release clutches.

B. Auxiliary Materials:
   1. Lifting handles and locking bars
   2. Vision panels
   3. Pass doors
   4. Automatic reversing control for bottom bar for electrically operated sectional overhead doors.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION ***083436***

REVOLVING DARKROOM DOORS

PART 1 GENERAL

1.01 SUMMARY

A. ***Qualitative requirements for revolving*** darkroom doors.

PART 2 PRODUCTS

2.01 MATERIALS

A. Pre-fabricated revolving darkroom door
   1. Frame and Panels: Aluminum frame and ABS plastic panels.
   2. Panel finish: Pebble
   3. Color: Standard black
   4. ADA wheelchair access compliant including ramp accessories
   5. Push out emergency egress capability

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 096000

WOOD DANCE FLOOR

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Qualitative requirements for a wood dance floor.

1.02 PROJECT CONDITIONS

A. Moisture Content: At time of delivery, average moisture content of wood flooring to be 7 to 10 percent.

B. Conditioning: Do not install wood flooring until spaces are enclosed and at approximate humidity condition planned for occupancy. Condition wood for 5 days before start of installation by placing in spaces to receive flooring and maintaining ambient temperature between 65 and 75 degrees F (18 and 24 degrees C) before, during, and after installation. Open sealed packages of wood flooring to permit natural adjustment of moisture content and allow flooring to acclimate to the room conditions.

PART 2 PRODUCTS

2.01 MATERIALS

A. Pad: Dance, ¾ DPM (50 durometer)

B. Plywood: 2 layers of 15/32 inch thick 4x8 APA structural rated sheathing, Exposure I (CD-X), Fir or Southern Pine.

C. Flooring: 7/16 inch by 13/16 inch by 9 inch, Seconds and Better, Square Edge, Edge Grain, Kiln Dried, Northern Hard Maple.

D. Base: Vented.

E. Finish Materials: Oil modified polyurethane sealer and finish.

PART 3 EXECUTION

3.01 PREPARATION

A. Where direct application of wood flooring to concrete substrate is indicated, test for dryness before proceeding with installation. Check levelness of concrete substrate to ensure not more than 1/8 inch deviation in any direction when checked with a 10 foot straight edge. Grind down high spots or fill in low spots to correct improper conditions.

B. Concrete Slabs: Verify that slabs are dry according to test methods recommended by flooring manufacturer or, if none, by test methods in NOFMA's "Installing Hardwood Flooring."

1. When concrete slabs are tested according to ASTM F1869, Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride, 4-1/2 pounds of water/1000 sq.ft. of slab in a 24 hour period is generally acceptable as a maximum moisture-emission level.

END OF SECTION

SECTION 099600

HIGH PERFORMANCE COATINGS

PART 1 GENERAL

1.01 SUMMARY

A. Qualitative requirements for water-based epoxy floor paint coating system.

1.02 QUALITY ASSURANCE

A. Master Painters Institute (MPI) Standards:
1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List".

PART 2 PRODUCTS

2.01 MATERIALS

A. Epoxy Coatings
1. Water-Based Epoxy Floor Paint

PART 3 EXECUTION

3.01 INTERIOR COATING SCHEDULE

A. Concrete Substrates, Horizontal Surfaces
1. Water-Based Epoxy Floor Paint System
a. Prime Coat: Water-based epoxy floor paint, MPI #93.
b. Topcoat: Water-based epoxy floor paint, MPI #93.

END OF SECTION

SECTION ***112713***

DARK ROOM EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. ***Qualitative requirements for*** dark room equipment.

1.02 QUALITY ASSURANCE

A. Regulations: OSHA, EPA compliance, ADAAG and local accessibility requirements.

PART 2 PRODUCTS

2.01 MATERIALS

A. Provide products specifically designed for intended use:
   1. Print and film processing sink units of epoxy resin fiberglass or stainless steel.
   2. Cabinetry and work surfaces ***plastic*** laminate with built in U.L. approved view lights and light tight drawers where needed.
   3. Safe lights and in-use warning lights.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION ***113100***

RESIDENTIAL APPLIANCES

PART 1 GENERAL

1.01 SUMMARY

A. Qualitative requirements for residential equipment.
- ***1.*** Kitchen area appliances
- ***2.*** Laundry area appliances

1.02 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with provisions of the following product certifications:
- ***1. Electrical Appliances: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.***
- ***2. UL and NEMA Compliance: Provide electrical components required as part of residential appliances that are listed and labeled by UL and that comply with applicable NEMA standards.***
- ***3. AGA and ANSI Standards: Provide gas-burning appliances that carry the design certification seal of AGA and that comply with ANSI Z21-Series standards.***
- ***4. NAECA: Provide residential appliances that comply with NAECA standards.***

B. Regulatory Requirements, Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."
- ***1. Operable Parts: Provide controls with forward reach no higher than 48 inches above the floor, horizontal front reach no more than 25 inches, horizontal side reach no more than 24 inches, and that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.***
- ***2. Range or Cooktop: Provide knee clearance for forward approach of 27 inches high, 30 inches wide, and 11 inches horizontally; toe space clearance of 9 inches high and 17 inches horizontally; with insulated underside of cooktop to prevent burns, shocks, or abrasions. Provide top surface 34 inches above the floor, with controls that do not require reaching across burners.***
- ***3. Refrigerator/Freezer: Provide 50 percent of freezer space within 54 inches of the floor.***

C. AHAM Standards: Provide appliances that comply with the following AHAM standards:
- ***1. Dishwashers: AHAM DW-DW1***
- ***2. Electric Ranges: AHAM ER-1***
- ***3. Clothes Dryers: AHAM HLD-1***
- ***4. Refrigerators: AHAM HRF-1***
- ***5. Freezers: AHAM HRF-1***

PART 2 PRODUCTS

2.01 MATERIALS

A. Kitchen Appliances:
   1. Ranges, electric
   2. Range hoods, ventilating type
   3. Refrigerator/freezer
   4. Undercounter refrigerators
   5. Microwave ovens
   6. Dishwashers
   7. Garbage disposals

B. Laundry Appliances:
   1. Clothes washers
   2. Clothes dryers, electric

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 116135

PIPE GRID

PART 1 GENERAL

1.01 SUMMARY

A. Qualitative requirements for dark pipe grid.

PART 2 PRODUCTS

2.01 MATERIALS

A. Pipe Grid: 5’0” increments both directions, centered in room.
   1. Pipe: ASTM A 53, standard weight (Schedule 40).
   2. Pipe joints shall be threaded and coupled, open ends, no caps.
   3. Pipe intersections shall be made with cross grid connectors.

B. Installation Accessories: Cable or threaded rod.

PART 3 EXECUTION

A. Hang grid from structural members only. Do not support grid from metal deck.

END OF SECTION

SECTION 116615

BALLET BARS

PART 1 GENERAL

1.01 SUMMARY

A. Qualitative requirements for wall mounted ballet bars.

PART 2 PRODUCTS

2.01 MATERIALS

A. Wall Mounted Ballet Bars

1. Single bar, either non-adjustable or adjustable.

2. Double bar, non-adjustable.

B. Oak Ballet Bars

1. 1-3/4” inch diameter

PART 3 EXECUTION

3.01 MOUNTING

A. Spacing for brackets

1. General: 96 inch maximum span between brackets
   a. Minimum overhang 2 inches.
   b. Maximum overhang 20 inches.

B. Bar heights

1. Single Bar: 32 inches to 46 inches from floor.

2. Double Bar: 32 inches to 34 inches from the floor for the lower bar, and 44 inches to 46 inches from the floor for the upper bar.

C. Distance from wall to bar

1. Inside at 7-1/2 inches.

SECTION 116800

PLAY FIELD EQUIPMENT AND STRUCTURES

PART 1 GENERAL

1.01 SUMMARY

A. Qualitative requirements for play field equipment and structures.

1.02 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has specialized in installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer of playground equipment.

B. Manufacturer's Qualifications: A firm who playground equipment components have been certified by IPEMA's "3rd Party Certification" service.

1. Provide only playground equipment and play structure components bearing the IPEMA Certification Seal.

C. Safety Standards: Provide playground equipment complying with or exceeding requirements in the following:

1. CPSC No. 325, "Handbook for Public Playground Safety".
2. Label play structures with warning label and manufacturer's identification per ASTM F 1487.

PART 2 PRODUCTS

2.01 MATERIALS

A. Provide units specifically designed for exterior exposure and intended use:

1. Swing main frame
2. Sand manipulating equipment
3. Modular/Composite play structure
   a. Play platform
   b. Bridge component
   c. Climbing component
   d. Slide component
   e. Crawl tube component
   f. Overhead play component
   g. ADA structure access components
   h. Roof/canopy component

PART 3 EXECUTION

3.01 INSTALLATION

A. General: Comply with manufacturer's written installation instructions, unless more stringent requirements are indicated. Anchor playground equipment securely, positioned at locations and elevations indicated on Shop Drawings.

B.

1. Maximum Equipment Height: Coordinated installed heights of equipment and components with installation of protective surfacing. Set equipment so fall heights and elevation requirements for age group use and accessibility are within required limits. Verify that playground equipment elevations comply with requirements for each type and component of equipment.

END OF SECTION

SECTION ***131900***

KENNELS & ANIMAL SHELTER EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. ***Qualitative requirements for*** chain link animal shelter/kennel equipment.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel Chain-Link Fence Fabric:
   1. Mesh and Wire Size: 2 inch mesh, 0.148 inch diameter (9 gage).
   2. Coating: ASTM A 817, Type 2, Class 2, zinc-coated (galvanized).

B. Framework:
   1. Galvanized steel, ASTM F 1083.

C. Gates:
   1. Swinging & sliding type.

D. Miscellaneous:
   1. Isolation panels – stainless steel sheets 24 ga. (18-8 type 304-2B)
   2. Animal operated doors
   3. Automatic feeding system

PART 3 EXECUTION

3.01 INSTALLATION

A. Install materials in accordance with manufacturer's instructions and approved submittals. Comply with ASTM F 567. Install materials in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections. Install posts to depth to avoid frost heave.

B. Cut pipe with pipe-cutters only. Cuttings with backsaws is not acceptable. Tack weld gates for strength. Use spring loaded latches, not yokes.

END OF SECTION

SECTION ***133413***

GLAZED STRUCTURES (GREENHOUSE)

PART 1 GENERAL

1.01 SUMMARY

A. ***Qualitative requirements for*** greenhouse superstructure including all glazing, doors, door hardware, and ventilation.

PART 2 PRODUCTS

2.01 MATERIALS

A. Provide units specifically designed for intended use:
   1. Superstructure
   2. Gutters and related drainage systems
   3. Wall and vent sills
   4. Glazing bars
   5. Operable roof and gable vents
   6. Vent operators and power actuators
   7. Doors and frames
   8. 8mm colorless polycarbonate glazing (U-value/R-value=0.62/1.61)
   9. Exhaust system and horizontal air flow fans
   10. Wet pad evaporative cooling system
   11. Heating system (maintain 70degF @ outside conditions of 9degF and 15mph wind)
   12. Ground cover fabric (17 mill, 3.2 oz polypropylene fabric)

PART 3 EXECUTION ***(NOT USED)***

END OF SECTION

SECTION ***133419***

METAL BUILDING SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. ***Qualitative requirements for*** pre-engineered metal buildings.
1. Structural framing
2. Roofing and siding
3. Doors, windows, vents, and louvers

1.02 QUALITY ASSURANCE

A. Manufacturer: AISC certified for Category MB.

PART 2 PRODUCTS

2.01 MATERIALS

A. Framing:
1. Structural Framing: Structural steel shapes, and primary, secondary, and endwall framing including columns, beams, purlins, girts, struts, and bracing.

B. Siding Panels:
1. Type: Factory-assembled insulated panels for concealed fastening.
2. Material: ***Metallic***-coated steel sheets.
3. Siding Panel Finish: ***High-performance organic finish*** (fluoropolymer)

C. Roofing Panels:
1. Type: Factory-formed standing-seam roof panel system.
2. Material: ***Metallic***-coated steel sheets.
3. Roofing Panel Finish: ***High-performance organic finish*** (fluoropolymer)

D. Doors and Hardware:
1. Steel Doors and Frames: SDI-100 requirements.
2. Hardware: ANSI A115 requirements.

E. Windows:
1. Type: Operable, with insect screens.
2. Material: Aluminum, mill finish.
3. Material: Aluminum, anodized finish.

F. Glazing:
1. Clear
2. Translucent

G. Related Materials:
1. Vapor barriers
2. Gutters and downspouts
3. Caulking and sealants
4. Wall louvers
5. Roof ventilators

PART 3 EXECUTION

3.01 INSTALLATION

A. Insulation: Over purlins with spacer blocks.

END OF SECTION

SECTION 233500

VEHICLE FUME EXHAUST EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Qualitative requirements for fume exhaust equipment for carbon monoxide vehicle exhaust and welding fume exhaust.

1.02 QUALITY ASSURANCE

A. ***Design and installation shall be in accordance with 1) ANSI/AIHA Standard Z9.2 – 2006: American National Standard for Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems and 2) Industrial Ventilation: A Manual of Recommended Practice, 24th Edition, American Conference of Governmental Industrial Hygienists (ACGIH).*** Provide products of acceptable manufacturers which have been satisfactorily used in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 MATERIALS

A. Overhead Carbon Monoxide Vehicle Exhaust System
1. Hanging overhead system with tubing sling and winch.
2. Articulated arm: welded construction, structural tubular steel, with pivot assembly and swivel connection to ductwork. Provide adjustable stops at all pivoting members and flexible tubing drop with spring balancer and adapter.
3. Power operated tubing storage reels with pendant-type remote control.
4. Exhaust Fans: Belt-drive exhaust fans, 15,000+ cfm min., AMCA rated, statically and dynamically balanced.
5. Furnish vibration isolations system of type to suit the fan(s).

PART 3 EXECUTION

3.01 INSTALLATION

A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.

B. Restore damaged finishes and test for proper function. Clean and protect work from damage.

END OF SECTION

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SECTION ***412223***

HOISTS & CRANES

PART 1 GENERAL

1.01 SUMMARY

A. ***Qualitative requirements for*** electric chain hoist.

1.02 QUALITY ASSURANCE

A. Safety Code: ASME/ANSI all applicable sections.

PART 2 PRODUCTS

2.01 MATERIALS

A. Provide electric chain hoist units specifically designed for intended use:
   1. Capacity Range: ¼ thru 2 tons.
   2. Lift: 10 feet minimum.
   3. Lifting Speed: 5 to 64 FPM.
   4. Control: Push-button control.
   5. Suspension: Push trolley.
   6. Motor: High-torque, 30-minute rated with class “B” with a thermal actuated switch (TAS)
   7. Safety: Mechanical load brake and overload protection which prevents lifting loads beyond the hoists load range.
   8. Safety: Provide an upper and lower control circuit limit switch.

PART 3 EXECUTION (NOT USED)

END OF SECTION

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A. COLOR IN SCHOOLS

1. Although color can be one of the most influential elements in the design of an educational facility, it is often not given appropriate attention in the design process, but rather develops as a result of product availability, color trends, ease of maintenance, or personal subjective preference of those involved in selecting colors instead of more scientific principles. The appropriate use of color is important in protecting eyesight and eyestrain, thereby creating surroundings that provide a balance of stimulation and a sense of security.

2. While developing standard palettes of colors for all schools would not be practical or beneficial, there are guidelines that can be used for the use of color and light in K-12 environments.

3. The reaction to, and influence of, color differs with variance in age groups. Children will, to some extent, view color differently than adults. Their eye and brain development is at a different stage than adults and at younger ages, they have not been as influenced by marketing trends. Different age groups in K-12 schools will vary in response to color as well.

B. RECOMMENDATIONS FOR COLOR APPROACH FOR ELEMENTARY SCHOOLS

1. Environments of a color palette made completely of neutral colors (achromatic hues) such as blacks, whites, greys, even dark browns, and off whites should be avoided. Lack of light wavelengths (colors of a variety of hues) have been shown to increase nervousness, anxiety, and insecurity in Dr. Harry Wohlfarth's, "*Effects of Color and Light on the Development of Elementary School Pupils,*" twelve month study from 1982-1983. These colors have been shown to be rejected or disliked by children ages 5-12 by Heinrich Friely's, Institute of Color Psychology, "*Study of Children's Color Preferences all Over the World."*

2. Warm base, background colors such as light salmon, beiges, soft yellows, or peaches on the walls have a tendency to complement the extroverted nature of younger children thus reducing tension, nervousness, and anxiety. Accent colors of more saturated hues of all colors will provide a moderate amount of stimulation as well as providing eye muscle relief to the warm lighter walls according to Frank A. Mahnke, Founder and Director of the American Information Center for Color and Environment.

B. RECOMMENDATIONS FOR COLOR APPROACH FOR ELEMENTARY SCHOOLS (cont.)

3. Avoid overuse of deeply saturated bright hues on all architectural elements (walls, floors, ceilings, and bulkheads) as this will create too much stimulation and children will have a hard time focusing.

4. Humans, especially children, can relate to the visual stimulus of color as an indication of location or special relationship. Color, therefore, provides an excellent element for Away finding≅ in a building. Areas of the building can be identified by use of colors on certain interior elements. Different corridors, classroom pods, clusters, or wings of a building could be color-coded to help children develop a sense of location in a large school. Note that the entire space in an area should not become one color (walls, lockers, flooring, casework) but rather, use one or two elements such as tack boards, signage, an occasional floor tile as a color accent that is consistent in each area of the building. When asked their preference, children ages 5-12 preferred and related to primary and secondary colors such as yellow, red, blue, violet, orange, and green (Heinrich Friely, Institute of Color Psychology, "S*tudy of 10,000 Children's Color Preferences all Over the World").*

5. As age increases, preferences are developed for more tertiary colors, in shades and tones of the primary and secondary color group.

6. As adults create environments for children, we should not allow our preferences to avoid the use of these preferred colors as accents and focal points throughout schools for an elementary school.

C. RECOMMENDATIONS FOR COLOR APPROACH FOR UPPER GRADES AND SECONDARY SCHOOLS

1. Many of the recommendations suggested for elementary grades are applicable.

2. Avoid a palette of achromatic hues.

3. Warm base colors (beige, light yellows, taupes, and peaches) on the walls will make one feel warmer than the actual temperature. This may be very beneficial in those schools in northern Ohio. Lighter shades of blue and green have been shown to elicit a sense of calmness, thus providing an environment conducive to concentration. These colors could probably be more applicable in classrooms and in the media center.

4. "Softer surroundings created by subtle and/or cooler hues have centripetal action which enhances the ability to concentrate. Beige, pale or light green, and blue-green are appropriate and they permit better concentration by providing a passive effect," according to Frank H. Mahuke's, "*Color, Environment and Human Response."*

5. If a wall in a space is indicated as the primary teaching wall or focus of presentation, a darker hue of a color on the wall will pull one's attention toward that wall.

6. School colors should be considered and discussed as to how and whether they should be incorporated into the overall color scheme. School colors are usually used in the athletic areas. Locker specifications should include the school color for the finish.

D. GENERAL RECOMMENDATIONS

1. Carpet

   a. A multicolor, dark carpet will hide staining and soiling.

   b. The value of a carpet should be at least as dark as value #6 on a grey scale.

2. Grout color for floor tile should always be a tinted shade (never white, light grey, or cream) to avoid staining and discoloration. Dark colors value #6 and above a grey scale work best.

3. Performance Stages

   a. Back walls and side walls of a stage are usually painted black or dark grey unless the space is multiuse.

   b. Stage floors are usually a dull, dark stain, or black to avoid the reflection of stage lighting.

4. Visual Display Boards

   a. The contrast of the background of a wall writing surface and the color of the written message should be as great as possible.

   b. Markers will be viewed best on a white marker board.

   c. All visual display boards should be glare-resistant.

5. Computer Area recommendations from the American Optometric Society for rooms with computers

   a. Wall color light reflectance: 50% - 60%

   b. Floors: 20% - 30%

   c. Furniture: 30% - 50%

   The goal is to have a 3:1 ratio between contrasts of surfaces in this type of space.

D. GENERAL RECOMMENDATIONS (cont.)

6. Work Surfaces

   a. The color and value of a work surface should contrast slightly to a piece of paper or a book, but should not be too dark to create an extreme contrast which would pull the attention away from the book or paper.

7. Plastic laminate on counter tops and work surfaces should have a pattern to them to avoid constant fingerprint marks.

8. Photometrics, to determine light levels, should be completed after a general color palette, hues, and color values of materials have been established for the building. Different colors and values of color will have different light reflectance and will affect the light footcandles required for each space.

9. The use of repeated colors and materials such as a common wall paint and flooring material will help give the building some unity and a sense of consistency, as well as giving each area a feeling of extended space.

E. EXTERIOR

1. The exterior palette is usually developed as a reflection of the surrounding environment relating to neighborhood buildings and landscape.

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A. LOOSE FURNISHINGS/EQUIPMENT

1. Loose furnishings and equipment in the project are those items that are not attached to the building such as furniture, special subject equipment, appliances, trash receptacles, cleaning equipment, etc. The type of loose furnishings and equipment for a school should be selected to support the educational curriculum and the function of the spaces, but also provide flexibility for change and development in the future. The exact items and styles may vary from school to school.

2. The recommended furniture and equipment is identified on each space plate in chapters 4, 5 and 6. Following are guidelines for a level of quality, durability, and function for various types of furniture that may be used in a school as well as features for consideration and review with school district representatives.

3 Maintenance items such as sweepers, lawn care machines, mops, brooms, buffers, scissors hoist, etc., are funded by the school district.

4. Student tables, student desks, and student chairs must comply with The Consumer Product Safety Improvement Act (CPSIA) of 2008 which regulates testing requirements for children's products. Section 102 of CPSIA provides regulations for lead in paint and similar surface coatings. Upon request, manufacturers must submit a third party testing and certification complying with Section 102 of the CPSIA with the requested bid.

B. QUALITY GUIDELINES AND FURNITURE SELECTION CONSIDERATIONS

1. Student Tables
   a. Tops
      .1 1 inch to 1 1/4 inch plywood with patterned horizontal grade plastic laminate on top and exposed, sanded, sealed, and lacquered plywood edge. Include steel stretcher support bar on tables over 60 inches in length.

   b. Legs or T Bases
      .1 19-gauge steel tubing with self-adjusting, rubber-cushioned, swivel type, nonremovable glides. Nickel plated chrome or electrostatically applied epoxy powder coat finish. Adjustable legs for flexibility for elementary schools and middle schools are beneficial to accommodate a wide range of student sizes at a given grade level. Tables 29 inches high are a standard height for adults and meet the Americans with Disabilities Act guidelines.

B. QUALITY GUIDELINES AND FURNITURE SELECTION CONSIDERATIONS (cont.)

2. Student Desks

a. Styles and sizes vary. Both present and future activities and goals should be considered when selecting the type of desk. If combination and attaching chair units are purchased, some free stand desks without chairs meeting the Americans with Disabilities guidelines should also be purchased.

b. Tops

.1 For ease of maintenance and durability, it is recommended that tops be 5/8 inches to 3/4 inches solid molded, thermosetting plastic with rounded edges.

c. Frames

.1 Nickel chrome plated or electrostatically applied epoxy powder coat finish shall be used. Construction will vary with style of desk. A minimum of 18-gauge should be used for legs and a minimum of 16-gauge steel tubing used for horizontal support and bracing. All welds should be continuous.

d. Glides

.1 Super-silent, rubber-cushioned, swivel-type, nickel plated steel should be externally applied and crimped onto legs. Glides should be nonremovable.

3. Student Chairs

a. Two different types of student chairs are typically used in schools. One is a soft plastic, molded steel chair, and the other type is a hard solid, molded thermosetting, plastic independent seat and back support. Both are valid options for classroom seating. The soft plastic chairs are usually available in either a four leg with glide or a sled base style. The hard plastic chairs are usually available only in a four leg with glide option.

B. QUALITY GUIDELINES AND FURNITURE SELECTION CONSIDERATIONS (cont.)

b. Sled base style chairs are generally used in carpeted areas, but, if a glide is placed on the bottom of the sled base, it can also be used on a resilient floor. The four leg chair option is generally used for resilient floors, but can also be used in carpeted spaces. The concern with a four leg chair is that the glides do sometimes come off the legs, even when crimped on in a permanent mounting. The exposed leg of the chair can then cause damage to both a carpeted or resilient floor.

c. Soft plastic chairs provide a softer and more comfortable seat. They, generally, are less expensive.

d. The hard plastic chairs are much heavier, are easier to keep clean, and are more durable with a longer use life than soft plastic. Both styles of chairs only stack about 5 to 7 chairs high.

e. Frames

.1 Nickel chrome plated or electrostatically applied epoxy powder coat finish shall be used. Nickel/chrome finish must meet all requirements for nonpeeling and abrasion-resistant finish. A minimum of 18-gauge steel tubing for legs and 16-gauge 1 1/8 inch steel tubing for backs should be used to construct the frame.

.2 Solid plastic chairs should have an "H" style frame for the legs. Avoid using an "A" style leg base. Cross-bracing of the legs about 9 inches to 12 inches below the seat is recommended for support. All welds should be continuous.

f. Solid Plastic Seat and Back

.1 Seat back should be a minimum of 5/8 inch solid, molded thermosetting plastic with contoured edges. Seat and back should be attached with metal to plastic fasteners from the frame or with exposed rivets so the exposed seating surfaces of plastic units are left unbroken.

B. QUALITY GUIDELINES AND FURNITURE SELECTION CONSIDERATIONS (cont.)

g. Soft Plastic Shell Seat

.1 Shell shall be one piece, flexible injection, molded shell with support ribbing. Shell should be attached with metal to plastic fasteners from the frame in such a way that the exposed seating surface is left unbroken and fasteners should not penetrate front of shell.

.2 Seat shall be braced in such a way that visible "stress" marks do not occur.

h. Glides

.1 ***Swivel-type, nickel-plated, steel glides*** should be externally applied and crimped onto legs. Glides should be nonremovable.

i. Sizes

.1 Exact sizes vary from manufacturer to manufacturer ranging from 12 inches to 18 inches in seat height. The following are some general guidelines for grade levels; however, Owner representatives should verify exact sizes and ratio depending on their own school requirements and need for flexibility.

Kindergarten and Prekindergarten 12 inches to 13 1/2 inches:

Grade 1	12"	to	14"
Grade 2	13 1/2"	to	15"
Grade 3	14"	to	15"
Grade 4	15"	to	16"
Grade 5	15"	to	16"
Grade 6	16"	to	18"
Grades 7 to 12	17 1/2"	to	18"

4. Teacher Desk

a. Teacher/staff desks may vary in size and style. Depending on teaching styles and methods of different school districts, the option to use something more mobile and flexible, such as a teacher support cart with writing area or a work surface on casters with hanging storage drawers versus an actual desk, may be considered.

.1 Regardless of the actual style of this desk/work surface or cart, the unit should have the capacity to hold supplies and a computer. Lockable drawers or storage is beneficial.

B. QUALITY GUIDELINES AND FURNITURE SELECTION CONSIDERATIONS (cont.)

b. Desk Construction

.1 22-gauge steel, reinforced, double wall, end panel or 20-gauge steel modesty panel or steel pedestal supported desks with steel or 1 inch horizontal grade plastic laminated 4 1/2 pound per linear inch honeycomb core. Front and back edges of top are to have post formed curved contour.

c. Work Surface Construction

.1 The frame is to be seam welded 16-gauge steel outer leg with 14-gauge steel tubing inner leg/support. Formed steel (11-gauge) cross support channel 1/4 inch thick steel work surface mounting plates or support arms or 14-gauge steel tubing support arms. All welds are to be continuous. Cable and cord raceway integral with frame construction. Top surface is to be horizontal grade plastic laminated 1 inch to 1 1/4 inch thick high density particle board with melamine/phenolic backing sheet. Front and back edges are to be post curved contour.

d. Glides

.1 Nickel/chrome plated steel self-leveling units.

e. Drawer Construction

.1 22-gauge steel durable wall box construction with 18-gauge steel ball bearing full extension glides or nylon roller suspension. Integral shaped pull in steel front. File drawers are to include integral hanging file lip on side of drawer and spring loaded follower.

f. Finish

.1 Nonchipping enamel or epoxy powder coat, electrostatically applied and then baked on over a rustproofing primer.

g. Details

.1 Plastic grommets with snap fit covers in top, wire management under unit, locks on drawers, end panel cable pass through is advantageous.

B. QUALITY GUIDELINES AND FURNITURE SELECTION CONSIDERATIONS (cont.)

5. Vertical Files
   a. Space considerations, location, layout, and type of filing should be reviewed before determining type of file and drawer capacity required. Vertical files are available in both letter and legal size.

   b. Shell Construction
      .1 22-gauge cold rolled, steel for all vertical surfaces and 20-gauge steel for top and bottom.

   c. Drawer Construction
      .1 22-gauge, cold rolled, steel with high drawer sides to form integral lip for hanging files. Drawer should include spring-loaded 22-gauge steel follower back with positive locking action.

   d. Drawer Suspension
      .1 Full extension of triple tier assembly with a minimum of 116 steel ball bearings.

   e. Details
      .1 Interchangeable core, removable locks, counterweight to inhibit tipping. Mechanical interlock preventing extension of more than one drawer at a time.

   f. Warranty
      .1 15 years

6. Lateral File
   a. Space considerations, location, layout, and type of filing should be reviewed before determining the type of file and drawer quantity required. Lateral files can be used to file paper both from front to back and side to side. Most lateral files are sized to fit both letter and legal paper but others are sized only for letter filing side to side.

   b. Shell construction
      .1 A minimum of 20-gauge steel sides and double wall base and back and 18-gauge steel top and bottom with double wall base.

B. QUALITY GUIDELINES AND FURNITURE SELECTION CONSIDERATIONS (cont.)

c. Drawer construction
.1 A minimum of 20-gauge cold rolled steel front with high sides. Removable front to back filing handrail bars to permit side to side filing.

d. Finish
.1 Chip resistant enamel electrostatically applied and then baked over a rustproofing primer.

e. Drawer suspension
.1 Full extension of triple tier assembly with a minimum of 40 steel ball bearings.

f. Details
.1 Locks are too be interchangeable and core removable. Center weight to inhibit tipping. Mechanical interlock preventing extension of more than one drawer at a time.

g. Warranty
.1 15 years

7. Steel Bookcases
a. Bookcases range from 2 to 5 shelves and usually 12 inches to 14 inches deep. Units over 36 inches should be placed against wall because they will easily tip over.

b. Shell construction
.1 20-gauge, cold rolled, steel sides and back with double wall box base. Integral standards to accept shelf supports for adjustment of 1/2 inch increments.

c. Shelves
.1 18-gauge, cold rolled, steel to accept loads of up to 100 pounds.

d. Finish
.1 Chip-resistant enamel electrostatically applied and baked over a rustproofing primer.

B. QUALITY GUIDELINES AND FURNITURE SELECTION CONSIDERATIONS (cont.)

8. High Density Stack Chair

a. High-density stack chairs provide flexibility in many spaces. Chairs should be comfortable with seat and back contours to give user back support. Chairs vary with stacking ability depending on design. ***Chairs should stack no higher than 60" above the floor.***

b. Frame

.1 7/16 inch diameter, solid coil, wire bent, sled base frame with maximum of 8 welded points on frame. Avoid cold welds.

.2 Frame to include 7/16 inch solid wire seat brace. Frame finish to be either nickel chrome plate or electrostatically applied epoxy powder coat.

c. Seat and Back

.1 Two-piece, independently molded seat and back. Seat and back construction should be in-through color injection, molded thermoset plastic. Attach to frame with plastic to metal fasteners. Seat and back should be replaceable.

9. General

a. Manufacturers shall provide the standard product warranty, unless otherwise noted by the Design Professional.

b. Adjustable, pneumatic chairs should have a minimum replacement warranty of 5 years for the hydraulic lift mechanism.

c. Fabrics on seating being used by students should have a durability exceeding 50,000 double rubs and meet state and local fire codes. Fabric is to pass ASTM-E84 and NFPA-255 codes. Color fastness is to meet 40-hour NAFM requirements.

d. Fabrics on seating being used in the administrative, guidance, or other private staff areas should have a durability of exceeding 30,000 double rubs and meet state and local fire codes. Fabric is to pass ASTM-E84, and NFPA-255 codes. Color fastness is to meet 40-hour NAFM requirements.

B. QUALITY GUIDELINES AND FURNITURE SELECTION CONSIDERATIONS (cont.)

e. Folding cafeteria tables on wheels should have pneumatic cylinders lift assist mechanism and an automatic lock with 2 manual releases in the folded and unfolded position.

f. All furniture is to meet the Americans with Disabilities Act guidelines.

g. Horizontal grade, plastic laminate tops on table, desk, work surface, and file tops is recommended for cleaning and durability.

LESSONS LEARNED

1. Many sled-based student chairs are now available with non-skid glides appropriate for hard-surface floors. Sled-based cantilever chairs are more ergonomic, but it is important to evaluate the glide as some can damage the floor.

2. Steel glides are generally considered preferable over nylon glides on hard surfaces because although they do cause black marks on the floor, they are less likely than plastic to scratch the floors over time. Steel guides must be specified, if desired, since most manufacturers have nylon as a standard.

3. Some manufacturers offer a non-skid, highly durable, plastic glide that will not mar or damage floors. However, it is typically more expensive and it is important that the Owner understands that the chair will not slide on the floor.

4. There are also various felt-type glides that can be field installed. These are a good solution to preventing scratches on the floor as long as the Owner understands that they will wear down and need replaced periodically.

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A. FOOD SERVICE EQUIPMENT

The food service area displayed on the space plates shows relationships and sizes of various areas. Each school district prepares the food to be served differently, primarily because of the way food goods are purchased. The following is a list of the different types of equipment found in food service areas:

1. E-FS-1a Preparation Area
   - a. Food Preparation
     - .1 Vegetable preparation sink
     - .2 Disposer with pre-rinse
     - .3 Food processor
     - .4 Mixer
     - .5 Drain trough
     - .6 Water station
     - .7 Can opener
     - .8 Scales
     - .9 Utility cart
     - .10 Mobile utility bins
     - .11 Mobile salad/dessert rack
     - .12 Refrigerator
     - .13 Freezer
     - .14 Soap dispenser
     - .15 Paper towel dispenser
     - .16 Mobile shelf truck
     - .17 Knife rack
     - .18 Mobile trash container
     - .19 Mobile and fixed work table
     - .20 Food slicer
     - .21 Ice maker

A. FOOD SERVICE EQUIPMENT (cont.)

b. Hot Food Production

.1 Cooks table with sink
.2 Pan storage unit
.3 Utensil rack
.4 Scales
.5 Can opener
.6 Mixer
.7 Fire suppression system
.8 Range
.9 Grill
.10 Oil filter/pump
.11 Hotplate
.12 Steam cooker
.13 Oven
.14 Kettle
.15 Tilt skillet
.16 Drain trough
.17 Water station
.18 Utility raceway
.19 Utility cart
.20 Mobile pan/cooling rack
.21 Mobile ingredient bin
.22 Refrigerator
.23 Freezer

A. FOOD SERVICE EQUIPMENT (cont.)

c. Baking

- .1 Refrigerator
- .2 Freezer
- .3 Oven
- .4 Proofing cabinet
- .5 Range
- .6 Trunnion kettle and stand
- .7 Fire suppression system
- .8 Sheerer
- .9 Water station
- .10 Mixer
- .11 Bakers table
- .12 Dessert table
- .13 Bakers sink
- .14 Mobile bakers rack
- .15 Pan storage unit
- .16 Pan dolly
- .17 Scales
- .18 Utility cart
- .19 Soap dispenser
- .20 Paper towel dispenser

d. Pot and Pan Washing

- .1 Three compartment sink
- .2 Disposer
- .3 Pre-rinse assembly
- .4 Water agitator
- .5 In-sink heater
- .6 Mechanical pot brush
- .7 Booster heater
- .8 Ventilation system - hood
- .9 Shelf truck
- .10 Utility cart
- .11 Soap dispenser
- .12 Paper towel dispenser

A. FOOD SERVICE EQUIPMENT (cont.)

2. H-FS-1b Serving Area
   - a. Tray cart
   - b. Flatware dispenser
   - c. Napkin dispenser
   - d. Straw dispenser
   - e. Milk cooler
   - f. Hot food station
   - g. Display warmers
   - h. Display refrigerators
   - i. Sandwich/fry slide
   - j. Serving counter
   - k. Cold food station
   - l. Dessert/snack station
   - m. Tray pick up station
   - n. Checker/cashier station
   - o. Ice cream cabinet
   - p. Specialty bar station
   - q. Hot food holding cabinet
   - r. Cold food holding cabinet
   - s. Mobile utility cabinet
   - t. Back counter with sink
   - u. Tray slide

3. H-FS-1c Dry Food Storage
   - a. Shelf unit
   - b. Dunnage platform
   - c. Dolly
   - d. Mobile ingredient bin
   - e. Can dispensing rack
   - f. Utility cart

4. H-FS-1d Cooler/Freezer
   - a. Mobile shelf unit
   - b. Mobile dunnage platform
   - c. Dolly
   - d. Mobile cooling rack
   - e. Strip curtain

A. FOOD SERVICE EQUIPMENT (cont.)

5. H-FS-1e Ware Washing
   - a. Soiled dish table
   - b. Clean dish table
   - c. Dishwasher
   - d. Disposer
   - e. Detergent-rinse injector
   - f. Wall shelf
   - g. Wall cabinet
   - h. Pre-rinse assembly
   - i. Rack dolly
   - j. Mobile trash container
   - k. Hose station
   - l. Tray return conveyor
   - m. Mobile bussing rack
   - n Pass through window
   - o. Tray washing racks
   - p. Flatware washing racks

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LOOSE FURNISHINGS/EQUIPMENT

1. Loose furnishings and equipment in the project are those items that are not attached to the building such as furniture, special subject equipment, appliances, trash receptacles, cleaning equipment, etc. The type of loose furnishings and equipment for a school should be selected to support the educational curriculum and the function of the spaces, but also provide flexibility for change and development in the future. The exact items and styles may vary from school to school.

2. The list of furniture and equipment typically required and funded by the Ohio Facilities Construction Commission is included in the Program Type sections in Chapter 6.

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