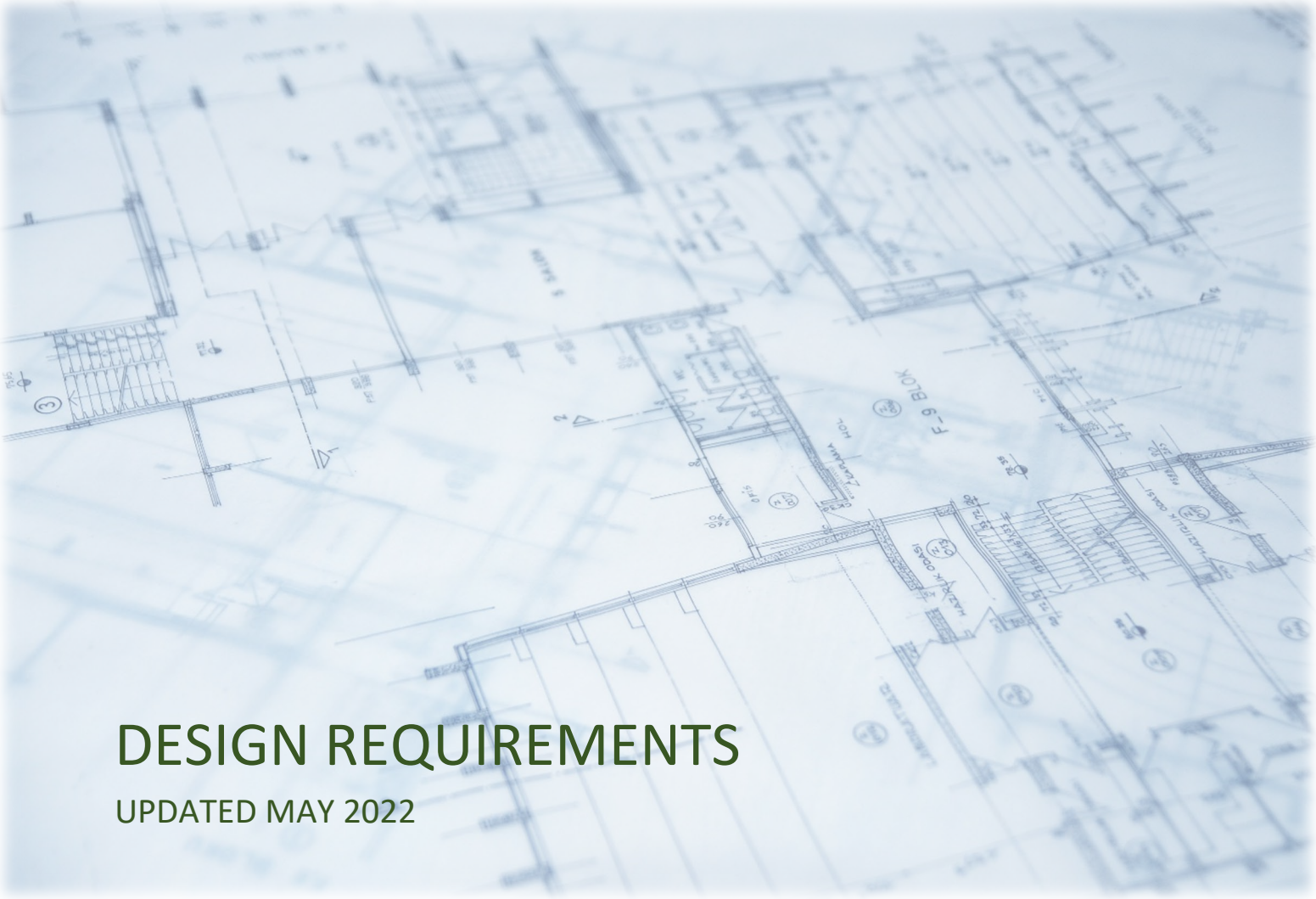
Fulton County Schools

Where Students Come First



DESIGN REQUIREMENTS

UPDATED MAY 2022

Fulton County Schools

SPLOST

Capital Improvement Program

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INTRODUCTION

These design requirements reflect Fulton County Schools' (FCS) experience in building and operating schools. They are provided to assist design professionals in preparing contract documents for new schools, additions, and renovation projects, balancing the need for instructional functionality with aesthetics, accessibility, operability, and assurance of safety so that all students, staff, and community members feel welcome and safe. These guidelines do NOT serve as a replacement for the design professional meeting with FCS Capital Improvements staff at the outset of each project to review the scope and expectations.

Due to the increased complexity of building systems that need to interface correctly to provide safe and efficient operations for the life of the building, all building mechanical and electrical system construction needs to be thoroughly checked for proper operation and fully commissioned.

The design requirements are organized into CSI divisions similar to the project specifications which will be prepared by and be the legal responsibility of the design professional of record. This document illustrates FCS requirements. It is not intended to be complete technical specifications. The design professional shall be responsible for incorporating these requirements into the appropriate final contract documents.

If manufacturers are listed in the Design Requirements, it is our understanding they have the ability to produce the building components to the performance standards listed in this document. Certain industries have been historically susceptible to company buyouts or product line cancellations or modifications. If a product line has changed since the publishing of this document or a company is no longer in existence, the performance based requirements relative to that building component are expected to be followed. **The design professional is responsible for confirming conformance with "Basis of Design" or "acceptable" manufacturers/products prior to issuing project specifications.**

All requirements noted shall be assumed to apply to every school type unless specifically noted. FCS Capital Improvements staff shall be solely responsible for establishing and maintaining the FCS Design Requirements. Deviation from these requirements must be receive written approved from FCS Capital Improvement staff. However, FCS is open to and encourages suggestions for the use of alternative methods or materials that may prove more efficient and/or cost effective.

Design professionals shall coordinate use of these design requirements with related documents, including, but not limited to:

- FCS Educational Specifications, current approved version
- GDOE's architectural review documents
- GDOE's grants administration documents
- Architect/engineer contract

FCS EDUCATIONAL SPECIFICATIONS

The FCS Educational Specifications provide descriptions of typical programmed spaces for each of the three main types of schools; elementary, middle, and high. These design requirements describe construction requirements applicable to all types of schools.

GDOE ARCHITECTURAL REVIEW DOCUMENTS

The GDOE requires that construction documents for FCS projects comply with GDOE standards and be submitted for formal review. These standards and review requirements are posted on the GDOE Facilities Services Resources web-site.
NOTE: Drawing submittals require coordination with the current GDOE "Curriculum and Space Needs" form for each project. These forms will be provided by GDOE through the FCS program manager.

GDOE STATE CAPITAL OUTLAY FUNDING

For projects where GDOE will provide funding, additional documentation is required. These requirements are posted on the GDOE Facilities Services Resources website.

ARCHITECTURAL/ENGINEERING CONTRACT

Contracts for new schools, additions and major renovations will be based on a professional services agreement for architectural and engineering services which provides a detailed description of the scope of work and obligations of the parties to the contract. Smaller projects may utilize other forms of contract authorization to describe the scope of work and obligations.

ROOM NUMBERS

FCS requires incorporation of a single room numbering system for inclusion on all drawings, schedules, and on the signage installed in the building. This includes:

- Schematic drawings
- Design development drawings
- Working drawings
- GDOE inventory drawings
- Door and finish schedules
- HVAC equipment, automated temperature controls and energy system
- Signage on the building

To achieve this, the architect shall develop a compliant building and room numbering system at the schematic planning stage. The sequence of room numbers shall be assigned based on ease of locating rooms in the completed building. In order to direct students, staff and visitors, the sequence shall start at the main entrance and progress in a logical sequence throughout the building. Random numbering of rooms is not acceptable.

- Architect shall present building and room numbering system to FCS Capital Improvements staff for review and approval before incorporating them into the construction documents. After room numbers are approved they shall not be altered without specific approval of FCS Capital Improvements staff.
- Refer to Division 10 - SIGNAGE for more information.

GADOE INVENTORY DRAWINGS

The architect shall prepare AutoCAD inventory drawings which the GaDOE requires for the Local Facility Plan and FCS uses for convenient reference. Inventory drawing standards:

- Deliver the inventory drawings to FCS, formatted and saved in AutoCAD 2013.
- Building walls shall be drawn in a simplified 2-D drawing format using AutoCAD # 8 Gray color and show only the net exposed surface of walls. (No hatching or interior chases)
- Show windows as a single Cyan Line without spandrels or sills.
- Show doors and swing as single lines similar to walls without thresholds or heads.
- Eliminate unnecessary detail features which may interfere with the readability of text at the prescribed sheet size.
- Identify all spaces, including corridors, stairs, elevators, and service rooms, with room name, room number, and net area.
- Standard sheet size = 11" x 17" without border

- Do not use more than one sheet per floor level. Adjust drawing scale as necessary to fit plan on the sheet and also retain readability. Typical scales: 1"= 40', 1"= 50' and 1"= 60'.
- All text must be readable without magnification when printed on 11" x 17" sheet. Use Century Gothic Font and colors to better distinguish room identification:
    - **Bold red text for room number at rooms that have a corridor door**
    - Plain red text at rooms within multi-room suites.
    - Show range of room numbers within multi-room suites (1200:1200.3)
    - **Bold green text for GaDOE instruction unit names**
    - Plain black text for rooms names within suites
    - Plain black text for non-instruction rooms
    - Small bold cyan text for typical room area (784sf)
    - Larger bold cyan text for total multi-room suite area (4,000sf total)
- Net room areas shall be calculated based on the inside face of walls.
- Gross building areas shall be calculated to the exterior surface of exterior walls. Do not include overhangs.
- Provide separate area calculations for mechanical mezzanines and canopies.
- Text shall be individually positioned for each space for best readability.
- Additions shall be identified with a cyan dashed line border and a title box showing GDOE building number, gross area and year when first occupied on June 30.
- Refer to typical existing inventory drawings for required schedules, tables, and overall format.

PROPRIETARY SPECIFICATIONS

- Technical specifications shall generally be performance based and include a minimum of 3 acceptable manufacturers actively bidding in Georgia.
- These shall be reviewed by FCS Capital Improvements staff or its designee in order to confirm acceptability.
- It is the desire of the Fulton County School System to utilize proprietary specifications for items for which there are less than three acceptable manufacturers or for items for which new purchases must be of the same manufacturer as existing to achieve system wide compatibility and economical use of funds in the maintenance of the systems.
- If required by GaDOE, FCS will furnish a letter of justification for each project.

GREEN CONSIDERATIONS & HIGH-PERFORMANCE SCHOOLS

FCS recognizes the environmental impact of its buildings and the importance of green design and green building practices. The District uses Energy Star labeling and awards to showcase the efforts of proper design and operation.

Architects and engineers are encouraged to incorporate energy performance in the design process and design energy efficient buildings that will lower the schools overall operating and maintenance costs based on life-cycle analysis.

OWNER ORIENTATION AND INSTRUCTION

Technical specifications shall address requirements for training sessions for building equipment and systems

- Provide a training schedule spreadsheet for distribution to owner one week before training
- Provide video record of training for future reference
- Coordinate delivery of mechanical, electrical and plumbing manuals one week before training sessions
- Deliver kitchen equipment manuals same day as training

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DIVISION 1 GENERAL REQUIREMENTS

SECTION 01 4000 QUALITY REQUIREMENTS

1. New facilities and projects that include a facility addition should include the requirement for an integrated exterior mockup. Specify the scope and location of the integrated exterior mockup in the design documents. Mockups should demonstrate installation of the materials and products within the individual specification sections. Contractor shall obtain Architect's approval of mockups before starting corresponding work, fabrication, or construction. Contractor shall maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
2. Refer to Section 23 0000 - HVAC Systems for HVAC mockup requirements.

SECTION 01 5813 TEMPORARY PROJECT SIGNAGE

1. A project sign is required for FCS construction projects which include New or Replacement schools or buildings, or Addition(s) to a building. Project signs are also required at most major and minor renovation projects. Refer to the project General Conditions for more information.

SECTION 01 7700 CLOSEOUT PROCEDURES

1. Operation and maintenance manual notebooks for all systems and equipment are required at Substantial Completion per the General Conditions of the contract.
2. Keys, valve schedules, attic stock materials, instruction confirmations, and as-built drawings are required at Substantial Completion per the General Conditions of the contract.
   2.1. Deliver keys to the Director of Maintenance Services.
3. All required warranties, inspection reports, governing certificates and other remaining items are required at Substantial Completion per the General Conditions of the contract.
4. Provide an itemized list of kitchen equipment with brand, model, and serial number for each piece along with cost.

SECTION 01 7800 EXTRA STOCK MATERIAL

1. Provide attic stock ONLY for the following materials:
   1.1. Standard ceiling tile: 2 boxes
   1.2. Resilient floor tile: 2 boxes of each color
   1.3. Carpet: 2 boxes of each color, or 15 LF each color rolled goods
   1.4. Paint: 2 gallons each specialty color

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DIVISION 2 EXISTING CONDITIONS

The design professional is expected to meet with Fulton County Schools Capital Improvement Program staff at the outset of each project to review project specifics and FCS expectations.

1. If land acquisition is involved, a complete ALTA/ACSM Land Title Survey of the property should be provided by FCS. The survey shall conform to the currently established standards for Land Title Surveys as adopted by The American Land Title Association and The American Congress on Surveying and Mapping in 2011 (or latest version). Survey must also cover owner identified services as indicated in Table A 'Optional Requirements'. Note: FCS must provide a current title inspection report (including all supporting documents in said report) prior to obtaining a final ALTA/ACSM certification. The Surveyor shall be required to provide an ASII file with all survey points
2. If land acquisition is not involved, the design professional shall meet with FCS to establish the limits of topographic and boundary survey needed, and level of detail that is required. At a minimum, the topographic and boundary survey should contain the following information. Once the limits and level of detail required are established, FCS will provide the design professional with the appropriate information. If at any time during the design process, it is determined that additional information is needed, the design professional shall notify FCS in writing of the required information.
   - 2.1. GENERAL INFORMATION
     - 2.1.1. Provide GPS* coordinates of all property pins
     - 2.1.2. Provide GPS* coordinates at the front (main) entrance to the building(s). GPS* coordinate shall be taken at the entrance threshold
     - The horizontal reference frame shall be North American Datum of 1983(HARN)-State Plane Coordinate System of Georgia. The vertical reference frame shall be North American Vertical Datum of 1988. Any directions or dimensions shown shall be a rectangular, ground level projection of the State Plane Coordinate System. Provide latitude and longitude for each GPS coordinate
   - 2.2. ADJACENT STREETS
     - 2.2.1. Names – identify as public or private
     - 2.2.2. Widths of pavement – provide dimension on survey
     - 2.2.3. Right of way dimensions – provide dimension on survey
     - 2.2.4. Center lines
     - 2.2.5. Edge of pavements
     - 2.2.6. Type of construction – identify as asphalt, concrete, gravel, etc.
     - 2.2.7. Curb and gutter (if existing)
     - 2.2.8. Elevation bottom of curb (if existing) - @ 20' intervals
     - 2.2.9. Elevation top of curb (if existing) - @ 20' intervals
     - 2.2.10. Elevation center line of street - @ 20'intervals
     - 2.2.11. Elevation of both sides of sidewalks (if existing) - @ 20' intervals
   - 2.3. EXISTING SIDEWALKS (IF ANY)
     - 2.3.1. Width
     - 2.3.2. Distance from curb
     - 2.3.3. Type of construction - Identify as asphalt, concrete, etc.
     - 2.3.4. Identify longitudinal and cross slope of walks
     - 2.3.5. Identify extents of existing handrails (if applicable)
   - 2.4. EXISTING GRADES
     - 2.4.1. Dashed, un-splined, polyline contours at a maximum two foot (2') interval highlighted (bolder) ten (10) foot intervals
     - 2.4.2. Bench mark (on permanent object) (tied to USGS datum - Provide mean sea level elevation and provide reference of datum elevation NAD83, NAD27, etc.)

2.4.3. Based upon field run readings (radial or grid) maximum distance between shots 50' (varies, based upon uniformity of existing grades)
2.4.4. Topographic information should extend 100' beyond all property lines, 400' along frontage roads (beyond side property lines), 30' beyond opposite R.O.W. of said frontage roads (across property frontage, and 30' beyond both R.O.W.s outside of property frontage) and 30' beyond all adjacent streets.

2.5. EXISTING TREES
2.5.1. Mark all trees 18" or larger* (diameter at breast height). *Size requirements of trees to be surveyed shall be determined by local jurisdiction.
2.5.2. Species of trees
2.5.3. Specimen trees. Size requirements of specimen trees to be surveyed shall be determined by local jurisdiction. Mark as "Specimen."

2.6. ELECTRIC SERVICE
2.6.1. Type of service (size, underground, overhead)
2.6.2. Depths of service lines (if underground). Service lines that require depth verification shall be determined by the design professional during the design phase. FCS will obtain information as needed.
2.6.3. Location of poles and guys
2.6.4. Service characteristics
2.6.5. Location of ground transformers

2.7. COMMUNICATION SERVICES
2.7.1. Identify type of service and location (cable, telephone, fiber optics, underground, overhead)
2.7.2. Location of poles and guys
2.7.3. Location of ground facilities (manholes, cross boxes, etc.)

2.8. WATER/GAS SERVICES
2.8.1. Locations
2.8.2. Size and type of lines
2.8.3. Pressures. Service lines that require pressure verification shall be determined by the design professional during the design phase. FCS will obtain information as needed.
2.8.4. Depths of service lines. Service lines that require depth verification shall be determined by the design professional during the design phase. FCS will obtain information as needed.
2.8.5. Existing fire lines and hydrants on and within 100 feet of the site
2.8.6. Fire flow data (static pressure, residual pressure, and GPM) taken at two locations
2.8.7. Existing back flow preventers (BFP)
2.8.8. Existing vaults
2.8.9. Existing lift stations
2.8.10. Existing meters
2.8.11. Existing valves

2.9. SANITARY/STORM SEWERS
2.9.1. Location
2.9.2. Pipe size and type
2.9.3. Direction of flow
2.9.4. Septic drain fields including septic tanks and distribution boxes (based upon existing as-built drawings or other sources noted on survey)

2.10. MANHOLES/CATCH BASINS/DROP INLETS/CURB INLETS
2.10.1. Location
2.10.2. Top and invert elevations (pipes in and out) – curb inlets (DWCB, SWCB, CI (1019a) shall be shown with throat elevations (at face of curb at inlet location – both ends of structure top)
2.10.3. Pipe sizes and direction of flow arrows

2.11. EXISTING CUT-INS FOR DRIVEWAYS
- 2.11.1. Location
- 2.11.2. Width
- 2.11.3. Elevations at street and high point at sidewalk on center line of cut-In (if applicable)

2.12. Miscellaneous
- 2.12.1. Existing easements
- 2.12.2. Existing buildings, temporary buildings with F.F.E. (identify changes in F.F.E. within same building)
- 2.12.3. Existing downspouts or rainleaders (if any)
- 2.12.4. Existing driveways (type of construction)
- 2.12.5. Existing retaining walls (top and bottom elevations)
- 2.12.6. Existing walks, playground equipment, site features (i.e. outdoor classroom, brick pavers, benches, trash receptacles, etc.)
- 2.12.7. Existing fences (if any) and type
- 2.12.8. Location of buildings on adjacent properties within 100' of property being surveyed
- 2.12.9. All adjacent property owners
- 2.12.10. Zoning of site and all adjacent properties
- 2.12.11. Tax map and parcel identification
- 2.12.12. Required front, side and rear building setback lines
- 2.12.13. Required buffer widths and type (if any)
- 2.12.14. Provide bearing and distance to the nearest county GIS monument
- 2.12.15. Off-site drainage areas
- 2.12.16. Jurisdictional wetlands limit lines (if applicable)
- 2.12.17. The 100 year IRF line (reference FIRM Panel) (if applicable)
- 2.12.18. Verify sight distances along road(s) after driveway location(s) has (have) been determined
- 2.12.19. Locate corners of proposed building on-site from preliminary site plan drawing for use by geotechnical engineer in locating soil boring holes
- 2.12.20. Locate soil boring holes as drilled in field by geotechnical testing firm
- 2.12.21. Provide survey in AutoCAD 2013 (.DWG) and PDF format, as well as six (6) hard copies of signed and sealed survey.
- 2.12.22. North arrow, date of survey, and scale
- 2.12.23. Survey shall bear seal of land surveyor registered in the state of Georgia. All deliverables shall be signed and sealed.
- 2.12.24. Soil boring locations with label
- 2.12.25. State waters within 200 linear feet of property shall be identified and labeled

- NOTE: SURVEYOR SHALL SECURE THE SERVICES OF A PRIVATE UTILITY LOCATOR FOR ITEMS 2.6, 2.7, 2.8 and 2.9.
- NOTE: SURVEYOR SHALL PROVIDE SURVEY INFORMATION WITHIN PUBLIC RIGHT-OF-WAY FOR A MINIMUM OF 150' BEYOND PROPERTY CORNERS. SURVEY WITHIN THE RIGHT OF WAY SHALL EXTEND TO THE RIGHT-OF-WAY LINE ON THE OPPOSITE SIDE OF THE STREET. ADDITIONAL SURVEY WITHIN THE RIGHT-OF-WAY MAY BE NEEDED AS DESIGN PROGRESSES. DESIGN PROFESSIONAL SHALL DETERMINE LIMITS OF ADDITIONAL SURVEY DURING THE DESIGN PHASE. FCS WILL OBTAIN AS NECESSARY.

The following information will be provided by FCS on an as-needed basis.

1. Risk Hazard Analysis (RHA):
   - 1.1. Updated requirements of the GDOE's Guideline for Risk Hazard Assessment of Educational Facility Sites 160-5-4-.16(a)5 (Effective Date May 30, 2012), and the GDOE's Guideline for Educational Facility Site Selection 160-5-4-.16(a)6 (Effective Date May 30, 2012)
2. Phase I Environmental Site Assessment
   - 2.1. Per ASTM E1527-05

3. Asbestos and Lead Based Paint Surveys and Universal Waste Inventory (fluorescent lamps, mercury thermostats, etc.) if there are buildings on site.
4. Georgia Environmental Policy Act (GEPA) Evaluation
    4.1. GEPA guidelines as provided by the Board of Regents of the University System of Georgia revised June 25, 2007.
5. Cultural Resources Services - Literature and Records Search, Site Reconnaissance, Reporting
6. Wetland/State Waters Delineation and Endangered Species Review
7. Geotechnical Engineering Exploration and Evaluation
    7.1. Customized to planned construction including buildings and infrastructure.

It shall be the responsibility of the design professional to determine the need for any and/or all of the above reports/studies for each specific project. Should any and/or all of the reports/studies be required, the design professional shall notify FCS in writing of such need. Any reports/studies that are provided shall be reviewed by the design professional and incorporated as necessary into the design documents.

DIVISION 3 CONCRETE

SECTION 03 0500 SELECTIVE DEMOLITION OF CONCRETE

1. For renovation projects requiring selective demolition and replacement of concrete, underslab termite treatment shall be re-applied and vapor barrier shall be replaced

SECTION 03 3000 CAST-IN-PLACE CONCRETE

1. Sealed Concrete flooring is the preferred finish in large storage, mechanical and electrical rooms
2. Egress stairs in enclosed stairwells shall be cast-in-place or precast concrete. Finish shall be sealed.

SECTION 03 3500 POLISHED CONCRETE FINISHING

1. Polished concrete with decorative aggregates is acceptable for Middle and High School Entrance Commons. Decorative aggregate treatment is preferred over polished and dyed concrete.
   1.1. Quality Assurance: Before casting concrete, build mockups to demonstrate typical joints, surface finish, tolerances, and standard of workmanship.
   1.2. Spread aggregate in a two-way cross pattern, ensuring full and consistent coverage
   1.3. Use penetrating liquid floor treatment suitable for polished concrete finishes
   1.4. Polish Level
      1.4.1. Level 3: High Sheen, 800 grit
2. Polished concrete floors shall be protected for the duration of construction to prevent damage from equipment and construction activities by other trades

SECTION 03 4133 PRECAST STRUCTURAL PRETENSIONED CONCRETE

1. Stadium Seating: Structure for home side stadium seating shall be precast pre-stressed concrete
2. Structure shall be designed to drain storm water away from the structure
3. Precast panel joints shall be caulked to prevent leakage
4. Provide seating for 2,500 based on 24” width per occupant
5. See Division 13 – SPECIAL CONSTRUCTION for stadium aluminum bench seats.

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DIVISION 4 MASONRY

SECTION 04 0513 MASONRY MORTARING AND GROUTING

1. Only one mortar color will be allowed at each new school.

SECTION 04 2113 BRICK MASONRY

1. Brick veneer shall be used as the exterior building material of choice. Changes in brick types, sizes, color, texture and orientation shall be kept to a minimum. Color(s) shall be recommended by the design professional and approved by FCS.
   1.1. At school additions, brick shall match existing if available. If existing brick is no longer available, the design professional shall select a complimentary brick color, and submit for approval to FCS Capital Improvements staff. Submittal shall be in the form of a finish board.
2. Avoid brick veneer finishes at interior locations
3. Specify manufactured mortar nets over the horizontal run of through wall flashing to catch mortar dropping and allow water to filtrate easily downward through the net material to the flashings and out the weeps.
4. Weeps and vents – Provide weeps immediately upon the horizontal leg of the through wall flashing at the exterior wall construction element at sills, beams and lintels at 24” o.c. maximum.

SECTION 04 2200 CONCRETE UNIT MASONRY

1. Concrete Masonry Unit (CMU) partitions are generally required at:
   1.1. Vaults and the adjacent office used for bookkeeping (extend to structure)
   1.2. Corridors and other high traffic areas
   1.3. Gymnasium, auditorium, stage, cafeteria, and kitchen
   1.4. Main mechanical and electrical rooms
   1.5. Group restrooms and other high abuse areas
   1.6. Locker rooms
   1.7. Mechanical and electrical closets
2. Additional requirements:
   2.1. High-ceiling areas shall be evaluated by the design professional to determine whether CMU or gyp is more economical
   2.2. See Finish Table in Division 9 FINISHES for additional information
   2.3. Bull-nosed block shall be used for all outside corners
   2.4. Split-faced block shall not be used unless specifically requested by FCS

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DIVISION 5 METALS

SECTION 05 1200 STRUCTURAL METAL FRAMING

1. Structural steel framing systems are preferred for new school construction as opposed to load-bearing masonry construction.
2. Steel lintel angles shall be shop primed with a corrosion-inhibitive primer.
   2.1. Field paint to match exterior trim

SECTION 05 5133 LADDERS

1. Submit provisions for roof access to FCS Capital Improvements staff for review and approval.
2. All flat roofs shall have a permanent means of access unless specifically exempt by FCS.
   2.1. Stairs are preferred
   2.2. Vertical or exterior ladders from the ground are not acceptable for required access to the roof
   2.3. Vertical fixed ladders may be used to access small areas projecting above the main roof
3. Permanent access must be provided to all mezzanines in a facility.
   3.1. Ladders provided for mezzanine access shall be a ship's type ladder. Alternating tread ladders are not acceptable.
4. Ladders and stairs shall be equipped with code-compliant guard and handrails.

SECTION 05 5200 RAILINGS

1. Gates at guard rails between interior track and bleachers in high school gyms shall be self-storing.
2. Exterior handrails shall be of welded aluminum construction with satin finish.
3. Interior handrails shall be stainless steel. Interior railings and guardrails and may be painted steel.

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DIVISION 6 WOOD, PLASTICS, AND COMPOSITES

SECTION 06 2000 FINISH CARPENTRY

1. Plastic Laminates:
   1.1. General use counter tops shall be plastic laminate material
      1.1.1. Horizontal surfaces shall be standard grade, 0.048" thick
      1.1.2. Vertical surfaces shall be vertical grade, 0.028" thick
   1.2. Color(s) to be selected from manufacturer's standard palette by the design professional and approved by FCS.
2. Casework:
   2.1. Manufactured wood casework shall be standard unless otherwise directed by FCS. See Divsion12 - FURNISHINGS. Custom casework shall only be used where manufactured casework will not serve the intended use.

SECTION 06 8300 COMPOSITE PANELING

1. Fiberglass reinforced paneling (FRP) is required as the wall finish at the following locations:
   1.1. K-1 classroom toilet room walls
      1.1.1. At a minimum, FRP panels shall be provided at the wet wall and two adjacent walls
      1.1.2. Panels shall be provided to wainscot height of 3'-6"
      1.1.3. Coordinate wall base detail with coved epoxy resinous flooring
   1.2. Kitchen food preparation area
      1.2.1. Comply with all local jurisdiction requirements
      1.2.2. Panels shall extend 8" above ceiling

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DIVISION 7 THERMAL AND MOISTURE PROTECTION

SECTION 07 0100 GENERAL ROOFING CONSIDERATIONS

1. Roof Drainage
   1.1. The designer shall review proposed drainage system requirements with FCS during design conception.
   1.2. The designer shall make reasonable efforts to drain water to eaves with gutters placed on the exterior wall in lieu of internal roof drains.
   1.3. Internal gutters are not approved under any circumstances.
   1.4. Downspouts shall be connected to underground drainage systems for new construction. At existing facilities without underground drainage systems, surface discharge is acceptable.
   1.5. Use PVC or cast iron downspout boots in areas subject to abuse.
   1.6. Boots of some type shall be used to protect downspout from damage.
   1.7. Downspout transition fittings need to be seamless or welded fittings.
   1.8. Provide dual layer TPO under gutter drains in lieu of splash guards.
   1.9. Internal drain system requirements:
      1.9.1. Drain bowls shall be set in a flat drain receiver flush with the top of the deck. Drain heights to match the top surface of roof insulation shall be accomplished with the use of drain extensions. Overflow drains shall be located the appropriate distance from the primary drains; use of collars to raise the overflow drains is not acceptable.
      1.9.2. Under-deck clamps and associated structural framing for internal roof drains and overflow drains are required.
      1.9.3. All primary drains and leaders shall be wrapped with an approved insulation system.
      1.9.4. Drains shall be connected to the leader with a 4-band, no-hub connector system, any other connection must be approved by FCS.
      1.9.5. The use of drain leaders extending through the roof and flashed with lead is not approved.
      1.9.6. Metal strainers shall be specified. The use of plastic strainers is not approved.
   1.10. Through-wall scuppers
      1.10.1. Through-wall scuppers must receive FCS approval for new construction.
      1.10.2. Height of existing through-wall scuppers shall be adjusted so that the bottom edge is flush with the top of the new roof system. If overflow through-wall scuppers are present, the heights shall be adjusted so that the bottom of the scupper is no more than 4 inches above the height of the primary drainage system.
2. Roof renovation projects
   2.1. Consider re-cover systems for both TPO and metal roofing systems
   2.2. Mechanical curbs shall be a minimum of 8” above new, finished roof surface
   2.3. Roof drains shall be replaced with new units. Retrofit bowls are not acceptable.

SECTION 07 1300 WATERPROOFING

1. Appropriate waterproofing and vapor retarders shall be specified by the design professional.
2. Avoid parapet wall penetrations.

SECTION 07 2100 THERMAL INSULATION

1. Appropriate insulation shall be specified by the design professional to provide a safe, energy efficient, comfortable building, and to meet all applicable building codes.

SECTION 07 2400 EXTERIOR INSULATION FINISH SYSTEMS (EIFS)

1. E.I.F.S is considered a secondary exterior finish and is only acceptable for use where not accessible to abuse, and where not exposed to grade. E.I.F.S. locations shall be approved by FCS Capital Improvements staff.
2. All E.I.F.S. should have water management capability.

SECTION 07 2600 VAPOR RETARDERS

1. Under-slab vapor retarders:
   1.1. Conform to ASTM E 1745, Class A, 15 mil thickness minimum
   1.2. Provide manufacturer's recommended seam overlap and tape, and seal all penetrations per manufacturer's recommendations
   1.3. Acceptable manufacturers:
   1.4. Vapor Block 15, Raven Industries
   1.5. Stego Wrap 15 mil, Stego Industries
   1.6. Moistop Ultra 15, Fortifiber Corporation
2. Refer to DIVISION 9 – Finishes, Resilient Athletic Flooring for waterproof underlayment at synthetic athletic flooring

SECTION 07 2700 FLUID APPLIED MEMBRANE AIR BARRIER

1. Appropriate fluid applied weather barrier shall be specified by the design professional.

SECTION 07 4113 ARCHITECTURAL METAL ROOF PANELS

1. Project Warranty requirements:
   1.1. Manufacturer's 20 year finish warranty covering refinishing of fluoropolymer coating due to checking, crazing, peeling, chalking, or fading
   1.2. Manufacturer's comprehensive 20 year warranty covering roof system installation and watertightness with no dollar limit (NDL)
   1.3. Installer's 5 year warranty covering roof system installation and watertightness
   1.4. Warranties shall begin on date of Substantial Completion
2. Provide installer certificates signed by the metal roofing manufacturer certifying that the installer is approved to install the specified system and that such installation will be approved for the roofing system manufacturer's watertight warranty with flashing endorsement.
3. Metal roof panels should comply with the following requirements:
   3.1. System shall conform to the requirements of FM Global 1-28 wind uplift requirements.
   3.2. Metal roofing shall be used on high-slope roofs. Steel is preferred; aluminum is acceptable.
   3.3. Minimum roof slope for metal panel systems on new construction is 4 inches per foot unless otherwise approved by FCS.
   3.4. All endwall trim and roof transition flashing shall allow the roof panel to move relative to the wall panel and/or the parapet as the roof expands and contracts with temperature change.
   3.5. Additional structural framing (where required)
      3.5.1. Furnish complete erection drawings prepared by or under the supervision of a professional engineer legally authorized to practice in the jurisdiction where the project is located.
      3.5.2. Include details showing fabrication and assembly of the metal roofing system.
      3.5.3. Show all fastenings and roof framing.
      3.5.4. Include detail drawings as required. Fabricate and install in accordance with standards of SMACNA Architectural Sheet Metal Manual and NRCA Metal Roof Panel Systems.
   3.6. Roofing panels: provide details of edge conditions, joints, corners, custom profiles, supports, anchorages, trim flashings, closures, and special details.
   3.7. Sheet metal accessories

3.7.1. Provide details of gutters, downspouts, and other sheet metal accessories at not less than 1½ inch scale showing profiles, method of attachment, and anchorages.

3.8. Provide samples for initial selection purposes in the form of manufacturer's color charts or chips showing full range of colors, textures, and patterns available for metal roofing with factory-applied finishes.

3.9. Standing seam roof panel

3.9.1. Factory roll-formed roof panel sheet from structural quality 24 gauge galvanized steel or 0.032" thick aluminum. Field formed not acceptable.

3.9.2. Panel coverage shall be 16 inches. The use of 24 inch wide panels is not approved.

3.9.3. Valleys shall have appropriately spaced striations.

3.9.4. Roofing panels shall be "snap-together" seam types with concealed clip system.

3.9.5. Panels shall be continuous from eave to ridge.

3.9.6. Architectural panels are to be installed over an approved deck and insulation system, concealed fasteners and bearing plates shall be used.

3.10. All self-adhering, heat resistant membrane laps shall be taped in accordance with the vapor retarder manufacturer's installation requirements.

3.11. All closures, ridge, hip, and valley flashings, and any other items associated with the metal panel system shall be fabricated and approved by the roofing system manufacturer. The use of field-fabricated items is not approved.

3.12. All penetrations and curbs shall be flashed in accordance with the roofing system manufacturer's written instructions and approved shop drawings, and flashings shall be included in the roofing system warranty provided to FCS.

3.13. Sealant shall be approved by the roofing system manufacturer. Sealant shall be applied between all lapped metal sections. The application of sealant after metal sections have been lapped is not acceptable and will be subject to rejection.

3.14. Special care should be taken in detailing transitions between metal panel roofing systems and other roof system types. Ensure proper flashing is provided in all locations.

SECTION 07 5200 MODIFIED BITUMEN ROOFING

1. TPO is the preferred roofing assembly for FCS facilities. Modified bitumen roofing may be used in select areas where existing roofs are modified or extended. Approval by FCS Capital Improvements staff is required prior to specifying modified bitumen roofing.
2. Roofing

2.1. System shall conform to the requirements of FM Global 1-28 wind uplift requirements.

2.2. Membrane system shall be a three ply, Type VI asphalt-coated fiber glass felt, adhered in solid moppings of Type III or IV asphalt, and one ply of granule-surface, polyester reinforced SBS modified bitumen cap sheet.

2.3. The use of torch-grade SBS or APP modified bitumen cap sheet is approved, so long as the installer has received documented training from the roofing system manufacturer or its authorized trainer for the safe application of such materials, and that the installer shall implement all required fire safety protocols during such installation.

2.4. All membrane plies shall be installed in accordance with the roofing system manufacturer's written instructions. All plies shall be fully adhered to the substrate and to each other without voids.

2.5. Cap sheet shall be installed within the timetable established by the roofing system manufacturer after fiber glass felts have been installed. Failure to meet this requirement will result in the application of an asphalt primer to the exposed fiber glass felts prior to the installation of the cap sheet. This requirement cannot be waived by the roofing system manufacturer.

2.6. All voids in the fiber glass felts, to include dry laps, shall be cut out and repaired prior to the installation of the cap sheet.

2.7. Membrane plies shall be installed within the asphalt manufacturer's EVT requirements.

2.8. Mineral perlite or wood fiber cants shall be installed at horizontal-to-vertical transitions and shall be adhered to both surfaces in solid moppings of hot asphalt or adhesives approved by the designer.

3. Base Flashing
   3.1. Shall be installed in accordance with the roofing system manufacturer's written requirements and the design document.
   3.2. At a minimum, the base flashings shall consists of one ply of Type VI asphalt-coated fiber glass felt and one ply of granule-surfaced, polyester-reinforced SBS modified bitumen cap sheet, adhered in solid moppings of hot, Type III or IV asphalt. The use of torch-grade SBS or APP modified bitumen cap sheet is approved, but shall conform to the requirements set forth for membrane installation.
   3.3. Base flashings shall have a minimum finished height of 8 inches above the surface of the roof, no exceptions. Designer shall ensure that new curbs are fabricated to meet this requirement.
   3.4. Base flashings shall be installed without voids.
4. Insulation
   4.1. Attachment of the roof insulation to the deck or approved substrate shall conform to FM Global 1-28 uplift requirements.
   4.2. Isocyanurate roof insulation shall have a minimum compressive strength of 20 PSI.
   4.3. A minimum of two layers of roof insulation shall be installed. Mechanical fastening through two layers is not approved. The application of the roof membrane directly over isocyanurate roof insulation is not approved.
   4.4. The cover board shall be approved by the roofing system manufacturer and shall be incorporated into the manufacturer's system warranty.
   4.5. Insulation and/or cover boards shall be adhered to the approved substrate in solid moppings of hot Type III asphalt or low-rise adhesives approved by the roofing system manufacturer.
   4.6. All insulation and/or cover boards used in the roof assembly shall be covered by the roofing system manufacturer in the No Dollar Limit warranty. Any insulation and/or cover board materials not manufactured by the roofing system manufacturer shall be included in such warranties.
   4.7. At internal roof drains, tapered insulation sumps shall be installed to insure positive drainage. Tapered insulation crickets shall be installed between internal roof drains to insure positive drainage.
   4.8. At eaves, the designer shall insure adequate slope is achieved to preclude ponded water conditions. The use of a row of tapered insulation may be required/specified to ensure this requirement is met.

SECTION 07 5400 THERMOPLASTIC MEMBRANE ROOFING

1. TPO is the preferred roofing assembly for FCS facilities
2. Project Warranty
   2.1. Provide written no dollar limit warranty, signed by Manufacturer of primary roofing materials and his authorized Installer, agreeing to replace/repair defective materials and workmanship. Repairs and replacements required because of events beyond Contractor's/Installer's/Manufacturer's control (and which exceed performance requirements) shall be completed by Contractor/Installer and paid for by Owner. Warranty period is 20 years after date of substantial completion. Warranty shall be paid for fully by contractor. Warranty shall be sent from manufacturer to the Architect by registered mail. Retainage of 10% of cost of roofing will be withheld until full warranty is delivered.
3. Roofing
   3.1. System shall conform to the requirements of FM Global Data Sheet 1-28
   3.2. Single ply Thermoplastic Olefin material, 60 mil minimum.
      3.2.1. Membrane shall be fully adhered to cover board
   3.3. Acceptable manufacturers
      3.3.1. Firestone Building Products, Ultraply TPO
      3.3.2. Carlisle Syntec Sureweld TPO
      3.3.3. GAF Everguard TPO

3.3.4. Johns Manville TPO

4. Insulation
   4.1. Roof insulation shall be type approved for use by single ply roof manufacturer and shall be two layers of polyisocyanurate closed-cell foam bonded to non-asphaltic fiberglass facers
   4.2. All insulation and/or cover boards used in the roof assembly shall be covered by the roofing system manufacturer in the No Dollar Limit warranty.
5. Cover Board
   5.1. High-density polyisocyanurate or DensDeck
6. Miscellaneous components
   6.1. Provide manufacturer's standard TPO walkway pads, approximately 30" wide, at locations as requested by FCS
      6.1.1. Provide a double row of walkway pads around rooftop mechanical units, at ladder and hatch landing points, and other rooftop locations as requested by FCS
   6.2. Install pipe seals and boots per manufacturer's recommendations
7. See Section 07 5200, paragraph 5 for Roof Drainage guidance

SECTION 07 6000 FLASHING AND SHEET METAL

Sheet metal flashing and trim shall comply with the following requirements:

1. Shall conform to SMACNA Architectural Sheet Metal Manual requirements. Thicknesses shall meet SMACMA Manual Table 1-5 requirements.
2. Perimeter sheet metal systems shall be shop-formed, and must meet FM Global 1-28 wind uplift requirements.
3. Gutters, copings, and fascias shall be galvanized steel with Kynar 500 finish factory-applied coating. Additionally, if shop-fabricated brake metal copings or fascias are proposed, they must have been tested and passed ANSI/SPRI ES-1.
4. Continuous cleats are required at all gravel stop-fascia locations.
5. Where coping is installed, continuous cleats are required on the exterior legs. The interior leg may be secured with appropriate screw fasteners with EPDM washers at spacings not to exceed 12 inches on center, or can be secured with continuous cleats.
6. Pitch pans, if approved for use by FCS, shall be fabricated from either 24 gauge galvanized steel or 24 gauge stainless steel. All lapped joints shall be soldered or welded; the use of caulk to seal joints is not approved.
7. Nominal 4 lb., 30" x 30" lead sheets shall be installed at all internal roof drains. Both sides shall be primed prior to installation.
8. Nominal 4 lb. soil pipe vent lead flashings with 12" x 12" flanges shall be used in non-TPO applications. Both sides of flange shall be primed prior to installation.
9. All surface mounted counterflashings shall be secured with a termination bar with appropriate fasteners at spacings not to exceed 12 inches on center.
10. The back of all gutters shall be a minimum of 1" higher than the front, no exceptions.
11. Applications under gravel top/fascia units should be the roof system base Sheet. Comply with roof manufacturer's details. For other applications, such as installation under copings, a self-adhering, heat-resistant membrane should be used, similar to Grace Construction Products, Grace Ice & Water Shield HT (high-temperature) or architect approved equal.

SECTION 07 6500 FLEXIBLE FLASHING

Flexible flashing shall comply with the following requirements:

1. Use copper, stainless or rubberized asphaltic flashing with an adhesive backing for through wall flashings at sills, beams and lintels.

2. If a fluid-applied air barrier is specified, the flexible flashing should be part of that system. Metal flashing products may be laminated with other materials such as asphalt or waterproof papers to reduce galvanic corrosion where necessary. Follow manufacturer's recommendations when specifying through wall flashing and installation accessories.

SECTION 07 7233 ROOF HATCHES

Appropriately located roof hatches shall be provided as required for access to low slope roof areas with ability to be secured from inside.

SECTION 07 8100 FIREPROOFING

Enclose space under first level of all stairs to prevent misuse of space for storage or misconduct.

DIVISION 8 OPENINGS

TESTING OF OPENINGS

1. Construction documents shall indicate that Contractor is responsible for supporting air infiltration testing of curtain wall, storefront and/or exterior window assemblies. Contractor should anticipate that testing will be required for 10% of each type of curtain wall, storefront, and/or exterior window assemblies. As part of this support, contractor shall also provide testing firm OSHA-approved means of access to and at the testing locations.
2. Construction documents shall indicate that Contractor is responsible for supporting water intrusion testing of skylights, exterior doors, curtain walls, and/or exterior window assemblies. Contractor should anticipate that testing will be required for 10% of each type of skylight, exterior doors, curtain walls, and/or exterior window assemblies. As part of this support, contractor shall also provide testing firm OSHA-approved means of access to and at the testing locations.

SECTION 08 1000 DOORS AND FRAMES - GENERAL

1. General: doors shall be 36” wide.
   - 1.1. Pairs of 36” doors with a removable mullion shall be provided at service entrances, throughout major circulation corridors and for access into large rooms such as the cafeteria, stage, gym, and media center in order to facilitate delivery of bulky objects.
   - 1.2. Single 42” doors shall be provided at kitchens and central receiving from the delivery corridor, and for access to bulk storage room, serving area, and cafeteria.
   - 1.3. Single 42” doors shall be provided for access into music practice and storage rooms to facilitate movement of large instruments.
2. Door Height: Door height at new schools shall be 84” minimum. Height of doors and frames shall be selected for best value and efficiency. Door height at renovations shall match existing.
3. Door Lites and Sidelites: Provide factory installed small vertical door lights (not hollow metal sidelights) at typical doors to classrooms and other frequently used doors. Do not provide a door lites or sidelights for the SRO office.
   - 3.1. Larger door lights and hollow metal sidelights may be used at the following:
     - 3.1.1. Administration
     - 3.1.2. Counseling
     - 3.1.3. Media Center
     - 3.1.4. Gymnasium
     - 3.1.5. Cafeteria
   - 3.2. Provide an observation light at the kitchen delivery door constructed of security glass designed to resist break-ins.
   - 3.3. Interior window frames shall be hollow metal and shall be provided at offices where supervision of adjacent areas is required. Do not provide interior windows at Locker Rooms. Do not provide interior windows at Resource Officer office.
   - 3.4. Provide interior windows in the kitchen manager’s office to allow observation of workers in the kitchen and vendors during deliveries.
   - 3.5. Student collaboration rooms and High School CTAE Broadcast Video Production editing rooms shall have windows and doors providing full visibility to the instructor.
4. Hollow Metal Frames: Hollow metal frames shall be used throughout except at primary entrances where aluminum storefront systems shall be used
5. For additional information, see APPENDIX to DESIGN REQUIREMENTS – Door Hardware Sample Specification

SECTION 08 1113 HOLLOW METAL DOORS AND FRAMES

1. Metal Doors: Metal doors shall be used on the exterior and interior of the building where appropriate for greater security. Provide heavy duty door and hardware at Vaults and Record Rooms.
2. Stile and Rail Doors: All hollow metal stile and rail doors shall be constructed with 6” stiles, 8” top rails and 10” bottom rails. Doors with exit devices shall have center rails.
3. Hollow metal door and frame construction at electrified exterior openings
   3.1. Selected exterior doors and frames shall be prepared for electrified hardware. Provide grout tight mortar/junction boxes at each electric power transfer (Von Duprin EPT, as required) and door monitor switch location. Provide 3/4” conduit from mortar boxes to a junction box located above the ceiling on the interior side of the building. EPT power transfers to be mounted on the frame and door above the center hinge (30" from top on 7'-0" door; 32" from top on 7'-2" door, 40" from top on 7’-10” door, 42” from top on 8’-0” door.
   3.2. All hollow metal doors to receive electrified door hardware shall include wire raceway as required to accommodate manufactured plug-n-play wire harnesses.

SECTION 08 1400 WOOD DOORS

1. Stile and Rail Doors: Wood stile and rail doors shall be constructed with 6” stiles, 8” top rails and 10” bottom rails. Doors with exit devices shall have center rails.
2. Wood and Plastic Doors: Wood doors shall be specified for general interior use. Veneer shall be Oak, Maple, or Select White Birch with shop applied transparent finish.

SECTION 08 3326 COILING GRILLES

1. Special wide roll-up doors shall be provided as appropriate for access to shops, stage scenery areas, mechanical rooms, and storage rooms to facilitate movement of bulky objects. Note: lock must be accessible from both sides.
2. Provide manual operated solid roll-up shutters with security latch operated by turn knob on room side at the following locations as required:
   2.1. High School athletic storage buildings
   2.2. Grounds maintenance storage buildings
3. High School and Middle School– between Serving Lines and Cafeteria:
   3.1. Provide electrically operated roll-up grilles or manual curtain grille in lieu of solid doors to allow for air circulation.
   3.2. Locate key operated control on serving line side.
   3.3. Do not provide supplemental latches or dead-bolts.
4. High School and Middle School – at Corridors between Separation Zones:
   4.1. Provide electrically operated roll-up grilles to limit access at corridor separation zones. These shall be in addition to emergency smoke doors that may be required by code.
   4.2. Locate key operated control on both sides.
   4.3. Provide security latch operated by key, accessible from both sides.

SECTION 08 4113 ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

1. Aluminum storefront systems shall be used at primary entrances to the building. Aluminum doors shall be “wide stile”
2. Door Height: Door height at new schools shall be 84” minimum. Height of doors and frames shall be selected for best value and efficiency. Door height at renovations shall match existing.

3. Stile and Rail Doors: All aluminum stile and rail doors shall be constructed with 6” stiles, 8” top rails and 10” bottom rails. Doors with exit devices shall have center rails.
4. Aluminum Door and Frame construction at electrified exterior openings.
   4.1. Selected exterior doors and frames shall be prepared for electrified hardware. Provide junction boxes at each electric power transfer (Von Duprin EPT, as required) and door monitor switch location. Provide 3/4” conduit from junction boxes to a junction box located above the ceiling on the interior side of the building. EPT power transfers to be mounted on the frame and door above the center hinge (30" from top on 7'-0" door; 32" from top on 7'-2" door, 40" from top on 7’-10” door, 42” from top on 8’-0” door.
   4.2. All aluminum doors to receive electrified door hardware shall include wire raceway as required to accommodate manufactured plug-n-play wire harnesses.
   4.3. Submittal to include details of frame members fabricated to accept Von Duprin EPT Power Transfer.

SECTION 08 5113 ALUMINUM WINDOWS

1. All exterior window frames shall be aluminum. Steel window frames are not acceptable at exterior walls.
2. Architects are encouraged to incorporate windows for natural lighting into as many building spaces as practical. However, care should be taken to design economical window systems that maximize light while minimizing cost. Curtainwall should be avoided.
3. Minimum Requirements:
   3.1. Windows are desired at all general instruction classrooms.

SECTION 08 7100 DOOR HARDWARE

1. Appropriate finish hardware shall be specified by the design professional for review and approval by FCS.
   1.1. See APPENDIX to DESIGN REQUIREMENTS – Door Hardware Sample Specification
2. Cylinders: Hardware must be heavy duty type and accept the proprietary Best removable core system.
   2.1. Proprietary Product: Best Lock Company
3. Door Closers:
   3.1. Proprietary Product: LCN
4. Fire and Smoke Doors: All fire and smoke doors shall have magnetic hold-open devices interfaced with the fire alarm system.
5. Overhead Fire and Smoke Doors: Doors shall be equipped with easily tested and re-set mechanisms.
6. Panic Hardware:
   6.1. Proprietary Product: Von Duprin

SECTION 08 8000 GLAZING

1. General exterior glazing shall be double insulated. Provide tempered, laminated, fire-resistant rated and impact-resistant glass as required by codes. Use tinted glass for sun control in lieu of blinds at large and inaccessible windows at Clerestories, Lobbies, Corridors, Media Centers, Cafeterias, Gymnasiums and similar spaces.

SECTION 08 8700 GLAZING SURFACE FILMS

1. In select locations, window film may be required on exterior windows and doors. Provide the following as directed by FCS Capital Improvements staff.
   1.1. Basis of Design: 3M Scotchshield Safety & Security Window Film Ultra 800
      1.1.1. Film thickness: 8 mil, microlayered
      1.1.2. Graves Tear Resistance: 1100 lbs%
      1.1.3. Tensile Strength: 31,000 psi
      1.1.4. Break Strength: 255 lbs/in
      1.1.5. Elongation at Break: 130%

1.1.6. Peel Strength: 6 lbs/in
1.1.7. Abrasion Resistance: less than 5%

DIVISION 9 FINISHES

GENERAL NOTE FOR DIVISION 9: Reference Finish Table at the end of this section, unless noted otherwise.

GENERAL COLOR DESIGN CONSIDERATIONS:

1. Colors should be building appropriate shades of the school colors. They are not required to be exact replicas of school colors, but should be shades in the general family of school colors that work with the general building design.
2. Generally, FCS prefers neutral white or light gray throughout, with up to three accent colors.
3. Corridors shall have no more than one color accent wall, if used. Avoid dark hallways.
4. Classrooms shall have no more than one color accent wall, if used.
5. Floor patterns with multiple colors of floor tile should be simple and limited to no more than three colors. See section 09 6500 below for more information.
6. Two (2) interior finish boards are required to be submitted along with the 90% progress submittal. Finishes represented shall include, but are not limited to the following: paint, wall tile, resilient flooring, carpet, epoxy flooring, acoustic panels, wood & metal door finishes, athletic flooring, casework, laminate, toilet partitions.
7. One (1) exterior finish board is required to be submitted along with the 90% progress submittal. Finishes represented shall include, but are not limited to the following: brick, EIFS finish color, storefront, exterior door finish, door and window frames, gutter and downspout finish, and metal roofing finish.

SECTION 09 2900 GYPSUM BOARD

1. Gypsum board wall systems are appropriate for interior partitions at light duty spaces such as offices and partitions between classrooms and labs. Use fire resistant material as required by code.
   - 1.1. Bullnose corner beads shall be used at typical outside corners. Corner guards, in lieu of bullnose corners, may be used at the Administrative and Counseling areas. Heavy duty corner guards shall be provided at high-abuse areas such as Band equipment rooms.
   - 1.2. In general, two layers of gypsum board should be applied to each side. The outer layer shall be abuse-resistant wallboard
   - 1.3. Sound batts shall be used to reduce the sound transmission coefficients of the wall system as needed. For more information, refer to APPENDIX to DESIGN REQUIREMENTS – Acoustical Standards.
   - 1.4. Refer to the Finish Table at the end of this section for more information on locations.
   - 1.5. Finish levels shall be in accordance with the “Recommended Specification: Levels of Gypsum Board Finish” as published jointly by the Gypsum Association, AWCI, CISCA, and PDCA.
2. The following special considerations need to be followed when gypsum board wall systems are used.
   - 2.1. At K-1 classroom restrooms use Fiberglass Reinforced Panels (FRP) covering over gyp walls. Coordinate water resistant wall base detail with flooring and FRP. Refer to section 06 6000 for more information.
     - 2.1.1. Keep gypsum ½” off of floor, run FRP to floor
   - 2.2. In general, CMU shall be used at custodial rooms and closets. Where gypsum board walls are necessary, water resistant wall finishes should be installed in the area of the janitorial sinks to prevent water damage over time.
   - 2.3. Rated and braced gypsum board systems may also be used at firewalls above the ceiling where appropriate.
3. Non-accessible Ceilings: Ceilings at restrooms, locker rooms and other similar spaces, including Kitchen Manager’s Office and Locked Closet, shall have non-accessible ceilings to prevent students from getting into ceiling plenums unobserved.

4. Ceiling access panels need to be installed wherever hard ceilings are installed to access valves, smoke detectors, etc. Minimum size shall be 24" x 24", if personnel access is required (i.e. more than hand access to reach a valve).

SECTION 09 3000 TILING

1. Quarry Tile: Quarry tile may be used on a limited basis for patching and repairing existing quarry tile floors. Epoxy flooring is the FCS standard for flooring in new construction at kitchen, walk-in cooler and freezer, dry storage, serving courts, restrooms, and custodial wet areas. Refer to section 09 6623 for more information.
2. Ceramic Tile: Ceramic tile may be used on a limited basis for patching and repairing existing ceramic tile floors. Epoxy flooring is the FCS standard for flooring in new or renovation construction at restrooms. Refer to section 09 6623 for more information. See also Finish Table at the end of this section.
    2.1. When renovation restroom floors, complete removal of existing tile floors and grout is required prior to installation of new epoxy flooring.

SECTION 09 5100 ACOUSTICAL CEILINGS

1. 2 x 2 ceiling grids with 2' x 2' suspended ceiling boards shall be used for all general use areas of the building. Special treatment may be needed in selected areas, such as kitchens and auditoriums. Floor-to-ceiling heights shall be as follows:
    1.1. Classrooms shall be 8'-8" minimum
    1.2. Corridors shall be 9'-0" minimum
    1.3. MS Music areas shall be 15'-0" minimum; HS Music areas shall be 16'-0" minimum.
    1.4. Black Box theaters shall be 17'-0" minimum. Pipe grid shall be 16'-0" AFF.
    1.5. CTAE spaces at ES and MS shall be 10'-0" minimum; HS CTAE ceiling heights vary with program
    1.6. Fitness Labs shall be 18'-0"
    1.7. Ceiling not required in the following spaces (exposed structure): Central storage, receiving, and custodial closets
    1.8. Avoid ceiling clouds if possible, especially where students can access. Ceilings should be continuous where designated.
2. Standard ceiling tile shall be square edge, non-directional, fissured design, 24" x 24" x 5/8" thick, NRC 0.55
    2.1. Basis of design: Armstrong Cortega 770
    2.2. For acoustic information, refer to APPENDIX to DESIGN REQUIREMENTS – Acoustical Standards.
3. Kitchen Prep area ceiling tiles shall be square edge, factory-applied vinyl latex paint, with washable, water-repellant finish, 24" x 24" x 5/8" thick. Ceilings shall be installed in all kitchen areas, including storage and custodial closets.
    3.1. Basis of design: Armstrong Kitchen Zone 673
    3.2. Stainless steel ceiling tiles required around kitchen hood
4. Suspended ceiling grid to be 15/16" exposed tee

SECTION 09 6400 WOOD FLOORING

1. Elementary cafeteria stage risers and Middle School stage shall be 25/32" maple flooring. Elementary stage shall be resilient flooring to match cafeteria floor.
2. High School stage flooring shall be shall be an anchored resilient floor system, with continuous plywood underlayment and ¾" 50 durometer resilient pads for vibration control, and pine finish strip flooring:
    2.1. Basis of design: Robbins Bio-Cushion Classic
    2.2. Finish paint color shall be black
        2.2.1. Ensure finish flooring is properly prepped for finish painting

SECTION 09 6466 WOOD ATHLETIC FLOORING

1. High school and middle school gym flooring shall be a wood strip athletic flooring system with 2-layers of continuous plywood underlayment with ¾ 60 durometer resilient pads, and MFMS-certified northern hard maple finish strip flooring.
   1.1. Basis of design: Robbins Bio-Cushion Classic system
   1.2. Minimum finish flooring thickness shall be 25/32", No.2 or better grade maple
   1.3. Flooring shall include multi-purpose court markings and custom designed school logo approved by FCS Capital Improvements staff.
      1.3.1. Coordinate markings with Section 11 6600 – ATHLETIC EQUIPMENT
      1.3.2. Provide 9' minimum clearance between basketball sidelines and front face of fully extended bleachers
   1.4. Provide recessed supports for volleyball nets at all middle and high school gyms.
      1.4.1. Coordinate supports with Section 11 6600 – ATHLETIC EQUIPMENT
   1.5. Provide event floor covering at wood floors which are also used for auditorium and other assembly functions.
2. Fitness Lab and Dance studio flooring shall be an anchored resilient floor system, with continuous plywood underlayment and ¾" 50 durometer resilient pads for vibration control, and polyurethane resin surface finish.
   2.1. Basis of design: Robbins Bio-Cushion Classic system with Forever Marley surface
   2.2. Color shall be selected from manufacturer's standard colors

SECTION 09 6500 RESILIENT FLOORING

1. Resilient Tile Flooring:
   1.1. Typical floor finish shall be resilient tiles unless otherwise noted. Sheet flooring is not preferred. Product shall be specified by the design professional and shall meet the following guidelines.
      1.1.1. Acceptable products
         1.1.1.1. LVT flooring
            1.1.1.1.1. 3.0 mm thick, wear layer 30 mil minimum
            1.1.1.1.2. Acceptable manufacturers, subject to the requirements listed herein:
               1.1.1.1.2.1. Tarkett Contour Series Abstract
               1.1.1.1.2.2. Shaw Contract, Joy Squared
               1.1.1.1.2.3. Mannington Commercial, Color Anchor
         1.1.1.2. Rubber tile
            1.1.1.2.1. 2.0 mm (minimum) thick vulcanized rubber tile
            1.1.1.2.2. Basis of design: nora systems, noraplan sentica
      1.1.2. Color selections shall be from manufacturer's standard colors. Patterns shall be tone-on-tone similar to VCT in appearance. Wood-look and stone-look patterns are not preferred. Where applicable in renovation projects, design shall take existing VCT finishes into consideration where replacement flooring will abut existing resilient floor.
      1.1.3. Tile finish shall be smooth. Tile size is preferred to be square or rectangular, not exceeding 24" x 24".
      1.1.4. Product availability is a consideration, and products available from domestic warehouses are preferred
      1.1.5. Manufacturer's recommended high moisture adhesive is preferred in all applications unless noted otherwise. For facilities with documented underslab moisture issues, refer to alternate product recommendations noted in paragraph 2 below.
      1.1.6. Manufacturer's written product warranty shall be 20 years minimum

1.2. At elementary and middle school corridors, the floor pattern shall incorporate a contrasting strip of tile set 24" clear of each wall in order to define an emergency safety zone for students. Corridor patterns shall be submitted to FCS Capital Improvements staff for review and approval.

2. Alternate resilient floor tile product for slab on grade areas with high Relative Humidity:
   2.1. Basis of Design: nora environcare nTx
      2.1.1. Prepare slab per manufacturer's recommendations
3. Resilient flooring not necessary beneath casework in classrooms and administrative areas.
4. Base shall be black or dark brown rubber cove base. Provide black rubber transition strips adjacent to other floor materials.
   4.1. Provide 4" base TYP UNO at resilient flooring and carpet flooring
   4.2. Provide 6" base at resilient athletic flooring
5. Floor finishes at enclosed egress stairs: Refer to Division 3 – CONCRETE for information on stair treads. Exposed and monumental staircases shall be designed to account for durability and high traffic considerations.

SECTION 09 6566 RESILIENT ATHLETIC FLOORING

1. Elementary Schools: Synthetic athletic flooring will be installed in all elementary school gyms.
   1.1. Acceptable manufacturers:
      1.1.1. Basis of design: Connor SportGrain Plus
      1.1.2. Gerflor Taraflex Multi-Use
      1.1.3. Shaw Rexcourt
      1.1.4. Tarkett/Omnisports Speed
      1.1.5. Grabo Sport Flooring Elite
   1.2. Color: Faux maple wood
   1.3. Provide fiberglass-reinforced waterproofing underlayment between subfloor and flooring material. Underlayment shall be loose laid with taped joints. Sports floor shall be glued to underlayment.
      1.3.1. Basis of design: Grabo Vaporex
   1.4. Court markings: Basketball court markings
2. High School Indoor Track Athletic Flooring: Polyurethane Flooring over Rubberized Base with continuous stripping for three lanes.
   2.1. Basis of design: Robbins Pulastic Classic 90
3. High School Weight Room Athletic Flooring: Non-porous vulcanized recycled rubber flooring manufactured in a dual-layer format, square tile format with interlocking tabs, free-laid without adhesive
   3.1. Basis of design: Robbins Galaxy Ultra
   3.2. Product thickness: 3/8"
4. High School Fitness Center Athletic Flooring: Non-porous vulcanized recycled rubber flooring manufactured in a dual-layer format
   4.1. Basis of design: Robbins Galaxy Ultra
   4.2. Product thickness: 3/8"

SECTION 09 6600 TERRAZZO FLOORING

1. Terrazzo may be considered for entrance logos at middle and high schools after analysis of its cost and schedule impact, and specifically approved by FCS Capital Improvements staff. Terrazzo is approved for indoor use only. Consider alternative materials which do not present a slipping hazard for entrance logos.

SECTION 09 6623 EPOXY RESINOUS FLOORING

1. Epoxy Resinous Flooring is required for use at athletic and PE Locker Rooms, restrooms, and kitchens. Polyurethane Flooring should be used in kitchen areas that may be subject to high temperatures.

2. Acceptable manufacturers:
   2.1. Basis of design: Stonhard, Inc., Stonshield HRI Epoxy Flooring System and Stonshield UTS Polyurethane Flooring System
   2.2. Dex-o-tex Epoxy Coating
   2.3. BASF Selby Epoxy Resin
   2.4. Key Resin
3. Stonshield HRI System (Epoxy) Characteristics:
   3.1. Overall system thickness: Nominal 3/16”
   3.2. Integral Cove Base: 4”
   3.3. Wearing Surface: Medium
4. Stonshield UTS System (Polyurethane) Characteristics:
   4.1. Overall system thickness: Nominal ¼”
   4.2. Integral Cove Base: 4”
   4.3. Wearing Surface: Medium

SECTION 09 6800 CARPETING

Vinyl Cushion Tufted Textile (carpet) shall be specified for administrative areas, media center, and other spaces as indicated by FCS.

1. Performance standards:
   1.1. Fiber: Type 6 or 6.6 nylon
   1.2. CRI TARR classification: Severe
   1.3. Backing: cushion
2. Acceptable manufacturers:
   2.1. Basis of design: Tarkett Powerbond Cushion RS
   2.2. Interface Modular with GlasBac backing
   2.3. Shaw Modular with EcoWorx backing
3. FCS preference is to minimize seams in standard installations
4. Base shall be black or dark brown rubber cove base

SECTION 09 8000 ACOUSTIC TREATMENT

1. Music room design guidelines:
   1.1. Provide impact resistant wall-mounted sound absorbing panels at all music classrooms, 2” thick, NRC 0.95 per ASTM C 423 as required by Acoustical Consultant
   1.2. Provide additional ceiling and wall-mounted sound diffusing panels at Band, Choral, and Orchestra classrooms as required by Acoustical Consultant
2. Auditorium and Main Gymnasium design guidelines:
   2.1. Provide wall-mounted sound absorbing panels, 2” thick, NRC 0.60 per ASTM C 423 as required by Acoustical Consultant
3. Additional specialty spaces:
   3.1. Provide acoustic panels as required by Acoustical Consultant
4. For more information, see APPENDIX to DESIGN REQUIREMENTS – Acoustical Standards

SECTION 09 9000 PAINTING AND COATING

1. Exterior painting: Exterior painting shall be in accordance with the manufacturer’s recommendations for the paint used and the material being painted. Color shall be selected by design professional and approved by FCS Capital Improvements staff. In general materials with factory applied paint, coatings, or integral color should be specified in order to reduce maintenance costs.
   1.1. Basis of design: Sherwin-Williams

2. Interior painting: Interior painting shall be in accordance with the manufacturer's recommendations for the paint used and the material being painted. Low VOC semi-gloss shall be used unless otherwise approved. Color shall be selected by design professional and approved by FCS Capital Improvements staff. In general, materials with factory applied paint, coatings, or integral color should be specified in order to reduce maintenance costs.
   2.1. Basis of design: Sherwin-Williams

DIVISION 09 FINISH TABLE

The following table includes a list of flooring and ceiling finish preferences for new FCS projects. Renovation projects may require a deviation from these preferences and must be approved by FCS Facilities.

Space	Floor Finish	Ceiling Finish	Wall Finish
Classrooms, Science Labs, Art, CTAE	Resilient Flooring	2'x2' Standard Acoustical Ceiling Tile	Gyp
Corridors	Resilient Flooring	2'x2' Standard Acoustical Ceiling Tile	CMU
Entry Commons/Lobby	Elementary: resilient Middle/High: Polished concrete or terrazzo; school logo acceptable if known	2'x2' Standard Acoustical Ceiling Tile	Varies
Media Center	Carpet	2'x2' Standard Acoustical Ceiling Tile	Varies
Music Rooms	Resilient Flooring TYP UNO Carpet @ Choral	2'x2' High NRC Acoustical Ceiling Tile	Gyp w/ acoustical panels as required
Stage and Platforms	Wood Flooring	Painted Exposed Structure	CMU
Auditorium	Sealed concrete & Carpet	Gyp	Gyp w/ acoustical panels as required
Black Box Theater	Resilient Flooring (black)	2'x2' High NRC Acoustical Ceiling Tile (black tile & grid)	CMU (painted black); acoustical panels as required
Darkroom	Epoxy Resinous Flooring (medium gray)	2'x2' Standard Acoustical Ceiling Tile & Grid (black)	CMU (painted black); gray laminate enlarging stations w/ black resin top
ES Multi-Purpose	Resilient Athletic Flooring	Painted Exposed Structure	CMU
HS and MS Gym	Wood Athletic Flooring	Painted Exposed Structure	CMU
Weight Room, Fitness Center	Vulcanized rubber flooring	2'x2' Standard Acoustical Ceiling Tile	CMU
Fitness Lab, Dance Studio	Resilient Wood Flooring system with Marley topping (specify floor mats for wrestling)	2'x2' Standard Acoustical Ceiling Tile	CMU; acoustical panels as required
Indoor Track	Polyurethane Flooring over Rubberized Base	Painted Exposed Structure	CMU

Space	Floor Finish	Ceiling Finish	Wall Finish
Locker Rooms	Epoxy Resinous Flooring	Gypsum Board Ceiling	CMU
Offices, Admin/Conference, Speech	Carpet	2'x2' Standard Acoustical Ceiling Tile	Gyp
Workrooms and Mailrooms	Resilient Flooring	2'x2' Standard Acoustical Ceiling Tile	Gyp
Cafeteria	Resilient Flooring	2'x2' Standard Acoustical Ceiling Tile	CMU
Kitchen, Serving Lines, and Ancillary Spaces	Epoxy Resinous Flooring (or is Polyurethane required per 09 6623)	2'x2' Scrubbable ACT TYP 2'x2' Stainless Steel Tiles @ Hood	CMU w/ FRP panels to 8" above ceiling
Restrooms	Epoxy Resinous Flooring	Gypsum Board Ceiling	CMU w/ tile accent wall (wall opposite entrance preferred)
K-1 Classroom Restrooms	Epoxy Resinous Flooring	Gypsum Board Ceiling	Gyp w/ FRP wainscot
Stairwells	Sealed Concrete	Gypsum Board Ceiling	CMU
Central storage, Custodial Closets/storage, Mech, Elec Rooms	Sealed Concrete	Exposed Structure TYP UNO 2'x2' Standard Acoustical Ceiling Tile @ Branch closets	CMU

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DIVISION 10 SPECIALTIES

SECTION 10 1100 VISUAL DISPLAY UNITS

Visual Display boards and related accessories shall be included in the construction contract.

1. Marker boards shall be factory laminated 3-ply construction with minimum 24 ga. porcelain-enameled steel bonded to 3/8" particleboard with 0.015 inch aluminum backing sheet. Boards shall be 4'-0" high, with aluminum frame, chalk tray, map rail, and flag holder attached to frame.
   1.1. Basis of design: Claridge Products and Equipment, Inc. Series 1 LCS
   1.2. For location information, refer to APPENDIX to DESIGN REQUIREMENTS – Marker and Tack Board Schedule.
   1.3. Mounting heights:
      1.3.1. K-5: 2'-2" AFF
      1.3.2. 6-8: 2'-9" AFF
      1.3.3. 9-12: 2'-9" AFF
   1.4. Provide special graphics as noted at music rooms.
   1.5. Provide manual sliding marker boards at science labs.
   1.6. Glass marker boards are prohibited in student areas.
2. Tack boards shall be 1/4" thick, plastic-impregnated cork sheet factory laminated to ¼" thick particleboard backing. Provide factory applied aluminum trim. For location information, refer to APPENDIX to DESIGN REQUIREMENTS – Marker and Tack Board Schedule.
   2.1. Basis of design: Claridge Products & Equipment, Inc. Series 1 Cork Bulletin Board
   2.2. Color to be natural cork color provided this is one of the manufacturer's standard colors. If natural cork color not available, select from manufacturer's standard colors and obtain approval from FCS.
   2.3. Mounting heights:
      2.3.1. K-5: 2'-2" AFF, or higher, depending on casework configuration
      2.3.2. 6-8: 2'-9" AFF
      2.3.3. 9-12: 2'-9" AFF
   2.4. Avoid tack strips in hallways.

SECTION 10 1400 SIGNAGE

1. Interior Room Signage: Appropriate signage shall be provided for in accordance with code and ADA requirements.
   1.1. Typical classrooms, labs and multi-purpose rooms shall be identified by room number only. For rooms that have more than one access point, provide signage for each door.
   1.2. Permanent special purpose rooms and suites (administration, counseling, media center, gymnasiums, cafeteria, staff dining, kitchen, restrooms, electrical, mechanical, custodial, IDF, etc.) should be identified by name and number, but not individual rooms within suites that may be subject to re-assignment.
   1.3. Characteristics:
      1.3.1. Sign shall be 1/8" thick acrylic plastic with etched away background leaving copy and tactile graphics raised, surface painted. Adhesive fixed characters are not acceptable.
      1.3.2. Tactile text, graphics, and Braille shall be raised from plaque surface by sand carved or photopolymer method, as required by ADA.
      1.3.3. Letter style to be Helvetica Condensed, ¾ inch height.
      1.3.4. Provide international symbol signs as required at all handicapped facilities and stairs.
      1.3.5. Classroom and office signs shall have two slots for staff name and/or additional information
      1.3.6. Signs shall be mounted using silastic adhesive and factory applied vinyl tape
   1.4. Cafeteria serving lines shall be identified with easy to read graphics as well as functional room numbers for identification. Graphics shall be coordinated with FCS Capital Improvements staff.

2. Room Numbers
   2.1. Room numbers shall be all numeric as required for GDOE Inventory for new facilities.
      2.1.1. Room numbers at additions shall extend existing Inventory Drawing numbers without repeats
      2.1.2. For minor renovation projects where signage replacement is not included, construction documents shall be labeled with existing building room numbering to match existing building automation system numbering; coordinate numbering with FCS Capital Improvement staff
      2.1.3. For renovation projects that include signage replacement, coordinate with FCS Capital Improvements staff on preferred numbering system for rooms and building automation systems
   2.2. Major room numbers at multi-story buildings shall be four digits starting with the floor level, and progress around the building in sequence (# 1211 = 1st floor, 2nd wing or Corridor, 11th room). Small spaces within major rooms or suites shall be identified with the major room number plus numeric suffix (# 1211.1). Where possible use whole thousands for wings or corridors (1200) and use postal odd-even progressive numbers down corridors (odd on right (1211), even on left (1212). All spaces must be numbered including corridors, stairs, elevators, and service rooms. Stairs, elevator and service rooms may be numbered as a suffix of the corridor leading to them.
   2.3. One story buildings shall be similar, but may use three digits when identification of the story is not needed
3. Site Signage (Road, Parking, and Drive Entrance): Appropriate metal signage shall be included in the contract per code and local requirements.
   3.1. Parking and traffic signage shall be included in the site design and Construction Documents.
   3.2. Identify restrictions on use of parking spaces such as handicap, staff, visitors, students, etc.
   3.3. Provide way-finding signage for major facilities such as visitor parking, building entrance, parent and bus drop-offs, stadium, ball fields, etc.
   3.4. Provide signage clearance from curbs to prevent bus “tail swing” from damaging signposts. Similar clearance needs to be maintained for bus canopy posts.
   3.5. Mount signage on building walls and columns where possible.
   3.6. Coordinate sign design with FCS Capital Improvements staff.
4. Marquee Sign (Elementary and Middle Schools):
   4.1. In addition to the directional and building identification signage described above, include a double sided non-illuminated school marquee sign in the construction documents for elementary and middle schools.
      4.1.1. The sign shall include a top panel with the school name and a second panel for manual placement of letters for messages.
      4.1.2. Sign shall include street address number that conforms to local jurisdiction first responder requirements and shall indicate the facility is a Fulton County School
   4.2. Provide a masonry base compatible with the building design. Base width shall be at least as wide and deep as the marquee sign. Sign surround may be of metal panel construction.
      4.2.1. Maximum height is 9’-4” from grade to top of marquee sign. Maximum width is 10’-4”.
   4.3. Architect shall determine the most functional location for the marquee sign and obtain prior approval by FCS Capital Improvements staff. Location shall conform to local jurisdictional and FCS Transportation requirements for vehicular sight lines
5. LED Marquee Sign (High Schools):
   5.1. In addition to the directional and building identification signage described above, include a double sided LED marquee sign in the construction documents for high schools.
      5.1.1. The LED sign surround shall include a top panel with the school name. Surround may be of metal panel construction.
      5.1.2. Sign shall include street address number that conforms to local jurisdiction first responder requirements, and shall indicate the facility is a Fulton County School
   5.2. Provide a masonry base compatible with the building design. Base width shall be at least as wide and deep as the marquee sign.

5.2.1. Maximum height is 9'-4" from grade to top of marquee sign. Maximum width is 10'-4".

5.3. Architect shall determine the most functional location for the marquee sign and obtain prior approval by FCS Capital Improvements staff. Location shall conform to local jurisdictional and FCS Transportation requirements for vehicular sight lines.

5.4. Coordinate power and data requirements with FCS Capital Improvements staff.

SECTION 10 1416 PLAQUES

1. For all new facilities, or as directed by FCS Capital Improvements staff, provide an exterior building dedication plaque.
   1.1. Plaques shall be bronze casting, with standard machine finish for border and letter finish. Background texture to be manufacturer's standard leatherette texture. Background finish to be black on all recessed surfaces only.
      1.1.1. Castings shall be free from pits, scale, sand holes, or other defects. Hand-tool and buff borders and raised copy to produce the manufacturer's standard satin finish.
      1.1.2. Plaque shall be 1'-8" wide by 2'-6" high, and shall indicate the school name, opening year, Board of Education names, Superintendent name, Contractor, Architect, Program Manager, and when applicable, indicate that construction was funded by SPLOST.
      1.1.3. Refer to the APPENDIX to DESIGN REQUIREMENTS – Dedication Plaques for more information on plaque dimensions and layout.

SECTION 10 2113 PHENOLIC TOILET AND URINAL PARTITIONS

Toilet partitions and urinal screens shall be provided at multi-person restrooms.

1. Partitions and screens shall be solid phenolic material with color impregnated through the entire thickness of the material.
   1.1. FCS color preference is black or dark gray. Use of alternate color must be approved by FCS Capital Improvements staff.
   1.2. Door hinges: Provide manufacturer's heavy duty stainless steel continuous cam type hinges that swing to a closed or partially open position
2. Partitions shall be floor mounted and overhead braced.
3. Hardware shall be heavy duty extruded aluminum or stainless steel.
4. Wall brackets for partitions and screens shall be extruded aluminum, continuous "two-ear" type.
5. Masonry partitions shall not be used.

SECTION 10 2123 CUBICLE CURTAINS AND TRACK

1. Cubicle track and curtains shall be provided in school clinic areas. Preference is for two (2) compartments.
   1.1. Track shall be ceiling mounted with chain carriers
   1.2. Curtains shall be flame-retardant antimicrobial fabric with mesh panel at top. Metal grommets required for hanging.

SECTION 10 2226 OPERABLE PARTITIONS

1. Coordinate all operable partition locations and products with FCS Capital Improvements staff. It is the desire of FCS to avoid costly or impractical operable partitions.

SECTION 10 2813 TOILET ACCESSORIES

Provide surface mounted heavy duty stainless steel commercial quality restroom and bath accessories as needed.

1. Provide location for soap dispensers over lavatories. Dispensers NIC.
2. Provide electric hand dryers as directed by FCS Capital Improvements staff.
3. Basis of design: World Dryer AirMax XM5-974 without heating element.
4. Coordinate paper dispenser requirements with FCS Capital Improvements staff.

5. Provide one long mirror per Restroom and one lavatory mirror per lavatory.

SECTION 10 5113 METAL LOCKERS

1. Metal Student Lockers at Corridors (middle schools and high schools): Provide metal double tier lockers at middle and high schools corridors for student use.
   1.1. Provide lockers equal to 100% of the "Design" FTE plus corridor space to increase the number of lockers to the "core" capacity.
   1.2. Each locker shall be approximately 12" wide x 12" deep x 36" high x double tier (72" total unit height).
   1.3. Lockers shall be equipped with multi-point automatically locking spring bolt and built-in key-controlled, three-number dialing combination lock with changes made automatic with a control key. Provide ADA compliant keys locks on 1% of all lockers ordered.
   1.4. Utilize welded construction with16 gauge bodies, 14-gauge doors with stiffeners and 18 gauge backs.
   1.5. Door shall have piano hinges, fastened with screws, not welded.
   1.6. Doors and frame (body) of lockers shall be painted one color.
   1.7. Locker colors may alternate or be different in different parts of the building.
   1.8. Specify manufacturer's standard paint colors unless use of custom colors is requested and specifically approved by FCS.
   1.9. Utilize a painted metal "Z" base in lieu of raised concrete (or other material), eliminating the need for resilient base finish.
   1.10. Extend floor finish below lockers to allow for their future removal if desired.
2. Physical Education (PE) Lockers (middle schools and high schools): Provide metal lockers at middle and high schools PE Locker Rooms.
   2.1. Provide the following number of lockers:
      2.1.1. Middle School: 675 lockers in five-tier units plus 60 lockers in double tier units at each Boys and each Girls PE Locker Room.
      2.1.2. High School: 800 lockers in five-tier units plus 90 lockers in double tier units at each Boys and each Girls PE Locker Room.
   2.2. Lockers in five tier units shall each be approximately 12" wide x 12" deep x 12" high (60" total unit height).
   2.3. Lockers in double tier units shall each be 12" wide x 12" deep x 30" high (60" total unit height).
   2.4. Sides and intermediate partitions shall be perforated metal for ventilation.
   2.5. Lockers shall be equipped with Multi-point automatically locking spring bolt and pad-lock lug.
   2.6. Provide three-number dialing combination pad-locks with a master key for 110% of lockers in five-tier units.
   2.7. Utilize welded construction with 16 gauge bodies, 14 gauge doors with stiffeners and 18 gauge backs.
   2.8. Doors shall have piano hinges, fastened with screws, not welded.
   2.9. Doors and frame (body) of lockers shall be painted one color selected from manufacturers standard paint colors.
   2.10. Provide continuous built-in poured concrete combination bench and base for lockers, 18" AFF and extending 12 to 14" from face of lockers.
3. Home Team Lockers (High School): Provide metal lockers at high school Home Team Locker Rooms.
   3.1. Provide approximately 34 single tier lockers at each of the 4 Boys and 4 Girls Team Locker Rooms.
   3.2. Lockers shall be 18" wide x 18" deep x 72" high single-tier at typical Home Team rooms
   3.3. Lockers shall be 24" wide x 18" deep x 72" high open front with combination seat and foot locker and 12" security box at Football Team rooms
      3.3.1. Security box shall be equipped with built-in key-controlled three-number dialing combination lock with changes made automatic with a control key
      3.3.2. Foot locker shall be equipped with padlock lug

3.4. Sides and intermediate partitions shall be perforated metal for ventilation
3.5. Lockers shall be equipped with Multi-point automatically locking spring bolt and padlock lug
3.6. Provide three-number dialing combination pad-locks with a master key for 110% of lockers
3.7. Utilize welded construction with 16 gauge bodies, 14 gauge doors with stiffeners and 18 gauge backs
3.8. Doors shall have piano hinges, fastened with screws, not welded
3.9. Doors and frame (body) of lockers shall be painted one color selected from manufacturers standard paint colors
3.10. Provide appropriate number of laminated maple locker room benches

4. Visitor Team Rooms (High Schools):
   4.1. Provide appropriate number of laminated maple locker room benches
5. Metal PE Staff Lockers: Provide metal lockers for PE Staff. Locker construction shall be similar to student corridor lockers with built-in combination locks. Provide the following number and size lockers:
   5.1. Elementary School PE Staff: three single-tier lockers 12” wide x 15” deep x 72” high at each male and female PE staff area.
   5.2. Middle School PE Staff: three single-tier lockers 12” wide x 15” deep x 72” high at each male and female PE staff area.
   5.3. High School PE Staff: ten single tier-lockers 15” wide x 21” deep x 72” high at each male and female PE staff area.
6. Metal Custodial Staff Lockers: Provide metal lockers for Custodial Staff. Each locker shall be approximately 12” wide x 15” deep x 72” high single-tier. Locker construction shall be similar to student corridor lockers with built-in combination locks. Provide the following number of lockers:
   6.1. Elementary School: 6
   6.2. Middle School: 8
   6.3. High School: 16
7. Metal Kitchen Staff Lockers: Provide metal lockers for kitchen Staff. Each locker shall be approximately 12” wide x 12” deep x 36” high x double-tier (72” total unit height) similar to student corridor lockers. Provide the following number of lockers:
   7.1. Elementary School: 10
   7.2. Middle School: 12
   7.3. High School: 16

SECTION 10 5600 METAL STORAGE SHELVING

Specify adjustable industrial heavy duty metal shelving in all Storage and Custodial Rooms. Typical shelving units shall be 36” wide x 85” high x depth appropriate for the intended use (12”, 18” or 24”). Shelves for book storage shall be 12” deep. Provide 7 shelves per unit (including base and top) to allow approximately 12” clear vertically per shelf.

SECTION 10 7316 CANOPIES

1. Prefabricated (Manufactured) Canopies
   1.1. Appropriate aluminum canopies shall be provided for at bus and auto drop-off areas, and loading areas as needed. Custom features like cantilevered trusses or excessive coverage distance should be avoided
   1.2. Drainage shall be controlled and piped to prevent flow across sidewalks.
   1.3. Provide adequate curb/bus set-back for posts to ensure bus “tail swing” clearances.
   1.4. Provide lighting at Canopies. See Division 26 ELECTRICAL for site lighting requirements.
   1.5. Provide adequate height requirements for bus and truck clearances; height requirements shall be reviewed and approved by FCS Capital Improvements staff.
2. Main Entrance Canopies
   2.1. Provide building main entrance canopies designed with materials and design appropriate to the building.
   2.2. Drainage shall be controlled and piped to prevent flow across sidewalks.

2.3. Coordinate lighting at Canopies with Division 26.
2.4. Canopies shall not extend out over roadway or drive.

SECTION 10 7500 FLAGPOLES

1. Provide 30’ high aluminum tapered ground set flagpole (with an external halyard) in a prominent location at the front of the building.

DIVISION 11 EQUIPMENT

SECTION 11 2000 COMMERCIAL EQUIPMENT

1. Athletic washer-extractor is required for athletic laundry room, 40 pound capacity. Acceptable products:
   1.1. Continental Girbau, model RMG040 washer-extractor
   1.2. UniMac, model UC40 washer-extractor
   1.3. Pellerin Milnor Corporation, model MWT18E4 washer-extractor
2. Athletic dryer-tumbler is required for athletic laundry room, 60 pound capacity. Acceptable products:
   2.1. Continental Girbau, model CG50-60 commercial dryer
   2.2. UniMac, model UT050DN drying tumbler
   2.3. Pellerin Milnor, model M50V dryer
3. Athletic Training Room hydrotherapy tub, 90 gallons minimum. Acceptable products are:
   3.1. Ferno Ille, model 680
   3.2. Whitehall Manufacturing Co., model S-90-S
   3.3. Medical Supplies Equipment Co., model M001BSWHM
4. Athletic training room requires floor mounted icemaker with drain. A refrigerator will be provided (N.I.C.)

SECTION 11 2213 SAFES

1. Provide a through-wall depository safe at the Records Storage/Vault room
   1.1. Chute shall be adjustable
   1.2. Lock shall be electronic
   1.3. Basis of Design Perma-Vault Pro-2225-E

SECTION 11 2723 DARKROOM DOORS AND EQUIPMENT

1. Darkrooms are provided only at high schools.
2. Revolving darkroom doors are no longer available. Design vestibule that serves as a light trap.
3. Ventilation equipment needs to be designed to meet vapor emissions of the darkroom chemicals. Coordinate with DIVISION 23- Exhaust Fans.

SECTION 11 3000 RESIDENTIAL EQUIPMENT

1. Custodial washer/dryer is required as part of the contract to wash custodial mop heads, dust mops and cleaning cloths. Coordinate location with FCS Capital Improvements staff.
2. Kitchen washer/dryer is required as part of the contract
3. Daily Living Center washer/dryer and kitchen equipment, if required per individual program requirements, are required as part of the contract
4. Science Lab prep room dishwasher is required as part of the contract
5. Refrigerators will be provided in Teacher Dining area, Science Lab prep rooms, Athletic Training Room, and High School Concession areas (N.I.C.). Coordinate locations and power requirements.

SECTION 11 4000 FOOD SERVICE EQUIPMENT

NOTE: Contact FCS Capital Improvements staff for current list of required kitchen equipment. See APPENDIX to DESIGN REQUIREMENTS – Kitchen Design Guidelines for additional kitchen information.
Kitchen Equipment shall be incorporated into the scope of work for all new school projects.

1. Architects shall be responsible for employing a qualified professional kitchen designer to develop appropriate kitchen design and construction documents
2. Drawings and specifications shall be submitted to FCS Capital Improvements staff for review and approval
3. FCS will provide the A/E with a list of three acceptable manufacturers of kitchen equipment for new schools and renovations
4. Teacher Dining area requires a countertop ice maker. A refrigerator will be provided (N.I.C.)

SECTION 11 5123 MEDIA CENTER SHELVING AND CASEWORK

1. Proposed shelving layout shall be submitted to FCS Capital Improvements staff for approval, with a detailed analysis of sight lines for security control
2. Coordinate required power and data outlets with FCS Capital Improvements staff
3. Preference is for solid oak wood shelving with the following characteristics:
   - 3.1. 1" thick vertical uprights; particle board not acceptable
   - 3.2. 3/4" thick solid wood shelves
   - 3.3. Veneer or laminate back panels
   - 3.4. Veneer or laminate wood tops with cornice
     - 3.4.1. Tops shall be assembled in continuous lengths to completely cover the tops of bookshelf units, including corners. Where joints are required, they shall be splined and bolted to produce a flush connection.
4. Provide single-face and double-faced shelving with adjustable shelves. All components shall be modular and interchangeable to permit reconfiguration with no additional items. Shelving shall be complete with all appurtenant features, and with appropriate heights and other dimensions. Double-faced shelving to be mobile.
5. Construct sloping wood magazine shelving, circulation desk and miscellaneous furniture of 3/4" thick, 7-ply veneer core, with plain-sliced face veneers with matching solid edging.
6. Acceptable Manufacturers:
   - 6.1. Basis of design
     - 6.1.1. Russwood Furniture, Inspire Series
   - 6.2. Fleetwood Library Collection
   - 6.3. Demco Shelving

SECTION 11 5213 PROJECTION SCREENS

1. Provide a 12'H x 16'W motorized screen at elementary, middle and high school stages.
   - 1.1. Provide additional drop header to set bottom of screen 2'-0" above stage floor
   - 1.2. Screen shall be mounted immediately in front of the stage curtain
   - 1.3. Acceptable manufacturers:
     - 1.3.1. Da-Lite Screen Co. Inc., Cosmopolitan Electrol
     - 1.3.2. Draper, Inc., Targa XL
     - 1.3.3. Claridge Products
2. Provide a 10'W x 10'H motorized screen at elementary, middle and high school media centers
   - 2.1. At elementary schools screen may be reduced to 8'W x 8'H if necessary due to ceiling clearances
   - 2.2. Screens shall be recessed in the ceiling suspended from structure above or mounted on CMU wall
   - 2.3. Basis of design shall be Da-Lite Screen Co. Inc. Cosmopolitan Electric
3. Provide a 8' x 8' pull-down screen at large instructional units

SECTION 11 5200 THEATRICAL/STAGE EQUIPMENT

Architects shall be responsible for employing a qualified professional stage equipment designer to develop appropriate design and construction documents for auditoriums, black box theaters, and other performance studios.

1. Provide lighting, sound systems, video systems, curtains and other equipment appropriate for the specific program.
2. For high school Auditoriums and Black Box Theaters provide audio system, video system, control system, stage and house lighting, and theater pipe grid for lighting. For Auditoriums, a motorized light bar is required per Division 26 – ELECTRICAL
3. Coordinate all equipment requirements with Division 26 – ELECTRICAL, and APPENDIX to DESIGN REQUIREMENTS – Theatrical Systems and Accessories.
4. Drawings and specifications shall be submitted to FCS Capital Improvements staff for review and approval.

SECTION 11 6600 ATHLETIC EQUIPMENT

1. Architect shall be responsible for developing appropriate design and construction documents for middle and high school athletic equipment subject to review and approval by FCS Capital Improvements staff
2. Bleachers: See Division 12 FURNISHINGS for telescoping bleachers and Division 13 SPECIAL CONSTRUCTION for exterior bleachers
3. Football Goal Post at High School Stadiums and Practice Fields:
   3.1. Basis of design, Gill model # FB18120C, 8’ off-set, 23’-4” between 20’ uprights
4. Track and Field Equipment at High School Stadiums:
   4.1. Long Jump/Triple Jump: Basis of design, Gill Model # 441TS Complete System-Synthetics
   4.2. Pole Vault Box: Basis of design, Gill Model #500 Box, # 503 Lid
   4.3. Shot Put Circle Toe Board: Basis of design, Gill Model #364
   4.4. Discus Circle: Basis of design, Gill Model #367
5. Soccer Goal at High Schools:
   5.1. Basis of design, Porter Athletics model # 477100, Portable Aluminum Soccer Goal
6. Exterior Basketball Goals, Backboards and supports at middle schools:
   6.1. Goals: Heavy-duty, fixed type with nylon net
   6.2. Backboard: Heavy-duty rectangular steel
   6.3. Minimum 4-1/2” diameter steel pipe with 5’-0” gooseneck extension
7. Gymnasium Basketball Backstops and Components at Middle and High Schools:
   7.1. Provide six electrically operated retractable basketball goals at each gymnasium as required by the Educational Specifications.
   7.2. Frame assembly:
      7.2.1. Type: Overhead supported, single center post with sway bracing, forward folding type for main court and cross courts
      7.2.2. Superstructure: Manufacturer’s standard design for attachment to building structure with precision die-formed fittings
      7.2.3. Hoist operations: Manufacturer’s one HP minimum electric winch; self-locking worm-gear type, capable of holding backstop at any position when raising or lowering; control by wall mounted key switch
      7.2.4. Safety Lock: Manufacturer’s safety lock, inertia sensitive lock type, capable of locking backstop in any position at any time in storage or during raising or lowering cycle due to sudden surge in speed; provide for all backstops
      7.2.5. Finish on exposed metal components: Manufacturer’s powder coat finish; color selected by architect from Manufacturer’s standard colors and approved by FCS Capital Improvements staff
   7.3. Backboards: (Main and Cross Court): Rectangular design, ½” thickness tempered glass panel in gasketed extruded aluminum frame with bolt-on padding along bottom edge and up sides 10’ minimum; fired vitreous enamel markings conforming with official requirements, 42” high x 72” wide
   7.4. Basketball Goals: steel rod rim welded to mounting bracket with enamel finish and nylon netting; provide breakaway type goals for main court backstops; all goals shall be designed to absorb shock loads due the slam dunking or hanging on the rim

8. Wall and column padding:
   8.1. Required at Gymnasiums and Fitness Labs
   8.2. 1 ¼" fire retardant foam core minimum over 7/16" OSB backing board, with 14 oz vinyl fabric cover and hidden fastening system. Fire rating must meet ASTM E84.
   8.3. Minimum panel thickness 2"
   8.4. Wall panel height: 6'-0" high
   8.5. Column pad size: Custom fabricated to fit around columns; height to match wall panels
   8.6. Color: As selected by the architect from manufacturer's standard colors and approved by FCS Capital Improvements staff
   8.7. Basis of Design: Resilite Wainscot Safeguard Plus Panels with Slot-Back fastening system
9. Wrestling Equipment:
   9.1. Wrestling Mat
      9.1.1. Closed-cell rubber nitrile foam core with ply-vinyl #457 coating on all sides and edges
      9.1.2. High School regulation size 38' x 38' with a minimum 28' wrestling circle
         9.1.2.1. Provide additional graphic circles on top and bottom surfaces as directed
         9.1.2.2. Provide mat in sections as required for shipment and storage
      9.1.3. Minimum mat thickness 1"
   9.2. Designate area for storage
10. Volleyball and Badminton Equipment:
   10.1. Provide quantities as follows:
      10.1.1. High school:
         10.1.1.1. (3) volleyball courts at main gym; (1) volleyball court at auxiliary gym
      10.1.2. Middle School:
         10.1.2.1. (2) volleyball courts at gymnasium
   10.2. Nets and removable support post
   10.3. Gym Floor sleeves for Volleyball and Badminton post:
      10.3.1. Basis of design: Spalding 408-785
      10.3.2. Sleeve diameter: 3-1/2" inside diameter
      10.3.3. Cover plate: Chrome plated cover assembly with swivel type hinge and removable key
      10.3.4. Installation: Cast into concrete footing and floor slab for flush mounting with wood floor system
11. Other athletic equipment as indicated on the drawings

SECTION 11 6643 INTERIOR SCOREBOARDS

Provide complete interior score boards and systems with easily accessible on/off switches at the following locations:

1. High School Main Gym: Provide two scoreboards
   1.1. Basis of design, Electro-mech Scoreboard Company Model LX2770
2. High School Auxiliary Gym: Provide two scoreboards
   2.1. Basis of design, Electro-mech Scoreboard Company Model LX2330
3. Middle School Gym: Provide two scoreboards
   3.1. Basis of design, Electro-mech Scoreboard Company Model LX2330
4. High School Main and Auxiliary Gyms: Provide two basketball shot clocks each gym
   4.1. Basis of Design, Nevco Model SSC-71, 20" x 20" shot clock

SECTION 11 6813 PLAYGROUND EQUIPMENT

1. FCS requires two playgrounds at each elementary school.
   1.1. One playground is designed for grades K-2 and a second playground for grades 3-5
   1.2. Each playground should be designed to fit within a 55' x 55' area

1.3. Playgrounds to be located within close proximity to each other and concrete play area
1.4. Preferred location is close to school but away from classrooms
1.5. ADA access must be provided to each playground along with an accessible ramp into the playground
1.6. Play surface to be 12" of compacted Engineered Wood Fiber (EWF)
1.7. Each playground to be installed above grade and have a plastic border around the entire playground
1.8. Playgrounds to have underground drainage system
1.9. The basis of design is Miracle Recreation. Designer to include pre-approved playground designs
1.10. Play equipment installer shall be approved by the equipment manufacturer

2. Kindergarten – 2nd grade area:
   2.1. This playground requires 14 active components including ground level and elevated equipment
      2.1.1. Swings are not allowed by FCS
   2.2. All elevated and ground level elements to be ADA accessible
   2.3. Playground will accommodate approximately 45 users
3. 3rd – 5th grade area:
   3.1. This playground requires 17 active ground level components
      3.1.1. Swings are not allowed by FCS
   3.2. Playground will accommodate approximately 50 users
   3.3. All elements to be ADA accessible

SECTION 11 6843 EXTERIOR SCOREBOARDS

Provide complete Exterior Score Boards systems at the following locations:

1. High School Stadium: Provide one scoreboard
   1.1. Basis of design, Electro-Mech Scoreboard Company Model LX3785
2. High School Baseball and Softball: Provide one scoreboard at baseball and one at softball
   2.1. Basis of design, Electro-Mech Scoreboard Company Model LX1780

SECTION 11 6900 CONCESSION FACILITIES AND EQUIPMENT

1. Concession facilities shall be provided at the following locations:
   1.1. Middle School Gym
   1.2. High School Main Gym
   1.3. High School Auditorium
   1.4. High School Stadium (Home and Visitor sides)
   1.5. High School Baseball/Softball area
2. Concessions facilities shall include the following utilities and equipment
   2.1. Lockable serving room with adjacent lockable bulk storage room
   2.2. Standard overhead LED lighting
   2.3. Ventilation fan with thermostatic control
   2.4. Heat at exterior locations to protect pipes from freezing
   2.5. Counter with serving window
   2.6. Lockable base and wall storage cabinets
   2.7. Double sink (minimum) with hot and cold running water. Coordinate requirements with local health department.
   2.8. Ice machine with 75 pound capacity furnished and installed under the building contract. Drain pipe shall not be located in pathway
   2.9. Floor drain, locate near ice machine
   2.10. A 200 amp electrical service to support 110V/220V outlets for appliances furnished by others; appliances shall be limited to refrigerator, microwave oven, drink cooler, hot dog machine, hot dog warmer,

popcorn machine and other light duty appliances. Heavy duty appliances such as cooking ranges and fryers which require hoods and fire protection equipment are specifically prohibited.

SECTION 11 9000 CUSTODIAL MAINTENANCE EQUIPMENT

1. A separate space for floor equipment recharging station/garage shall be provided to keep self-propelled and other custodial equipment from obstructing mechanical rooms. The designated area shall be equipped with electrical service needed to meet the demands of the recharging equipment. Any appropriate fire separation and ventilation shall be provided.
2. Provide a ramp and/or walkway from building to the top of dumpsters so that custodial personnel can load the dumpster from the top without personal injury.
3. Coordinate washer and dryer units with section 11 3000 – Residential Equipment.

SECTION 11 9500 KILNS

1. Art suites kiln rooms shall be equipped with kilns and an associated exhaust system as follows
   1.1. Kilns shall be contractor furnished and installed
   1.2. Kiln basis of design: Skutt KM-1227PK
      1.2.1. High school suites: (3) kilns
      1.2.2. Middle and Elementary school suites: (1) kiln
      1.2.3. Coordinate kiln voltage and amperage requirements with building power
2. See Section 23 0000, paragraph 2.15.5 for exhaust requirements

DIVISION 12 FURNISHINGS

SECTION 12 2100 BLINDS

1. Interior blinds shall be 1" aluminum horizontal slats
2. Basis of design shall be Levolor Riviera
3. Provide blinds at typical classroom, lab, and office exterior windows.
4. Use tinted glass for sun control in lieu of blinds at large and inaccessible windows at clearstories, lobbies, corridors, media centers, cafeterias, gymnasiums and similar spaces
5. Interior windows are provided for supervision purposes and shall not have blinds unless otherwise directed by FCS Capital Improvements staff. Interior windows should be avoided at School Resource Officer's office; however if windows exist, blinds shall be provided.

SECTION 12 3200 MANUFACTURED WOOD CASEWORK

1. Manufactured casework includes but is not limited to:
   1.1. Typical classroom teacher wardrobe/storage cabinet (36" wide x 24" deep x 84" high) at middle and high school classrooms (lockable)
   1.2. Classroom and office vertical storage cabinets, base cabinets with counter tops and wall cabinets
   1.3. Miscellaneous specialty cabinets and shelving
   1.4. For more information, see APPENDIX to DESIGN REQUIREMENTS – Manufactured Casework Schedule
2. Construction: Cabinet bodies shall be standard high pressure plastic laminate finish over M-3 industrial quality core. Cabinet bottom, top, and sides shall be ¾" thick. Cabinet backs shall be ½" thick minimum.
   2.1. Refer to DIVISION 6 – Section 06 2000, FINISH CARPENTRY for plastic laminate thickness requirements.
   2.2. Cabinet sub-base shall be of separate construction. Material shall be exterior grade plywood. No cabinet sides to floor will be allowed. Base front shall be finished with 4" high black extruded rubber cove base with pre-molded corners to match room base.
   2.3. Counter tops shall be 1" deeper than base cabinet and 1-1/8" thick minimum with high pressure plastic laminate finish with 3mm PVC edging. For Middle School and High School applications, solid surface counter tops are desirable.
      2.3.1. Finished counter height shall be as follows:
         2.3.1.1. 34" AFF UNO
         2.3.1.2. Elementary K-1 CR: 26" AFF
         2.3.1.3. Elementary 2-5 CR: 30" AFF
3. Counter tops for computers shall be 30" deep and be equipped w/ grommets and wire management below.
4. Counter tops without sinks shall have particleboard core and water resistive adhesive.
5. Counter top with sinks shall be constructed with calibrated plywood and non-soluble glue to thickness indicated.
6. Counter backsplash shall match countertop construction.
7. Drawer fronts and hinged doors shall be overlay style with higher pressure laminate exterior and interior liner and matching 3mm PVC edging.
8. Shelving behind doors shall be high pressure plastic laminate on particle board core with matching 3mm PVC edging. Shelves behind doors up to 27" wide shall be ¾" thick, with divider supports if over 27''. Open shelving and instrument storage shelving shall be 1" thick.
9. Shelving shall be adjustable and supported by side panels with concealed fasteners capable of supporting the specified content.
10. Hardware:

10.1. Hinges shall be satin finish stainless steel, adjustable 5-knuckle, institutional grade, 2-3/4" overlay type with hospital tip with minimum load capacity of 310 lbs/pair. Anchor hinges with engineered screws (no wood screws)
10.2. Pulls for drawers and swing doors shall be ADA compliant one piece semi-recessed molded contour finger pulls
10.3. Catches shall be nylon roller or friction type
10.4. Drawer slides shall be heavy duty, side mounted type, equipped with heavy duty ball bearing nylon wheels and automatic positive stops
10.5. Locks shall be half mortise design with only round cylinder exposed, five tumbler cylinder, satin finish. Provide locks for all drawers and cabinets U.N.O., keyed to a single key for each individual classroom/lab/area.
10.6. Shelf clips shall be heavy duty design to hold shelf in place
10.7. Submit a sample which includes every typical component including hardware and shelf retaining clips
11. Accessories: Provide accessories appropriate to the cabinet's function.
12. Warranty: Provide manufacturer's standard 5-year warranty against defects in material and workmanship.
13. Acceptable manufacturers:
13.1. Basis of design: LSI Corporation of America, Inc., L44 Series
13.2. TMI Systems Corporation
13.3. Stevens Industries, Inc.
13.4. Case Systems
13.5. Cabinets by Design (USA Millwork)

SECTION 12 3550 MUSIC CASEWORK

1. Casework shall be designed for appropriate storage of music instruments, stands, sheet music and teaching aids.
2. Casework shall be constructed of industrial grade particleboard with black plastic laminate finish selected from manufacturer's standard finishes. Cabinet body shall be ¾" thick. Cabinet body edges shall have matching 3mm PVC edging.
3. Musical instrument storage cabinets and racks shall be specifically designed and engineered for the storage and protection of the instruments stored, shall meet specified minimum performance standards, shall be chip and abrasion resistant under normal usage, and shall protect instruments from damage under normal school use.
4. Each individual compartment shall have a welded steel grill door with non-binding 180 degree five knuckle safety tip hinges and a one-piece finger pull/padlock hasp with integral door stop feature and no moving parts.
5. Hardware finish shall be black epoxy powder coat.
6. Provide manufacturer's standard 5-year warranty against defects in material and workmanship.
7. Acceptable Manufacturers:
7.1. Basis of design: LSI Corporation of America, Inc.
7.2. Wenger Corporation
7.3. TMI Systems Design Corporation
7.4. Stevens Industries
7.5. Case Systems
8. For more information, see APPENDIX to DESIGN REQUIREMENTS – Manufactured Casework Schedule

SECTION 12 3553 SCIENCE LABORATORY CASEWORK AND EQUIPMENT

Science casework and equipment includes, but is not limited to the following:

1. Modular laboratory casework, including casework, tops, ledges, filler panels, knee space panels supporting structures and miscellaneous items of equipment as specified or scheduled:

1.1. Demonstration tables
1.2. Student tables
1.3. Peg boards
1.4. Fume hoods shall be equipped with worktop, base cabinet and specified accessories
1.5. Utility service outlet accessory fittings, electrical receptacles and switches shall be listed in the specifications, equipment schedules or shown on drawings as mounted on the laboratory furniture
1.6. Laboratory sinks, cup sinks or drains troughs, overflows and sink outlets with integral tailpieces, which occur above the floor, and where these items are part of the equipment or list in the specifications, equipment schedules or shown on the drawings

2. Science Casework and related furniture shall be of oak construction. Base cabinets and case units shall be lipped style construction having drawer heads and hinged doors with radius edges, overlapping cabinet and case openings on all edges
   2.1. Cabinets shall be constructed with flush interiors having no offsets to maximize drawer and cupboard space and ease of cleanability
   2.2. Face frame construction cabinets or cases are not acceptable
   2.3. Cabinets shall be assembled using blind mortised and tenoned (or rabbeted) joints, glued and screwed together in accordance with best cabinet maker methods
   2.4. Cabinets or casework featuring pinned or doweled construction is not acceptable
   2.5. All exposed joints shall be closely fitted and tight showing no open joints
   2.6. All exposed corners shall be rounded
   2.7. Counter and table tops shall be 1" thick chemical resistant solid monolithic molded modified epoxy resins with surface coating; black color
   2.8. Hardware shall be stainless steel with satin finish. At science labs and prep rooms, provide locks for 50% of drawers and cabinets, keyed to a single key for each individual lab or prep room. Provide one set of prep room keys for each adjacent science lab.
   2.9. Provide manufacturer's standard 5-year warranty against defects in material and workmanship
3. Acceptable Manufacturers:
   3.1. The basis of design:
      3.1.1. Kewaunee Scientific Corporation, Signature Series
      3.1.2. Leonard Peterson Company, Vanguard Series.
   3.2. ICI Campbell Rhea Intuitional Casework, Inc.
   3.3. Fisher Hamilton, LLC
4. For additional information, see APPENDIX to DESIGN REQUIREMENTS – Manufactured Casework Schedule

SECTION 12 6500 AUDITORIUM SEATING

1. Auditorium Seating shall be fixed upholstered multiple seating with self-raising seat mechanisms, steel or plastic seat pans, plastic rear panels and wood arm rest. Gravity seat lift mechanism is preferred. Provide accessories, including end panels, aisle lights, and seat numbers. All seating components shall be provided by a single manufacturer. Seating Layout shall be designed with standards spaced laterally in rows so that end standards are in alignment from first to last row, regardless of whether aisles converge or are of constant width, and so that sightlines are optimized. Provide appropriate accommodations for wheelchairs in accordance with ADA.
2. Acceptable Manufacturers:
   2.1. Basis of design: KI Seating, Lancaster model
   2.2. Hussey Seating Company, Quattro model
   2.3. Irwin Seating Company, Citation model

SECTION 12 6613 TELESCOPING BLEACHERS

1. Provide telescoping bleachers at middle school gymnasiums and high school main and auxiliary gymnasiums.
   1.1. The bleacher system shall consist of motor operated, multi-tiered, closed deck seating rows operating on the telescoping principal, and stacking vertically in minimal floor area when not in use
   1.2. The structural system shall be engineered to withstand all applicable design loads associated with the intended use
   1.3. Provide non-marring rubber tire wheels designed for wood or synthetic floors and sized appropriately for the specific bleacher
   1.4. Provide self-storing railings at all exposed bank ends and elevated sections
   1.5. Provide power at center lower front of bleachers for scoreboard control panels. Power should be accessible when bleachers are fully extended. Coordinate power switch location with FCS Capital Improvements staff.
   1.6. Coordinate bleacher layout with ADA requirements for wheelchair seating
   1.7. Seats: 18” long by 10” deep plastic modules, single color
      1.7.1. Basis of design: Hussey CourtSide XC10
   1.8. Decking and steps: Plywood
   1.9. Finish wood surfaces with one coat of moisture repellant sealer and two coats of polyurethane finish.
   1.10. Provide vinyl curtains where necessary to restrict access below bleachers.
   1.11. Motor Operation:
      1.11.1. Provide integral automatic electro-mechanical propulsion system engineered specifically for the requirements of the bleacher system
      1.11.2. All wiring within the seating bank, as well as all service wiring to the units, shall be provided, including remote control panel or pendent control
      1.11.3. Controls: Start, stop, forward and reverse in a single control unit together with appropriate safety limiting features
      1.11.4. Motors shall be three phase and accessible from the front of the bleachers
2. Warranty: Provide manufacturer’s standard 5-year warranty against defects in material and workmanship
3. Acceptable Manufacturers:
   3.1. Basis of Design: Hussey Seating Company; MAXAM model
   3.2. Interkal Spectator Seating System
   3.3. Irwin Seating Company, Telescopic Seating System
   3.4. Sheridan Seating, Inc. Telescopic Bleachers

DIVISION 13 SPECIAL CONSTRUCTION

SECTION 13 3416 GRANDSTANDS AND BLEACHERS

1. Stadium Bleachers at Visitor side: Provide aluminum grandstand bleacher system at Visitor side of high school stadiums complete with bench seats, and all related appurtenances, fittings, and accessories; system shall include, but is not limited to:
   1.1. Provide seating for 1,200 based on 24” width per occupant
   1.2. Compliance with all safety and building codes, including accessibility codes
   1.3. Understructure supporting framing
   1.4. Decking system
   1.5. Stairs and ramps
   1.6. Slip resistance surfaces
   1.7. Guard and handrails
   1.8. Water drainage provisions
2. Stadium Aluminum Bench Seats at home side: Provide aluminum bench seats for home side concrete stadium grandstands
   2.1. Provide seating for 2,500 based on 24” width per occupant
   2.2. See Division 3 – CONCRETE for Stadium Seating structure
3. Portable Bleachers: Provide aluminum portable bleachers at high school baseball fields, softball fields and tennis courts complete with bench seats, and all related appurtenances, fittings and accessories; attach bleachers to a concrete slab extending to walkway system
   3.1. 5 rows high x 10’ deep x 21’ long
   3.2. 42” central aisle with steps
   3.3. Appropriate guardrails
   3.4. Wheelchair cut out at each end

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DIVISION 14 CONVEYING EQUIPMENT

SECTION 14 2000 ELEVATORS

1. Provide passenger elevator(s) as needed to comply with ADA requirements. Elevators should be of minimum size and have basic, easily maintained finishes. Provide key controlled access, cab telephone, and tie-in to fire alarm system.
2. Acceptable Manufacturers:
   2.1. Basis of Design: ThyssenKrupp Elevator, Endura Twinpost
   2.2. Kone, Inc.
   2.3. Otis Elevator Co.
   2.4. Proposed additional manufacturers must be approved by FCS Capital Improvement staff for inclusion in the specifications.
   2.5. Manufacturers that require proprietary tools for maintenance are not acceptable.
3. Elevator description:
   3.1. Rated Load: 3500 lbs
   3.2. Rated Speed: 110 fpm minimum
   3.3. Operation system: Single automatic operation
   3.4. Car enclosure clear dimensions: 6’-8”W x 5’-5”D x 7’-4”H
   3.5. Hoistway entrance size: 3’-6” x 7’-0”
4. ADA accessibility statement needs to be included; 60” turn radius, non-keyed controls.
5. All controls shall be open access, non-proprietary controls.

SECTION 14 4000 LIFTS

1. Building design should avoid the need of ADA access lifts and stair lifts if possible. Vertical lifts will be considered if ramps or other ADA acceptable devices are impractical. Angular stair lifts should be avoided due maintenance difficulties.
2. Box lifts or vertical lifts shall be utilized when elevator access to required level changes is not available.
3. Inclined lifts are not acceptable.

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DIVISION 21 FIRE SUPRESSION

SECTION 21 1300 FIRE-SUPPRESSION SPRINKLER SYSTEMS

1. All buildings shall be protected with an automatic fire sprinkler system. Sprinkler systems and other fire protection equipment shall be provided and installed in accordance with NFPA 13, current building codes, and local requirements.
2. Coordinate design of sprinkler system with design of combustible built-in furniture and storage units such as music instrument storage units.
3. Install pressure reducing stations where main water pressure fluctuates and exceeds fire protection system working pressure.
4. Smoke detector devices shall be installed in a manner that preserves accessibility.
5. All sprinkler work shall be performed by a licensed sprinkler contractor registered in the State of Georgia.
6. The Fire Marshall shall witness all underground and fire service entrance piping installations prior to cover-up.
7. The installation of the fire suppression system shall be inspected by Fulton County School's personnel or their assigned representative during the warranty period.
8. All inspectors test and drain assemblies shall terminate at the building exterior and spill thru the wall on a splash block. Provide escutcheon cover at exterior wall penetration and caulk penetration water tight.
9. Plastic piping shall not be used in the fire sprinkler system.
10. Flexible piping shall not be used in the building fire sprinkler system.
11. The contractor shall install fire zone diagrams for each level at a minimum scale of 1" = 20' (equivalent to contract drawings) showing all fire protection system mains, valves, inspectors' test and drain locations for each system and system zone limit lines.
    - 11.1. Diagrams shall be mounted on plywood board under clear Plexiglas cover in a frame and posted next to the sprinkler alarm valve assembly in the main mechanical room. Posting shall be completed prior to project Final Completion and shall reflect all as-built conditions. Each diagram shall include but not be limited to the following:
        - 11.1.1. Project name
        - 11.1.2. Color coded zones with same zone on different level the same color
        - 11.1.3. Legend showing sectors incorporated (referenced from architectural plans), supply riser identifier and system area (sq. ft.)
        - 11.1.4. Riser valve location chart showing supply riser number, color code and room number (referenced from architectural plans)
        - 11.1.5. Routing of all outside underground fire mains with hydrants shown and pipe sizes
        - 11.1.6. Location of test-and-drain valve assembly for each zone
    - 11.2. Provide electronic copy of fire zone diagrams to FCS Facilities in PDF format.
12. Sprinkler Mains and branch piping shall be located high in the ceiling and above mechanical equipment to avoid conflicts with installation and maintenance.

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DIVISION 22 PLUMBING

SECTION 22 0553 PIPING IDENTIFICATION

1. Coordination:
   1.1. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied
   1.2. Coordinate installation of identifying devices with location of access panels and doors
   1.3. Install identifying devices before installing acoustical ceilings and similar concealment
2. Piping Identification Devices:
   2.1. Manufactured pipe markers, preprinted, color-coded, with lettering indicating service, and showing direction of flow
      2.1.1. Colors: Comply with ASME A13.1, unless otherwise indicated
      2.1.2. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow
      2.1.3. Self-adhesive pipe markers not acceptable
      2.1.4. Plastic tape not acceptable
      2.1.5. Manufacturers: T&B/ Westline, Seton, MSI (Marking Services, Inc.), Brimar Identification & Safety Products, Brady Worldwide, Inc.
   2.2. Band and letter sizes shall conform to the following table:

O.D. of Piping Covering:	Width of Color Band	Size of Letter/Numbers
1" and smaller	6"	1/2"
1/4" to 2"	8"	3/4"
2-1/2" to 6"	12"	1-1/4"
8" and larger	18"	2"

   2.3. Band legend and color and letter color shall conform to the following table:

Piping	Band Legend	Letters	Band Color
Non-Potable Water	NPW	White	Green
Natural Gas	G	Black	Yellow
Medium Pressure Gas	MPG	Black	Yellow
Domestic Cold Water	CW	White	Green
Domestic Hot Water	HW	Black	Yellow
Domestic Circulating	HWC	Black	Yellow
Sanitary Waste Drain	W	White	Green
Sanitary Soil Drain	S	White	Green
Sanitary Vent	V	White	Green
Sprinkler Piping	SPK	White	Red
Rainwater/Downspouts	DS	White	Green
Overflow Drain Piping	OFD	White	Green
Chilled Water Supply	CWS	White	Green
Chilled Water Return	CWR	White	Green
Hydronic Hot Water Supply	HWS	Black	Yellow
Hydronic Hot Water Return	HWR	Black	Yellow
Condensate Drain	DRAIN	White	Green

SECTION 22 1000 PLUMBING PIPING

1. Pipe and Fittings:
    1.1. Domestic Hot and Cold water piping inside building:
        1.1.1. Type L hard copper tube; wrought copper fittings with lead-free solder joints
    1.2. Domestic water piping exposed to view below fixtures and in kitchen areas shall be chrome plated with chrome plated escutcheon covers at walls and ceilings
    1.3. Domestic Cold water piping from street main/meter to building:
        1.3.1. Type K hard copper tube with wrought copper fittings; pipe size 2-1/2" and smaller
        1.3.2. Ductile iron pipe and fittings; pipe size 3" and larger
        1.3.3. Schedule 80 PVC pressure pipe with schedule 80 solvent weld fittings; pipe size 2-1/2" and smaller, upon approval by FCS Facilities.
            1.3.3.1. Install continuous #12 bare copper wire on top of pipe along entire length affixed to pipe with plastic tie straps a maximum of 4' on center
            1.3.3.2. Install continuous buried warning identification tape 12" above top of pipe in trench
        1.3.4. All underground pressure piping shall be thrust blocked at all changes of direction and changes in elevation
        1.3.5. Saddle tees are not permitted in any portion of the underground piping system
    1.4. Sanitary Waste and Vent Piping: (kitchen fresh air waste and vent piping included)
        1.4.1. Cast iron, hub and spigot, service weight, push on joints for under slab below building pad
        1.4.2. Cast iron, no-hub pipe with cast iron no-hub fittings and heavy duty shielded no-hub stainless steel couplings for above slab inside building
        1.4.3. PVC schedule 40 solid wall pipe with standard PVC DWV fittings with solvent weld joints above or below slab
            1.4.3.1. PVC pipe shall not be used for kitchen waste piping systems
            1.4.3.2. PVC pipe shall not be used in return air plenum areas
            1.4.3.3. Where piping is installed below grade outside of building pad, install continuous #12 bare copper wire on top of pipe along entire length affixed to pipe with plastic tie straps a maximum of 4' on center from building to manhole
            1.4.3.4. Install continuous buried warning identification tape 12" above top of pipe in trench from building manhole
        1.4.4. Sanitary vent penetrations through the roof shall be located a minimum of 15 feet from any HVAC unit air intake
    1.5. Storm/Rainwater Piping:
        1.5.1. Cast iron, hub and spigot, service weight, push on joints for under slab inside building pad and below grade outside building
        1.5.2. PVC schedule 40 solid wall pipe with standard PVC DWV fittings with solvent weld joints for above slab and under slab inside building pad and below grade outside building
            1.5.2.1. Where piping is installed below grade outside of building pad, install continuous #12 bare copper wire on top of pipe along entire length affixed to pipe with plastic tie straps a maximum of 4' on center from building to storm structure or junction box
            1.5.2.2. Install continuous buried warning identification tape 12" above top of pipe in trench from building to storm structure or junction box
        1.5.3. Cast iron, no-hub pipe with cast iron, no-hub fittings and heavy duty shielded no-hub stainless steel couplings for above slab inside building
        1.5.4. Cast iron downspout boots a minimum of 18" high to be installed for all exterior aluminum downspouts piped to storm water systems below grade; install a minimum 4" yard cleanout within 3' of each boot at grade in a minimum 12" square by 4" deep concrete pad
    1.6. Natural Gas Piping:

1.6.1. Domestic, schedule 40 black steel pipe with socket welded or threaded malleable iron screwed fittings. Pipe sizes 2-1/2" and smaller
1.6.2. Domestic, schedule 40 black steel pipe with socket weld fittings; pipe sizes 3" and larger
1.6.2.1. All gas piping installed below grade shall be welded construction regardless of pipe size and pressure; minimum gas line size below grade is 1"
1.6.2.2. All metallic underground gas piping shall be wrapped and coated
1.6.2.3. Install continuous buried warning identification tape 12" above top of pipe in trench for all buried exterior gas piping regardless of pipe size and pressure
1.6.3. Delivery gas pressure downstream of gas meter shall not exceed 5 psi
1.6.4. Natural gas piping shall be designed to distribute high pressure gas across the school and regulate to the pressure required at point of service
1.6.5. Gas regulators shall be "service grade" and located outside the building
1.6.6. Gas piping shall be stepped down to required pressure at the generator
1.6.7. Install isolation valves for kitchen, generator and HVAC piping where possible
1.6.8. Where possible limit gas pressure for piping installed inside buildings to 7" W.C.
1.6.9. Install gas pressure regulators for equipment where gas pressure exceeds 11" W.C. delivery pressure with vent pointed to ground
1.6.10. Galvanized pipe or pipe fittings shall not be used in gas piping systems
1.6.11. All gas piping and fittings installed exterior of the building shall be primed at the time of installation and painted yellow prior to the system being placed in service
1.6.12. Polyethylene (PE) piping with socket weld heat fusion or electro fusion joints is acceptable for exterior below grade use outside of building pads; install tracer wire and buried warning identification tape in trench with pipe
1.6.13. Pipe curb assemblies shall be installed for all gas piping penetrations thru the roof
1.6.14. Design the natural gas system for 5 PSI from the gas company

1.7. Chemical Waste and Vent Piping:
1.7.1. No longer required in elementary and middle schools; still required in high schools

1.8. Drainage Piping Accessories:
1.8.1. Floor Drains:
1.8.1.1. Floor drains shall have a cast iron body and flashing flange with adjustable 6" round or square nickel bronze top strainer, stainless steel securing screws, sediment bucket and trap primer connection
1.8.1.2. Floor drains shall be installed in all multi-fixture toilet rooms, janitorial/custodial closets, rooms where washing machines and domestic water heaters are installed, mechanical rooms where HVAC units are installed and at emergency shower/eyewash units.
1.8.1.3. All floor drains shall have trap primers. Exception: Floor drains installed in kitchen-safe waste systems shall not have trap primers
1.8.1.4. Floor drains installed in Mechanical Rooms shall have deep seal traps
1.8.1.5. Floor drains that receive indirect waste water from sinks and equipment shall have an air gap of 2 x diameter of discharge pipe size, such as food handling equipment in the kitchen, shall use a grate with an opening or grate top option to prevent splashing
1.8.2. Wall Cleanouts:
1.8.2.1. Shall be no-hub cleanout tee with bronze countersunk plug tapped for machine screw with shallow stainless steel face-of wall access cover
1.8.2.2. Shall be roughed with centerline not more than 24" above the finished floor, but high enough for escutcheon cover to clear the baseboard
1.8.2.3. Shall be installed at the base of all sanitary waste stacks at slab on grade
1.8.2.4. Wall cleanout covers and plugs shall be removed at the final project review to demonstrate accessibility to owner

1.8.3. Floor Cleanouts:
1.8.3.1. Shall have cast iron body, adjustable round or square scoriated nickel bronze cover and rim, stainless steel securing screws and countersunk taper threaded bronze plug and sediment bucket
1.8.3.2. Cleanouts installed in carpeted areas shall have accessible top with carpet trim plate
1.8.3.3. Cleanouts in waterproofed floors or overhead slabs shall have flashing clamps
1.8.3.4. Stainless steel, Phillips head screws shall be used to secure all floor drain grates and strainer tops
1.8.3.5. Floor cleanout spacing shall not exceed 50 feet for pipe sizes 3” and smaller and 80 feet for pipe sizes 4” and larger
1.8.3.6. Water closet removal shall not be a substitution for a floor cleanout
1.8.3.7. Floor cleanout covers and plugs shall be removed at the final project review to demonstrate accessibility to owner
1.8.4. Yard Cleanouts:
1.8.4.1. Shall have tractor weight cast iron housing, stainless steel securing screws and countersunk bronze plug; cleanouts shall be set in a 16" X 16" X 6" deep poured concrete pad set flush with grade
1.8.4.2. Yard cleanout spacing shall not exceed 50 feet for pipe sizes 3” and smaller and 80 feet for pipe sizes 4” and larger
1.8.4.3. Yard cleanouts shall be installed within 5 feet of the building exterior for all sanitary sewer waste piping leaving the building. The minimum size is 4”
1.8.5. P-Traps:
1.8.5.1. P-traps for lavatories, countertop sinks, and drinking fountains shall be 17 gauge, cast brass, polished chrome plated with cleanout plug, brass nuts and deep wall escutcheon covers
1.8.6. Handicapped Covers:
1.8.6.1. All exposed lavatory and sink trim on wheelchair accessible fixtures shall be covered with a seamless cover with a vinyl insulating outer shell; insulating kits shall include covers for drain tailpiece, all P-trap components, and hot and cold water supplies
1.8.7. Floor Penetrations through Elevated Slabs:
1.8.7.1. All floor penetrations between occupied floors on elevated slabs shall be sealed watertight top and bottom and with material that will maintain the rating of the floor assembly
1.9. Domestic Water Piping Specialties:
1.9.1. Water Pressure Regulator Valves (PRV):
1.9.1.1. Bronze body construction with removable strainer, threaded or flanged connections and renewable seats; provide stainless steel spring, stainless steel adjusting screw and stainless steel screws and fasteners throughout
1.9.1.2. Flow rates and reduced pressure fall-off shall be within limits set by the applicable plumbing code. Residential type PRV valves are not acceptable
1.9.1.3. Install PRV stations for the facility at the main water entrance to the facility and set for 80 psi.
1.9.1.4. PRV valves located in mechanical rooms that serve specific pieces of equipment shall be accessible from the floor and include bypass with manual valve
1.9.1.5. Back flow preventer shall be located at the street downstream of the main water meter vault
1.9.1.6. Preferred location of Reduced Pressure Zone (RPZ) backflow preventers shall be located on a wall within 5 feet above the finished floor with funnel drain piping routed full size to a floor drain unless exterior unit is required by the Local Authority
1.9.2. Trap Primers for Condensate Drains:
1.9.2.1. Trap primers for condensate drains shall be a solenoid type controlled by the building automation system (BAS)
1.9.2.2. Do not use pressure drop type trap primers

1.9.2.3. Trap guard type trap seal devices are not permitted
1.9.2.4. Install an isolation ball valve, union, “Y” strainer, and PRV valve upstream of trap primer solenoid valve. Set outlet pressure to 10 PSI
1.9.2.5. Trap primer valves shall be installed above accessible ceilings
1.9.2.6. Trap primer connections shall be made off of the top of the domestic water line only
1.9.2.7. Trap primers shall be installed at all floor drains except drains installed on a kitchen safe waste system
1.9.2.8. Basis of design: Precision Plumbing Products, Inc Model SP-500-24V; equal products by Jay R. Smith, Mifab, or Zurn
1.9.3. Trap Primers for Floor Drains:
1.9.3.1. Trap primers for toilet room floor drains can be a waste water type primer from a sink or lavatory
1.9.3.2. Do not install at ADA accessible fixtures where possible
1.9.3.3. Basis of design: Jay R. Smith Fig. 2698 or approved equal products by Mifab or Zurn
1.9.4. Supplies and Stops:
1.9.4.1. Supplies and stops for lavatories, countertop sinks, and drinking fountains shall be chrome plated, all brass stops with brass stems, chrome plated copper risers, loose tee key operator with deep bell chrome plated wall escutcheon with set screw; product shall comply with the SDWA (Safe Water Drinking Act) “No Lead” restrictions of ANSI NSF 61, Section 9
1.9.5. Supplies and Stops for Chemical Cleaning and Disinfecting Systems:
1.9.5.1. Provide T-fitting at cold water supply to custodial service sinks and mop receptor faucets for installation of sanitizing chemical systems; install double check valve assembly between fixture cold water isolation valve and T-fitting
1.9.5.2. Provide T-fitting at hot water supply to at kitchen dish machines for installation of sanitizing chemical feed systems. Install double check valve assembly between fixture hot water isolation valve and T-fitting
1.9.5.3. Provide T-fitting at cold water supply to kitchen pot sinks for installation of sanitizing chemical feed systems. Install double check valve assembly between fixture cold water isolation valve and T-fitting
1.9.5.4. Water taps shall be installed in all science lab prep rooms for science lab distilled/ ionized water production equipment
1.9.5.5. Provide ½” CW valved tap at equipment for water treatment at kitchen steamers and combi ovens
1.9.6. Overhead Pipe Support:
1.9.6.1. Use Clevis-type hangers; where hangers are installed on insulated piping, sheet metal pipe saddles are required at each hanger location; swivel ring and/or band type hangers are not allowed on any plumbing piping support system
1.9.7. Isolation ball valves and swing check valves are required in all horizontal domestic water in the following locations:
1.9.7.1. Mop sink faucets, mop basin faucets, service sink faucets, and can wash faucets
1.9.7.2. All faucets with spray hose attachments and all hose reels
1.9.8. Isolation valves in domestic water piping serving gang toilet rooms shall be located over lay-in ceilings for maintenance access
1.10. Domestic water system shall be designed to reduce probability of Legionnaires' disease
2. Plumbing System Check-Out Procedures
2.1. Designer shall establish written procedures for verifying that sanitary sewer, kitchen waste, and storm water systems are clear and installed without bellies and blockages:
2.1.1. Remove all wall and floor cleanout covers and cleanout plugs. Lubricate and reinstall; route out lines as required

2.1.2. Outline procedures for video inspection of horizontal waste lines above and below floor to the exterior manhole connection:
2.1.2.1. All lines 4" and larger and greater than 20' in length shall be video camera inspected
2.1.2.2. The video inspection report shall be provided to the owner prior to final project acceptance and included as part of the close-out documentation
2.1.2.3. Routed lines shall be flushed from wall and/or floor cleanouts
2.1.3. Outline procedures for smoke testing of sanitary vent, kitchen fresh air vent and chemical vent systems within the building:
2.1.3.1. The smoke testing report shall be provided to the owner prior to final project acceptance and included as part of the close-out documentation
2.1.3.2. Smoke testing shall not be done until all fixtures are operational and trap primer systems operating
2.1.4. Outline procedures for cleaning, sterilization, and testing of all potable water systems:
2.1.4.1. Water samples shall be drawn and submitted to local health department for testing
2.1.4.2. Test reports shall be provided to the owner and included as part of the close-out documentation
2.1.5. Outline procedures for testing of natural gas piping systems:
2.1.5.1. Test system piping at a pressure no less than 1-1/2 times the proposed maximum working pressure but no less than 3 psi irrespective of the design pressure; duration of test shall be 1 hour for each 500 cubic feet of piping system volume or fraction thereof

2.2. The owner's maintenance staff or representative shall be notified in advance of all testing and inspections

3. Room names and numbers shall match the Architectural drawings on all plumbing floor plans.

SECTION 22 3300 DOMESTIC WATER HEATERS

1. General requirements:
1.1. Hot/tempered water shall be provided for the following and other areas as required by code:
1.1.1. Kitchens, culinary arts and food preparation areas
1.1.2. Custodial service sinks and mop receptor faucets
1.1.3. Adult/Staff toilet rooms
1.1.4. Faculty workroom and break room sinks
1.1.5. Lab demonstration and prep rooms
1.1.6. Showers
1.1.7. Clinic
1.1.8. Media center sinks
1.1.9. Art rooms
1.1.10. Home making/family living
1.1.11. Special Ed
1.1.12. Student toilet rooms adjacent to cafeteria
1.2. Use several electric water heaters sized for their point of use zones in lieu of a central heating system with a single circulating loop. Additionally, internal circulating pumps are not allowed for instantaneous water heaters.
1.3. The administrative area shall have its own separate water heating system
1.4. Kitchens shall have their own water heating system. Provide gas fired, instantaneous type with sealed combustion, direct vent installed inside the building with hot water circulating system
1.5. Locker rooms with student/faculty showers shall have a separate water heating system; owner preference is gas fired, instantaneous type with sealed combustion, direct vent installed inside the building with hot water circulating system

1.6. Water heaters larger than 20 gallons shall be floor mounted; heaters 20 gallons or less may be mounted on shelves supported from masonry walls in custodial areas below ceilings above mop receptor basins or service sinks with proper support from walls and/or structure
1.7. Preference is for all piping to be type L hard copper; flexible water piping may be used for instantaneous pre-packaged units.
1.8. Water heaters shall not be located above ceilings. Water heaters shall be installed in areas with a floor drain designed to catch overflow. If drain cannot be provided, water heater should be installed with a catch pan that is plumbed to a drain.
1.9. All water heaters shall be controlled by the building automation system (BAS)
1.10. Water heating systems serving student accessible fixtures shall be provided with 110 degrees Fahrenheit water
1.11. Install water heaters such that access panels are accessible for service.
1.12. Identification numbers for all water heaters and circulation pumps shall be unique. No duplicate equipment identification numbers are allowed. Where the equipment is added to an existing facility, the new equipment shall be given identification numbers continuing the original numbering format. Where equipment is replaced and there are existing duplicate equipment numbers, the new equipment shall be given new, unique equipment numbers. Where existing equipment is replaced, either use the identification number in the BAS system, or specify the BAS system to be updated to new equipment tagging if duplicates exist.
1.13. Acceptable manufacturers: Rinnai, Rheem, and Navien.

2. HW circulating pumps:
2.1. Pumps shall be wall mounted no higher than 5’ above the floor for accessibility.
2.2. Bronze body construction with screwed or flanged connections, shaft sleeves rated for water temperature range of 40-220° degrees Fahrenheit.
2.3. All circulating pumps shall be controlled by the building automation system (BAS). Aquastats are not allowed
2.4. Include circulating pump when the distance between heater and final fixture exceeds 50 feet.

SECTION 22 4000 PLUMBING FIXTURES

1. Water closets:
1.1. Floor mounted, floor outlet, vitreous-china, white, elongated, 1.28 gallons per flush maximum water consumption, 1-1/2” top spud flush valve connection; fixture designed for flush valve operation;
1.1.1. In elementary schools only, where existing wall mounted fixtures exist in the same restroom, wall mounted back outlet water closets may be installed
1.2. Provide brass floor mounting bolt hardware
1.3. Bowl gaskets shall be a combination wax seal or urethane reinforced flanged polyethylene sleeve molded into gasket assembly
1.4. Grout fixture base at floor
1.5. Acceptable manufacturers: Kohler, American Standard, Zurn, Sloan
2. Urinals:
2.1. Wall mounted 2” back outlet, vitreous-china, white, siphon jet operation, .125 gallons per flush maximum water consumption, 3/4” top spud flush valve connection; fixture designed for flush valve operation
2.2. Waterless/water free urinals are not permitted
2.3. Caulk fixture at wall
2.4. For new construction, mount fixture on floor mounted carrier
2.5. For renovation/replacement, mount fixture on existing support
2.6. Acceptable manufacturers: Kohler, American Standard, Zurn, Sloan
3. Wall Hung Lavatories:

3.1. Accessible, wall mounted drilled for concealed arm supports, white, cast iron fixture, nominal 20”x18” with backsplash
3.2. Drilling as required for faucet specified
3.3. Caulk fixture at wall
3.4. For new construction, mount fixture on floor mounted carrier
3.5. For renovation/replacement, mount fixture on existing support
3.6. Lavatories are preferred at elementary schools. For middle and high schools, see paragraph 12 for wash fountains.
3.7. Acceptable manufacturers: Kohler, American Standard, Zurn, Sloan

4. Stainless Steel Sinks:
4.1. Single bowl, commercial, drop-in, 18-gauge, type 300 series stainless steel sink, size, depth and faucet drilling arrangement as scheduled
4.1.1. Art room sinks shall have point of use plaster traps/solids interceptors at each sink waste under counter. Bottom access, acid resisting, 1-1/2” inlet and outlet, removable sediment bucket
4.1.1.1. Provide (2) single bowl sinks in elementary schools and middle schools
4.1.1.2. At high school Art labs, provide (1) single bowl stainless steel sink and (2) stainless steel sinks with integral drain boards (at 2D Digital Art lab, provide (1) single bowl sink and (1) sink w/ integral drain board). Basis of design Advance Tabco 93-21-20-18RL.
4.1.2. Provide sinks at CTAE labs as required. Coordinate with FCS Capital Improvements staff.
4.1.3. Provide sink at high school Training rooms
4.1.4. Concessions: provide triple bowl 20 guage standard depth drop-in sink, and separate hand washing sink, as required by local health department
4.1.5. Acceptable manufacturers: Elkay, Just, Moen, Kohler

5. Classroom Stainless Steel Sinks: (elementary schools only)
5.1. Single-bowl, commercial, drop-in, 18-gauge, stainless steel sink, size, depth and faucet drilling arrangement as scheduled
5.2. Side oriented, deck mounted cold water gooseneck faucet, Moen 8103
5.3. Front side oriented, deck mounted bubbler with slow closing valve; mount on opposite side of sink as faucet; bubblers attached to sinks do not count towards GDOE minimum drinking fountain requirements
5.4. For handicapped accessible locations, select sink with waste opening centered at rear of the fixture
5.5. Strainers shall be vandal resistant perforated grid; do not use removable strainer baskets
5.6. Acceptable manufacturers: Elkay, Just, Moen

6. Service Sinks:
6.1. Wall mounted, cast iron acid resistant enamel, white, single basin, nominal 22”x18” with blank back drilled for 8” spread faucet, stainless steel rim guard, and 3” trap standard with stainless steel strainer top at bottom outlet. Provide at all custodial closets.
6.2. Caulk fixture at wall
6.3. Acceptable manufacturers: Kohler, American Standard, Zurn, Sloan

7. Multipurpose Sink: Floor mounted, polypropylene, single compartment, with chrome-plated dual handle deck faucet
7.1. Provide multipurpose sink in MS and HS Band instrument storage room
7.2. Basis of design: Zurn MS2620-DF1

8. Darkroom Sink:
8.1. Provide sink in high school Art suite darkrooms
8.2. Basis of design: Regal Arkay SQP-3684X6/WA sink and stand

9. Mop Receptors: Floor mounted, molded stone, nominal 36”x24”x10” deep with 3” drain outlet and stainless steel strainer top, stainless steel caps on curbs. Provide at all custodial closets.
9.1. Caulk fixture at walls and floor
9.2. Acceptable manufacturers: Kohler, American Standard, Zurn, Stern Williams, Fiat

10. Service Sink and Mop Receptor Faucets and Accessories:
    10.1. Rough chrome plated cast brass body with brass wall brace and mounting hardware, internal check stops, cross handles, threaded brass wall flanges, brass vacuum breaker, pail hook and ¾" hose thread connection, Moen 8124 or equivalent
    10.2. Provide 48" long vinyl hose with ¾" connection and wall hook
    10.3. Provide mop hanger above mop receptor units, Moen 8198 and 8199 or equivalent
    10.4. Install check valve on each supply line above ceiling downstream of isolation ball valve
11. Water Coolers:
    11.1. Touchless bottle filling station with single ADA vandal-resistant water cooler, non-filtered refrigerated, stainless steel. Bubbler shall be adjustable chrome plated brass with keyway and shank for vandal resistant installation.
    11.2. Wall mounted installation on floor mounted commercial carrier and backing plate supplied with unit in new construction
    11.3. Caulk fixture top at wall
    11.4. Install toggle bolts thru wall at bottom of unit
    11.5. Hi-Lo combination water cooler units are not permitted
    11.6. Water coolers or drinking fountains shall not be installed in Gym areas with wood flooring
    11.7. Recessed wall units are not permitted
    11.8. Acceptable manufacturers: Elkay, Oasis, Halsey Taylor
12. Flush Valves:
    12.1. Flush valves for water closets shall be manual, brass body with corrosion-resistant internal components, 1-1/2" top spud, 1.28 GPF, vandal resistant cap, control stop with check valve, vacuum breaker, copper or brass tubing, polished chrome-plated finish on exposed parts and solid ring pipe support to wall
        12.1.1. Basis of design and owner preferred: Sloan. Equal products by Zurn, MOEN 8310M128, or TOTO subject to review and approval by FCS Facility Services
        12.1.2. Provide 5-year warranty
        12.1.3. Automatic flush valves are not permitted.
    12.2. Flush valves for urinals shall be manual type, brass body with corrosion-resistant internal components, piston style 3/4" top spud, .125 GPF, vandal resistant cap, control stop with check valve, vacuum breaker, copper or brass tubing, polished chrome-plated finish on exposed parts
        12.2.1. Basis of design and owner preferred: Sloan. Equal products by Zurn, Moen (8312M125), or TOTO subject to review and approval by FCS Facility Services
        12.2.2. Automatic flush valves are not permitted.
13. Faucets:
    13.1. Wall Hung Lavatory – cold water only – student toilet rooms: Single deck mount, metered, ADA compliant, chrome plated, vandal resistant, with brass stem and .5 GPM vandal resistant aerator; faucet shall meet the requirements of the 2014 "Reduction of Lead in Drinking Water Act"; faucet shall have an unconditional warranty of 5 years; warranty letter shall accompany product submittals.
        13.1.1. Basis of design and owner preferred: Moen 8884 and 99550 w/4" Anti-Rotation Deckplate. Equal products by Chicago, Sloan, American Standard, or Delta subject to review and approval by FCS Facility Services
        13.1.2. Sensored faucets are not permitted.
    13.2. Wall Hung Lavatory – hot and cold water – staff areas and student toilet rooms at cafeteria: Dual deck mount, ADA compliant chrome plated, vandal resistant, single lever faucet with brass stems and .5 GPM vandal resistant aerator; faucet shall meet the requirements of the 2014 "Reduction of Lead in Drinking Water Act"; faucet shall have an unconditional warranty of 5 years; warranty letter shall accompany product submittals
        13.2.1. Basis of design and owner preferred: Moen 8886. Equal products by Chicago, Sloan, or Delta subject to review and approval by FCS Facility Services

13.2.2. Sensored faucets are not permitted.

13.3. Countertop Stainless Steel Sink Faucets: ADA compliant, deck mount, 8" spread faucet with single lever handle, 2.0 GPM vandal resistant aerator, three or four-hole fixture, with or without hand spray, hot and cold water indicators, chrome plated brass body and construction with ½" inlet shanks; faucet shall meet the requirements of the 2014 "Reduction of Lead in Drinking Water Act"; faucet shall have an unconditional warranty of 5 years; warranty letter shall accompany product submittals.

13.3.1. Basis of design and owner preferred: Moen Commercial 8712/8720/8701/8707. Equal products by Chicago, Sloan, Zurn, Elkay, Just, or Delta subject to review and approval by FCS Facility Services

13.3.2. Cold-water only at elementary school classroom sinks. Hot and cold water at staff areas/art rooms

13.3.3. Hose spray units shall not be installed in student accessible sink locations.

14. Wash Fountains:

14.1. Accessible, vandal resistant, solid surface unit with integral bowl, pedestal mounted for 1 to 4 users; 0.5 GPM spray heads with air valve control, factory assembled with thermostatic mixing valve complete with check stops, strainers, and flexible stainless steel hoses concealed behind heavy gauge 304 stainless steel panels; each spray unit shall be controlled by touch time metering.

14.2. Basis of design and owner preferred: Bradley Tri/Quadra-Fount model MF2933/MF2944. Equal products by Intersan or Acorn subject to review and approval by FCS Facility Services

14.3. Wash fountains are preferred at middle and high schools. Wash fountains shall not be installed in elementary schools.

15. Water closet seats:

15.1. White, commercial, molded solid plastic with open front without cover, elongated, self-sustaining check hinge with Sta-Tite commercial fastening system

15.2. Acceptable manufacturers: Bemis, Church, and Olsonite

16. Fixture carriers and supports:

16.1. All wall hung lavatories, urinals and drinking fountains installed in new walls or chases shall be supported independently of the wall by a commercial floor mounted carrier consisting of rectangular steel uprights with welded feet and secured to floor with lead anchor inserts or self drilling expansion shields and lag bolts at each location; wall brackets and conceal arms shall be provided where appropriate for fixture being supported. Leveling and locking hardware shall be provided for lavatory carrier concealed arm supports.

16.2. Acceptable manufacturers: Jay R. Smith, Josam, Zurn, Wade, and Mifab

17. Hydrants:

17.1. Interior: 1/2", chrome plated, loose tee key operated hose bib in recessed cast brass/bronze box hinged cover with vacuum breaker and 3/4", hose connection

17.1.1. Provide at each multi stall restroom. Mount on wall below a lavatory

17.2. Exterior: Cast brass/bronze box and hinged cover with non-freeze hydrant and vacuum breaker, 3/4", rough chrome, loose tee key operated hose bib with vacuum breaker and 3/4" hose connection.

17.2.1. Maximum spacing around perimeter of building is 150 feet

17.2.1.1. Provide hose bib at exterior Art patio

17.2.2. Mount flush with face of wall and caulk

17.3. Exterior Play Fields: Provide freezeless hose bibs in key access ground boxes adjacent to all play fields. Install RPZ backflow preventer in protective accessible box above grade; where water pressure exceeds 100 psi, install a commercial PRV valve, union and isolation gate valve upstream of PRV in a meter box flush with finished grade

17.4. Roof Hydrants: Freezeless roof hydrants are required for flat roof areas where HVAC and energry recovery equipment is installed; provide one unit for each 100,000 square feet of roof area located central to equipment served

17.4.1. Basis of design and owner preferred: Woodford Model SRH-MS. Equal products by MAPA or Jay R. Smith subject to review and approval by FCS Facility Services

18. Can Wash: Provide freeze-proof mixing faucet, hose outlet, and floor drain.
19. Bathtub/Shower: Provide bathtub or shower in the following locations:
    19.1. Elementary School clinic
        19.1.1. Basis of Design: American Standard Princeton bathtub model 2394.202 or 2395.202 with hand-held shower head
    19.2. Middle School clinic
        19.2.1. Basis of Design: Bradley HN200 wall mounted shower with hand-held shower head and folding seat
    19.3. Other locations as indicated by FCS

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DIVISION 23 HEATING VENTILATION AND AIR CONDITIONING

SECTION 23 0000 HVAC SYSTEMS

HVAC Unit Location Priority:

1. Locating HVAC units in closets is preferable. Where design considerations do not allow this, second preference would be for units to be located on a mezzanine. Final preference is for units to be located above ceilings in hallways.

HVAC Mockups:

1. Mechanical design documents shall include requirements for the following HVAC mockups. Mockups shall be installed by the contractor for review and approval by FCS prior to proceeding with remaining unit installations
   1.1. Water Source Heat Pump unit and ductwork
   1.2. Fan Coil unit

Space Requirements:

1. HVAC System Requirements by Space:

Type of Space	HVAC Requirement	Special Requirements
Classroom	Water Source Heat Pumps	
Administrative Offices	Packaged HVAC Equipment with Variable Volume Terminal Units	Offices, reception work and conference rooms shall be on independent controlled, separate zones. Use parallel boxes with electric heat for high heating loads
Counseling Suite	Packaged HVAC Equipment with Variable Volume Terminal Units	Offices, reception and conference rooms shall be placed on independently controlled, separate zones.
Media Center Suite	Packaged HVAC Equipment with Variable Volume Terminal Units	Office, work and conference rooms shall be placed on independently controlled, separate zones.
Cafeteria	Packaged HVAC Equipment	
Cafeteria Managers Office	Ductless Split System with Heating and Cooling	Local thermostat and enabled /disabled by the building automation system (BAS)
Kitchen	Packaged HVAC Equipment	
Dry Storage	Single Zone Packaged HVAC Equipment or Ductless Split System with Heating and Cooling	Maximum indoor design temp of 70F must be year-round.
Auditorium	Packaged HVAC Equipment	Designed for 70degF during the summer
PE Areas including Gyms	Packaged HVAC Equipment	
Locker Rooms	Packaged HVAC Equipment	
Stadium Press Boxes	Ductless Split System Heating and Cooling	Local thermostat and enabled/disabled by BAS or no-hold timer

Type of Space	HVAC Requirement	Special Requirements
Network Server Rooms to include video surveillance equipment (MDF and IDFs)	Dedicated Split system preferred. Ductless Split System if space constraints for Cooling	Local thermostat and enabled /disabled by BAS. Requires 24-7-365 control
Corridors	Water source heat pumps (WSHP)	Use WSHP with additional ceiling mounted electric heater at entry doors.

System Requirements:

1. Special Instructions:
   1.1. All HVAC units shall be controlled and monitored by the BAS. Local thermostats only when approved; manufacturer of equipment to provide safeties and timers.
   1.2. Design professional to coordinate the BAS controls requirements with the HVAC equipment.
   1.3. Alternate HVAC systems outside the design requirements must be approved by FCS prior to developing the design documents.
   1.4. Provide HVAC emergency shutdown button in administration area.
   1.5. Designers are to develop plans and specifications that preserve manufacturers recommended service clearances around all HVAC equipment. Additionally, all equipment shall be installed in such a manor as to allow removal of equipment without having to remove other building components.
   1.6. Panels and other control devices not located above the ceiling shall be mounted at an elevation that does not require a ladder to access. Equipment above the ceiling shall be within three (3) feet of the ceiling.
   1.7. The education specifications require that certain classrooms shall be capable of being sub-divided into two smaller rooms. The HVAC system and controls for these classrooms shall be designed to operate properly as a single large classroom or as two smaller classrooms. If two separate units and thermostats are provided, they shall be designed to operate as a single unit for the single large classroom.
   1.8. Design engineer shall clearly identify the ambient and space design temperatures used for winter and summer conditions prior to design development.
   1.9. All HVAC units shall have ducted returns. Corridors, stairs and elevator spaces shall be pressurized.
   1.10. Front entrances which are served by a RTU VVT unit shall use parallel PIU boxes with electric heat.
   1.11. Isolated rooms located along the building perimeter and served by a predominately interior RTU VVT unit shall use parallel PIU boxes with electric heat.
   1.12. RTU VVT systems shall have no diversity for airflow. The sum of the VVT box airflows shall equal the supply airflow of the RTU.
   1.13. All HVAC units shall be charged with R410A refrigerant.
   1.14. Locker room air conditioning and ventilation shall be designed to address the special conditions in these spaces. Provide ionization units to assist in odor control that is problematic in most existing schools. See paragraph 2.6.
   1.15. Locate zone temperature sensor on an interior wall, close to the return grill and at adult ADA height.
   1.16. On renovation projects, the HVAC demolition plans should include provisions to remove all abandoned equipment and be coordinated with architectural plans to ensure building finishes are restored.
   1.17. On renovation projects roof top equipment should include new roof curbs in lieu of adapter curbs when feasible. Existing roof structure shall be evaluated for new equipment loads.
   1.18. On renovation projects design engineer shall evaluate existing smoke dampers and call for replacement where necessary.
   1.19. Roof curbs to provide a minimum of 8” of flashing height above the roof.
   1.20. Design documents to require contractor to change filters during construction and extend service through the warranty period.

1.21. New construction and major HVAC renovation projects will be independently commissioned. Designer to confirm with FCS if a renovation project will be commissioned and include provisions in design documents to inform contractor of any special commissioning requirements. Responsibility for test and balance procedures shall be as indicated in the front-end specifications.
1.22. Design engineer to consult with FCS Facilities to determine if building location will necessitate heightened air filtration requirements.
1.23. All air distribution systems shall be designed for a maximum occupant sound level of 35 NC. Lower levels shall be provided for sound sensitive areas such as music and media.
1.24. The use of ionic air cleaners is required in order to reduce the quantity of outside air unless restricted by code or needed to maintain building pressure.
1.25. Design for demand control ventilation for cafeterias, gymnasiums, and auditoriums.
1.26. Room names and numbers shall match the Architectural drawings on all mechanical floor plans.
1.27. Identification numbers for all mechanical equipment shall be unique. No duplicate equipment identification numbers are allowed. Where the equipment is added to an existing facility, the new equipment shall be given identification numbers continuing the original numbering format. Where existing equipment is replaced, either use the identification number in the BAS system, or specify the BAS system to be updated to new equipment tagging if duplicates exist. Where equipment is replaced and there are existing duplicate equipment numbers, the new equipment shall be given new, unique equipment numbers.

2. IAQ plan for HVAC operation during Construction
   2.1. Design shall include protection of ductwork and equipment coils when operated during construction
3. Air Filters
   3.1. All units shall be designed for 2” MERV-13 filters
   3.2. Metal frames and filter media to be purchased by mechanical contractor through FCS filter contractor
   3.3. Contractor responsible for replacing filters every three months during warranty period; filter changes to be performed by the current FCS filter contractor.
   3.4. Ductless split system shall use internal filtering
   3.5. Filter use during construction should be MERV-8 or better over return grilles
4. Equipment Requirements:
   4.1. Water Source Heat Pumps:
      4.1.1. Approved manufacturers are Carrier, Trane, and Climatemaster.
      4.1.2. Specifications for water source heat pumps shall require units to be resettable from BAS by disabling the fan or compressor.
      4.1.3. Water source heat pumps shall be extended range type with expansion valves. Units to operate on a minimum entering air temperature in heating mode of 40F with a minimum entering water temperature of 20F and a maximum entering water temperature of 110F. Cap tubes not acceptable.
      4.1.4. Connections to the loop piping shall be on the side or top.
      4.1.5. Provide ball type isolation valves and automatic flow control valves to all water source heat pumps.
      4.1.6. Flow control valves shall be separate from the solenoid valves
      4.1.7. The filter rack to be 2” and configured with an air tight seal, continuous hinged access doors and tool-less quarter turn latches.
      4.1.8. No external condensate pans.
      4.1.9. Condensate control to be provided by float switch in the primary pan of the WSHP.
      4.1.10. Provide monitoring output for unit alarms.
      4.1.11. Solenoid valve for condenser water shall be controlled by BAS. Use separate output from compressor.
      4.1.12. Ensure maintenance access requirements are met and no piping, conduit, etc. is located below the unit.
      4.1.13. Design system for minimum flow using bypass or 3-way valves.

4.2. Packaged Rooftop (RTU) Equipment:
- 4.2.1. Approved manufacturers are Trane, Carrier and Lennox.
- 4.2.2. Provide criteria for “burn-in” of gas heat exchangers in Project Manual. Force unit to run all gas heat stages at least 20 minutes. Coordinate schedule with principal at schools.
- 4.2.3. Units are to be gas heat unless gas is not on site.
- 4.2.4. Provide differential enthalpy controls for economizer.
- 4.2.5. All access doors are to be continuous hinged with quarter turn tool-less entry (include a lockable option if available – key lock is preferred).
- 4.2.6. Provide hail guards on all rooftop equipment.
- 4.2.7. Through-base utility connections are not allowed at packaged rooftop units. All interior piping, wiring, and conduit to rooftop units shall penetrate the roof through a separate Pipe Curb Assembly, with matching Pipe Curb Cover and boots.
- 4.2.8. Packaged Equipment with VVT units shall have constant speed with bypass damper.
- 4.2.9. All units shall have dehumidification
- 4.2.10. All outside air to pass through MERV 13 filters unless adjacent to highway or other fine particulate sources of pollution. For outside air in areas of high pollution, equipment may require up to MERV 13 filters.
- 4.2.11. R-410A refrigerant
- 4.2.12. BACNet control is prohibited, unless approved in writing by FCS
- 4.2.13. Units shall have low leakage dampers

4.3. Variable Volume Terminal Units:
- 4.3.1. Units to be pressure independent
- 4.3.2. Provide flow monitoring
- 4.3.3. Unit to be controlled by BAS

4.4. Power Induction Units (PIU):
- 4.4.1. Use parallel PIU boxes
- 4.4.2. When electric heat requirement is greater than 3 kW, use multiple stages
- 4.4.3. Ensure that return air is pulled from space served by PIU
- 4.4.4. Normally used for lobby for lobbies and vestibules served by the admin RTU
- 4.4.5. VAV/PIU inlets and dampers for VVT system shall be sized no greater than 0.08 inches friction loss per 100’ of duct method

4.5. Ductless Split Systems:
- 4.5.1. Approved manufacturers are: Mitsubishi (Trane), Daikin, and Carrier
- 4.5.2. Shall be installed over the door
- 4.5.3. Factory filtration is acceptable on these units
- 4.5.4. Condensate pumps shall be sump-type, external to the unit
- 4.5.5. Tie condensate pump to unit so unit will stop cooling if condensate pump fails
- 4.5.6. Design for low ambient operation (down to 10° F)
- 4.5.7. Use wired thermostat with setpoint limiting
- 4.5.8. Include hardware option to allow enable/disable by BAS
- 4.5.9. MDFs – 1.5 tons, IDFs 1.0 tons (dedicated split systems preferred)
- 4.5.10. Avoid ceiling cassette units

4.6. Ionization Units:
- 4.6.1. Provide bi-polar ionization throughout HVAC system. Ionization units must be L 2998 certified, with zero ozone emissions.
- 4.6.2. Approved manufacturers are Global Plasma, Bioclimatic and Plasma Air
- 4.6.3. Use needlepoint type
- 4.6.4. Provide alarm contacts for BAS

4.7. Energy Recovery Units: CREATE DEDICATED SPEC SECTION FOR ENGINEERS

4.7.1. Approved manufacturers are AAON, Addison and Munters
4.7.2. Heat is not needed. Units are to be gas heat if approved. Electric heat is never allowed
4.7.3. Supply duct from ERU to be tied into WSHP return air duct before filter
4.7.4. Provide hail guards
4.7.5. Access doors to be continuous hinged with quarter turn tool-less entry (include a lockable option if available – key lock is preferred)
4.7.6. ERU's to allow for the recirculation of return air for unoccupied dehumidification.
4.7.7. All outside air to pass through 2" MERV 13 filters unless adjacent to highway or other fine particulate sources of pollution; for outside air in areas of high pollution, equipment may require up to MERV 13 filters
4.7.8. Enthalpy wheels shall use silica gel desiccant. Molecular wheel is not allowed
4.7.9. Cooling design shall take into account heat load from the roof;
4.7.10. Outdoor air summer design conditions shall be 94 dry bulb /74 wet bulb
4.7.11. Cooling sizing shall produce 52 degF wb temp
4.7.12. ERU shall allow full control by BAS system including start/stop of wheel and subcooling
4.7.13. Subcooling must be pre-approved
4.7.14. ERU warranty shall be two years
4.7.15. Insulate supply and return ductwork

4.8. Kitchen Hoods:
4.8.1. Approved manufacturers are Duo-Air, Gaylor, and Avtec
4.8.2. Kitchen Hood shall be a double shell design, constructed of stainless steel, consisting of an inner exhaust canopy with minimum 86% supply air ratio. See Division 11 – EQUIPMENT for food service equipment.
4.8.3. Hood shut-down shall be located on the hood
4.8.4. UDS under the hood is required
4.8.5. Kitchen hoods are not to include heat

4.9. Cooling Towers:
4.9.1. Approved manufacturers are Evapco, BAC, Marley
4.9.2. Cooling towers shall be constructed of all stainless steel type 304 or poly cast material
4.9.3. Select low-noise cooling towers
4.9.4. Provide ladder and davit for access to cooling towers
4.9.5. Water meter need to be included on all cooling tower make-up water line
4.9.6. Water level controller shall control feed solenoid and provide low and high water alarms for BAS. Level controller shall be freeze protected. Solenoid shall be mounted in heated space with service valve upstream and manual bypass.
4.9.7. Cooling towers need to be vertical discharge
4.9.8. Makeup water piping connection shall be in the mechanical room
4.9.9. Provide cast-in-place or CMU piers for tower support
4.9.10. Oversize towers by approximately 10% for efficiency

4.10. Pumps:
4.10.1. Approved manufacturers of water loop pumps are Bell and Gossett, Taco, Patterson, and Armstrong. Tower and loop pumps to be 1750 rpm
4.10.2. Flexible coupled pumps shall be laser aligned
4.10.3. Include variable frequency drives for loop and tower pumps
4.10.4. Provide two (2) tower pumps and two (2) loop pumps, each designed at 100% flow for redundancy
4.10.5. Provide N + 1 redundancy for all primary, secondary, or condenser pumps for chiller/boiler systems
4.10.6. Provide dedicated pump per boiler

4.10.7. Require pressure gauge at the suction flange and discharge flange of all pumps including in-line circulator servpumps. All pressure gauge points that be piped together to one pressure gauge. Each pressure tap point shall include a tee with a P-T plug and an isolation ball valve.

4.10.8. Do not allow triple duty valves for pumps that have VFDs. Require the discharge of these pumps to be individual non-slam check valve, a Venturi flow measuring device and an isolation valve

4.11. Variable Frequency Drives (VFD):

4.11.1. Approved manufacturers are ABB (preferred), General Electric and Siemens

4.11.2. VFDs on tower fans and loop and cooling tower pumps shall be required

4.11.3. VFD to be located within the mechanical room

4.11.4. VFDs to be stand-alone type, not motor control center type

4.11.5. VFDs to be controlled by BAS and include remote controlled bypass and manual controls. BAS control of bypass is required

4.11.6. VFD's to be monitored by BAS via Modbus

4.11.7. All motors associated with VFD installations shall be rated for inverter duty

4.12. Boilers:

4.12.1. Provide two (2) boilers at 50-75% capacity each (typical); for facilities over 225,000 SF provide three (3) boilers, each designed at 50% capacity

4.12.2. Approved manufacturers are AERCO, Hydrotherm, or Fulton

4.12.3. Boilers shall be true condensing-type with stainless steel heat exchangers

4.12.4. Combustion air shall be ducted. Provide air intake and exhaust from boilers to the side wall of the mechanical room.

4.12.5. Include condensate neutralization tanks

4.12.6. Discharge water setpoint to be reset by BAS via hard wire (0-10 volts)

4.12.7. Boiler monitoring via Modbus for setpoint, firing rate, and alarms at a minimum

4.12.8. Provide alarm contacts for BAS monitoring

4.12.9. Do not include boiler control system for staging

4.12.10. Combustion air booster fan system are not allowed

4.12.11. Emergency boiler shutdown via shunt trip breakers. Wire in series between emergency shutdown button and fire alarm panel relay enabled by carbon monoxide sensor. Coordinate with Fire Alarm System.

4.13. Heat Exchanger:

4.13.1. Approved manufacturers are Sondex, Alpha Laval or Mueller

4.13.2. Heat exchangers shall be of stainless steel construction with shroud around the plate pack

4.13.3. Isolation valves, bypass and drain valves shall be installed on each heat exchanger. The piping system shall be designed to allow full operation of the water loop without the heat exchanger.

4.13.4. Provide strainers on inlets

4.13.5. Include four permanent insertion thermometers on outlets and inlets

4.13.6. Provide one piece clip-on molded nitrile rubber gasket between plates

4.13.7. Heat transfer performance to be ARI certified

4.14. Electric Ceiling or Cabinet Heaters:

4.14.1. Should have integral thermostats and enabled/disabled by BAS

4.14.2. Ceiling location is preferred whenever possible

4.15. Exhaust Fans:

4.15.1. Exhaust fans to be direct drive

4.15.2. Exhaust fans to be enabled and disabled by BAS

4.15.3. Art suite and science labs shall exhaust directly to the exterior

4.15.4. In science labs, provide dedicated exhaust fan over demonstration tables with local switch (non-hold timer)

4.15.5. Art suite kiln room requires an exhaust fan. Interlock exhaust fan with kiln operation to provide time delayed shutdown. Kiln exhaust to be coordinated with the installation of the kiln.

4.15.5.1. Kiln downdraft exhaust shall be Skutt system.
4.15.5.2. Dark Room ventilation shall be designed to address the special conditions in these spaces
4.16. Flow Controls and Balancing Valves:
4.16.1. Preferred manufacturers for supply and return line valve assemblies: Flow Design, Inc., Griswold, Bell & Gossett, Nexus and Pro-Hydronic
4.17. Building Automation System:
4.17.1. Sole Source approved vendor is Automated Logic Company
4.17.2. Provide automated direct digital control system
4.17.3. Control points list shall be FCS standard. Engineer to contact FCS Capital Improvements staff for latest version. Any addition or deletion of points only by approval by FCS
4.17.4. For renovation projects, the contract documents shall require that BAS graphics in the control system graphical interface be updated by GC/Automated Logic to reflect new floor plans where the floor plan changes even if mechanical systems do not change.
4.17.5. Provide UPS on main BAS panel which is fed from emergency power
4.17.6. Some monitoring points require operation during a power outage. See control points list for minimum requirements
4.17.7. BAS communication layout design shall take into account current maximum standards for controllers. Star configurations are prohibited
4.17.8. Wire guards are required for the zone sensor in gymnasiums and cafeterias
4.17.9. Flush mounted zone sensors are required at corridors
4.18. Fan Coil Units
4.18.1. Double wall construction
4.18.2. No fan belts
4.18.3. Coils order shall be chilled water and then hot water reheat
4.18.4. Hot water coils shall be two row
4.19. Chillers
4.19.1. Provide system redundancy. Each chiller to be designed for 75% of total load
4.19.2. Constant speed primary flow; Variable speed secondary flow
4.19.3. Provide glycol to allow 40 degF supply water
4.19.4. Acceptable manufacturers – Daikin, Trane, Carrier
4.19.5. Variable Refrigerant Flow (VRF) Systems are not allowed

5. Piping
5.1. Condensate Piping:
5.1.1. Interior condensate pipe needs to be copper and insulated
5.1.2. Exterior condensate piping to be copper and piped to roof drain or rain gutter. Do not pipe to overflow roof drain. Piping shall be supported by polypropylene blocks with closed cell structural foam base.
5.1.3. Identify and show locations of interior condensate lines
5.1.4. Provide a drain location for interior condensate. Provide trap primer enabled/disabled by BAS. Refer to Section 22 1000 – Plumbing Piping for additional trap primer information.
5.1.5. The maximum length of condensate pipe run for FCUs and WSHP without a vertical hub drain shall be 50’
5.1.6. Use a gravity drain at ¼” per foot for the condensate lines; avoid condensate pumps
5.2. Hydronic Piping:
5.2.1. In closed loop hydronic system makeup water feed shall be after the PRV
5.2.2. Piping 2 ½” and larger shall be steel piping schedule 40.
5.2.2.1. Aquatherm Blue Pipe is an acceptable alternate. Ensure comparable equivalent pipe size and flow rate is selected. Fittings to be per manufacturer’s recommendations.

5.2.3. Provide air/dirt separators in all closed loop piping systems. Units shall have a coalescing filter/separator with 100% air removal and 80% efficiency for all particles 30 microns and larger within 100 passes. Separator shall have removable head or base
5.2.4. Design documents shall require that the water treatment system be installed and working prior to HVAC equipment start-up and throughout all functional testing. HVAC system shall not be operated without water treatment
5.2.5. Designer to include the flushing of the piping loop and cleaning of strainers prior to connection of water source heat pumps for protection of internal heat exchanger
5.2.6. Designer to include open pipe loop filtration system with preferred location in mechanical room
5.2.7. Sprinkler mains and branch piping shall be located high in the ceiling above mechanical equipment
5.2.8. Indicate bypass valves for chilled and hot water at end of each wing

6. Chemical Treatment for Piping System:
6.1. Acceptable vendors: Chem Aqua, Garrett Callahan, or current FCS service contractor
6.2. The water treatment chemical and service supplier shall be a recognized specialist, active in the field of industrial water treatment for the last ten (10) years, whose major business is in the field of water treatment
6.3. Pipe design
6.3.1. Use Schedule 80 PVC pipe for all lines
6.3.2. Connections shall be across the heat exchanger, not the pumps
6.4. Controls:
6.4.1. System controlled by BAS
6.4.2. Conductivity sensor shall be by Burkert
6.4.3. 8222 standard transmitter, constant 1.0, Burkert part 559638
6.4.4. Display programming module, Burkert part 559168
6.4.5. Insertion tee, Burkert part 56069.2
6.4.6. Additional hardware to match standard detail for switched outlets with override, flow switch, etc., to make a functioning system
6.4.7. Provide plastic backboard for mounting chemical treatment equipment
6.5. Pumps:
6.5.1. Plug-in Walchem-type with electronic flow adjustments
6.6. Chemicals:
6.6.1. Daily Biocide - Stabilized liquid bromine (Formula 3388 for Garrett Callahan, or equal)
6.6.2. Weekly biocide - Broad spectrum, non-foaming microbiocide, Isothiazoline (Formula 315 for Garrett Callahan, or equal)
6.6.3. Inhibitor - Organic scale and corrosion inhibitor type (Formula 2010-Z for Garrett Callahan, or equal)
6.7. Coupon Rack:
6.7.1. Mild steel and copper corrosion coupons
6.8. Meters:
6.8.1. Seametrics MJR meter or equal by Carlon
6.8.2. Two meters - One for makeup, one for blowdown
6.8.3. One (1) gallon per pulse and connected to the BAS
6.8.4. Must be mounted horizontal with register facing up and kept wet
6.9. Service:
6.9.1. Contractor to provide monthly visits and chemicals through the warranty period
One coupon test during first year

DIVISION 26 ELECTRICAL SYSTEMS

SECTION 26 0000 ELECTRICAL SYSTEMS

1. Non-Revenue Grade Power Metering:
   1.1. Provide non-revenue grade power metering on interior lighting panels for new construction projects or where new lighting panels are being installed
   1.2. Connect meters to building automation system (BAS) via pulse output in order to allow remote analysis of energy use and waste. Do not use a “green” meter
   1.3. Provide sub-metering as required by ASHRAE 90.1
2. Switchgear:
   2.1. Designer to include surge protection requirements as specify by manufacturer
   2.2. Manufacturer shall provide commissioning service to ensure equipment has been installed as specified
   2.3. Switchgear power quality meter similar to a GE PQM II monitored by BAS via Modbus & pulse output. Switchgear power quality meter will also monitor neutral current
   2.4. Include 3 phase breaker for phase loss monitoring by building automation system
3. Solid Front Electrical Panels:
   3.1. Electrical panels shall be located in designated electrical or mechanical rooms or other spaces not accessible to students such as kitchens
   3.2. Electrical panels to have solid hinged fronts to provide access to wiring without completely removing the front cover – door in door type panel. This applies to both surface and flush mounted panels
   3.3. Add surge protection devices to all panels.
4. Future Expandability: Provide junction box for future irrigation controller for elementary school playfields. Locate on the outside of the building, in a location closest to the playfield. Provide conduit stub out 5’ from building.
5. Conductors and Grounding:
   5.1. Aluminum wiring shall not be used on the building side of the meter.
   5.2. Plenum-rated low-voltage cabling may be used in lieu of conduit, if cost effective. Provide hooks in hallways for low voltage cabling. Low voltage cable shall not be installed resting on ceiling tile and grid.
   5.3. Conduit shall be run in a manner that preserves service access to all adjacent equipment.
   5.4. MC cable is not acceptable for branch circuits.
   5.5. Install eight 2 ½” conduits with pull wire for power service to future portable classrooms. Provide GRS conduit where routed beneath parking lots or drives. Provide a concrete or composite pull box flush with grade with a top and bottom. The top of the box shall be permanently marked “Electric Service for Portables.” Cap all conduits inside the box for future use and seal all penetrations. Size of pull box and depth of conduit shall be per NEC. Provide conduit sleeves on opposite side of conduit penetrations for future use. Cap conduit sleeves.
   5.6. Conduit for low voltage wiring to portables is not required. We run all low voltage above ground on top of canopies.
6. Overload Devices for Motor Starters:
   6.1. Motors shall be equipped with a solid state overload protection device with an adjustable trip point rather than thermal overloads.
   6.2. Provide phase protection devices on all motor rotating equipment.
7. Power Outlets:
   7.1. Provide at least one 110 volt duplex outlet on each wall and an average of one per 8’ of wall in academic areas, student collaboration areas, and media centers. Other areas shall be code minimum spacing.
      7.1.1. Provide (2) additional 110 volt duplex outlets for classroom computer cart charging area (15 amps/cart).
   7.2. Provide (2) quad outlets at outdoor Art patios.

7.3. Additional outlets may be required for computer/project labs and technology support areas. Coordinate requirements with FCS Capital Improvements staff.
7.3.1. Provide at least one 110 volt dedicated duplex outlet for each designated computer data outlet. (One quad outlet for each pair of computer data outlets)
7.3.2. Provide minimum (3) quad outlets at Media tech area, and 2 quad outlets at METI workstation
7.4. In corridors, provide dedicated circuit for power outlets. Outlets should be no greater than 25' on center. Coordinate also with paragraph 7.1 above where student collaboration areas are in corridors.
7.5. Provide one 110 volt GFI duplex outlet adjacent to each sink counter except in student restrooms.
7.6. Provide special voltage outlets for designated equipment such as large printer/copy machines and other special equipment.
7.7. Provide pull-down power at Projects Laboratory
7.8. Outlet covers
7.8.1. Typical outlet covers to be jumbo sized ivory color.
7.8.2. Blank receptacle plate covers to be stainless steel.
7.8.3. Outlets and cover plate backed up by generator shall be red.
7.8.4. Low voltage data and telecom outlets to be blue.
7.8.5. All isolated ground outlets to be orange.
7.8.6. Floor boxes shall be brass.
7.8.6.1. Basis of design: Legrand Wiremold FloorPort Series.

8. Motion Sensors:
8.1. On new construction projects, all unoccupied spaces (i.e. supply, storage, hallways, breakrooms, etc.) shall be equipped with motion sensors that will automatically turn off the lights and place the switch in the off position when the room is unoccupied. Exclude mechanical, electrical and data closets.
8.2. Connect motion sensors to building automation system.
8.3. Review characteristics of the system and possible additional rooms to be included with FCS Capital Improvements staff for approval prior to incorporation into the construction documents.

9. Emergency Electrical System: All FCS shall be equipped with an automatic emergency electrical generation system. The system shall include, but shall not be limited to, a natural gas engine and electrical generator with vibration control, automatic engine starting system with batteries, instrument panel, weather-protective housing, annunciator panel, exhaust silencer, accessories and the frame grounded to the earth.
9.1. The system shall be sized for and be connected to the following:
9.1.1. Sanitary sewer pump stations if school is so equipped
9.1.2. Emergency lighting fixtures (battery pack lighting fixtures are not acceptable)
9.1.3. Fire alarm system
9.1.4. Intercom system
9.1.5. Telephone system
9.1.6. Intrusion detection system
9.1.7. Security camera system
9.1.8. Doors with access control
9.1.9. Building automation system main panel
9.1.10. Walk-in freezer and cooler
9.1.11. Outlets for serving line cash registers
9.1.12. MDF and IDF rack outlets
9.1.13. Emergency Responder Radio Communication System (ERRCS)
9.1.14. Elevators – (where applicable) to achieve at least one elevator access to each level.
9.2. Some of the electronic loads listed above also need to have a small UPS/surge protector to carry the electrical loads from the point of power interruption through start-up of the generator. Specifically, the intercom system, the telephone system switch, the ERRCS, and the building automation system main panel need to be served in this manner. Ensure the ERRCS battery backup meets IFC section 510.

9.2.1. Normal/emergency generator outlets shall be color coded/placarded in accordance with NEC.
9.2.2. The generator control panel shall be provided with two Modbus connection points, one to supply data to the remote annunciator (located in the front office) and one to supply data to the building automation system. The connections shall use the Modbus RTU-2 protocols. The data transmitted to the building automation system shall be the same as transmitted to the remote annunciator plus any additional data made available by the manufacturer.
9.2.3. Provide factory start-up and testing of the system including a load test. This testing shall include coordination with the building automation system and confirmation that the required data is being properly transmitted.
9.2.4. Generator will have contacts for building automation system monitoring of "alarm" and "run" signals.
9.2.5. Generator installation to include a grounding rod
9.2.6. Power to the generator shall be fed from the emergency panel
9.3. Transfer switches:
9.3.1. Transfer switches must have the ability to schedule at least a 30 minute weekly test.
9.3.2. Weekly test shall be scheduled at 8am EDT with load transfer for all transfer switches
9.4. Provide a permanent connection and hardware for a temporary generator for life safety loads to meet code in the event the generator is unable to operate
9.4.1. When generators are replaced in existing facilities, connections and hardware for temporary generator shall be added
9.5. Replacement generators shall be sized to accommodate all items noted in 9.1. Engineer shall confirm all loads are fed from the generator for replacement projects.

10. Lighting
10.1. Specify a pre-installation meeting be held by the contractors. Meeting participants to include: Owner or owner's designated representative, Commissioning Agent, and Engineer.
10.2. The interior lighting design shall minimize fixture types and incorporate standardized lamp inventory to the extent practicable. All lighting shall be LED except as noted below.
10.3. General interior lighting, including typical classrooms and labs, shall be provided by 2' x 4' recessed static lensed grid troffer LED fixtures. A safety cable should be attached to the fixture, cover reflector and lens.
10.3.1. Basis of design: Metalux Cruze 24CZ
10.4. Storage areas, mechanical and electrical rooms should have metal cage protection.
10.5. Locker rooms near showers and kitchens should have gasket type vapor proof lenses.
10.6. Electrical, mechanical, MDF rooms, IDF rooms, mechanical mezzanines, and equipment storage rooms shall have fixtures on digital timer switches.
10.6.1. Digital timer switches shall have adjustable time durations. Digital timer switches shall flash the lights and provide audible warning in advance of turning off the lights.
10.6.2. Digital timer switches for mechanical mezzanines shall be located an the bottom and at the top of all access ladders, wired in a multi-way configuration.
10.6.3. Time durations for digital timer switches shall be set for the following time durations:
10.6.3.1. Mechanical rooms: 2 hours
10.6.3.2. Electrical room: 2 hours
10.6.3.3. IDF rooms: 1 hour
10.6.3.4. MDF rooms: 1 hours
10.6.3.5. Mechanical mezzanines: 3 hours
10.6.3.6. Equipment storage room: 1 hour
10.7. The use of incandescent fixtures or dimming electronic ballasted fixtures shall be limited to special uses, such as theatrical lighting.
10.8. Media centers, cafeterias, and other spaces with ceiling heights above 12 feet shall have LED pendant fixtures.

10.9. Typical classrooms, labs, and other Instructional spaces shall have two dimmable zones: one for the teaching wall, and one for the remainder of the space.
10.9.1. Provide full lighting levels as follows: 60-70 f.c. unless noted otherwise
10.9.2. Larger spaces such as Media Center and Cafeteria may require additional zones; coordinate with FCS Capital Improvements staff
10.10. Corridor lighting levels shall be 20-30 f.c., unless noted otherwise
10.11. Stairwell lighting should be provided by wall pack fixtures at a minimum height of 12'. Lighting should be installed over landings.
10.12. Use of in-ground up-lighting of the facility is not allowed

11. Occupancy Sensors
11.1. All rooms are required to have either occupancy sensors, wall switched occupancy sensor or digital timer switches. Photocell operation in any area is not allowed.
11.2. Specify occupancy sensors operation shall be verified by the contractor to having the sensitivity time, duration, and mode of operation set. Contractor to submit written start up reports.
11.3. Wall switched occupancy/vacancy sensors:
11.3.1. All wall switch sensors shall be able to be set to operate as either an occupancy sensor or a vacancy sensor.
11.3.2. Wall switched sensors shall be provided for all closets, small storage rooms, offices 120 sq. Ft. or less in size, single toilet rooms.
11.3.3. Time durations for wall switched sensors shall be set for 15 minutes.
11.3.4. Wall switched sensors located in rooms with exterior windows shall be set to operate as vacancy sensors.
11.4. Occupancy Sensors:
11.4.1. Occupancy sensors are required for all rooms not listed in paragraph 11.3. The above list does not preclude using wall switched sensor where deemed appropriate by the design professional.
11.4.2. Occupancy sensors located above 15-foot AFF shall be specified as high-bay type suitable for elevated installation application.
11.4.3. Occupancy sensors in Gyms located below 20-foot AFF shall be specified to have metal cages over them to prevent damage.
11.4.4. Occupancy sensors for classrooms shall be ceiling-mounted to cover the door and teachers' desk
11.4.5. Wall mounted occupancy sensors shall be located to prevent triggering of the sensor by motion is adjacent spaces.
11.4.6. Time durations for occupancy sensors shall have the following time durations:
11.4.6.1. Corridors: 30 minutes
11.4.6.2. Lobbies: 30 minutes
11.4.6.3. Gang toilet rooms: 15 minutes
11.4.6.4. Classrooms: 15 minutes
11.4.6.5. Media center main areas: 30 minutes
11.4.6.6. Media center offices and auxiliary rooms: 15 minutes
11.4.6.7. Offices: 15 minutes
11.4.6.8. Cafeterias: 30 minutes
11.4.6.9. Kitchens main areas: 30 minutes
11.4.6.10. Kitchen auxiliary areas: 15 minutes
11.4.6.11. Storage / stock rooms: 15 minutes
11.4.6.12. All other areas not listed: 15 minutes

12. Gym Lighting:
12.1. Provide multi-level lighting at all gyms by means of switching.
12.1.1. Provide two lighting levels at ES gyms
12.1.2. Provide four lighting levels at MS gyms; switches shall be provided in both gym and stage area

12.1.3. Provide multi-level lighting in addition to dimming options at HS gyms
12.2. Competition gyms shall have multi-level lighting for recreational use and competition use at 80fc per athletic association requirements.
12.3. Gym lighting fixtures shall be LED type.
12.3.1. Fixtures shall be standardized for cost efficiency to the extent possible.
12.3.2. Elementary and Middle schools shall have 2x4 high bay type fixtures. High Schools shall have pendant type fixtures.
12.3.3. Gym lighting fixtures shall have guards and safety chains to prevent components from falling or damage by impact. All gym lighting fixtures shall be rated for medium duty.

13. Theatrical Lighting Systems: High school auditorium, Black Box Theaters, and broadcast video production labs shall be equipped with performance lighting which shall be incorporated into the scope of work for all new school projects.
13.1. Architects shall be responsible for employing a qualified professional lighting designer to develop appropriate design and construction documents.
13.2. Drawings and specifications shall be submitted to FCS Capital Improvements staff for review and approval.
13.3. Scope of work shall include overhead pipe grid, dimmable theatrical light fixtures, wiring and control system. Provide separate LED work light system.
13.4. High school auditorium front overhead stage lighting shall be mounted on motorized light bar that can be lowered for maintenance.
13.5. Auditoriums shall be equipped with dimmable LED house lights.
13.6. Refer to APPENDIX to DESIGN REQUIREMENTS – Theatrical Audio Visual Systems for additional information
14. Exit and Emergency Lighting:
14.1. Place all emergency lighting fixtures on the generator; battery back-up is not acceptable.
14.2. Red LED fixtures shall be utilized for exit lighting.
15. Exterior Lighting: Provide adequate exterior lighting at building parking and walkway areas (for security to employees and building). Fixtures shall be energy efficient and vandal resistant with rectangular lenses, similar to “Wal-Pak” series as manufactured by Lumark with an LED HPS lamp. Exterior fixtures shall be controlled by building automation system with local overrides.
15.1. All exterior lighting shall be controlled through the lighting contactors by the building automation system (BAS) with local override switch per zone.
15.2. Divide controls for site lighting into multiple zones (parking, canopy and building-mounted at a minimum) that can be operated independently. Submit design for zones to FCS for review and approval.
15.3. Local override shall be momentary contact button tied to building automation system.
15.4. Photocells shall not be acceptable exterior lighting controls.
15.5. Parking lot lighting design criteria:
15.5.1. Provide a pole light on the entrance from each road to provide lights for turning buses and the gate
15.5.2. Minimum light levels in parking lots to be 0.5 fc
15.5.3. Parking lot lighting shall adhere to light pollution regulations of the local municipality. Primary goal is to not negatively impact the adjacent community with excessive spill light and glare.
15.5.4. Provide adequate lighting for drop off areas
15.6. Wall pack lighting criteria:
15.6.1. Provide lighting for mechanical yard
15.6.2. Fixtures shall aim down and are dark sky complaint
15.6.3. Provide adequate wall packs to provide lighting in dark areas for security
15.7. Canopy lighting design criteria:
15.7.1. Maximum lighting level to be 30 fc

15.8. When replacing exterior light fixtures designer to match lamp temperature with remaining exterior fixtures.
15.9. Lighting contactors shall be multi-pole, down stream of the electrical panelboard.
15.10. Lighting contactors shall be electrically held with HAND-OFF-AUTO switches. Lighting contractors shall be wired to fail ON so that the lighting power circuit is energized if the contactor fails.
15.11. Separate lighting contactors shall be provided for parking lot lighting, bus canopy lighting, other canopy lighting, exterior building lighting.
15.12. Where pole lighting is specified with motion sensors, program pole lights per FCS requirements (contact FCS for specific requirements by project).

16. Sports Field Lighting: The architect shall develop complete drawings and specifications to describe sports field lighting as described in the following paragraphs.
16.1. Sports lighting shall be provided at the following fields:
16.1.1. Football/track stadium: 360’ 160’
16.1.2. Baseball field: 330’ x 380” x 330’ plus batting cage area
16.1.3. Softball field: 200’ x 200’ x 200’ plus batting cage area
16.1.4. Environmental light control:
16.1.4.1. Primary goal is to not negatively impact the adjacent community with excessive spill light and glare.
16.1.4.2. Provide maximum spill and glare control. The specifications shall require a photometric report from an independent or certified testing lab certifying that the luminous intensity from any one fixture does not exceed the following criteria:
16.1.4.3. Football/track stadium: 7,500 candela at 150’ radius surrounding the illuminated area
16.1.4.4. Baseball field: 7,500 candela at 150’ radius surrounding the illuminated area
16.1.4.5. Softball field: 7,500 candela at 150’ radius surrounding the illuminated area
16.1.4.6. Multisport Athletic Field: 7,500 candela at 150’ radius surrounding the illuminated area
16.2. Life Cycle Cost:
16.2.1. The preferred lighting system shall be energy efficient and cost effective to operate.
16.2.1.1. LED luminaries shall be DLC-Certified and compliant with minimum requirement of 105 lumens produced per watt of energy consumed
16.2.1.2. Minimum color temperature of 5700K and a Color Rendering Index of 75
16.2.2. Include all maintenance (parts and labor) for 25 years. Architect to coordinate details of FCS requirements for remote controls and incorporate those requirements into the specifications.
16.2.3. Architect to coordinate details of FCS requirements for remote controls and incorporate those requirements into the specifications.
16.2.3.1. Remote On/Off and Scheduling Control: Owner and users log in with usernames/passwords via smart device app, lighting manufacturer website, or 24/7 manufacturer-staffed support
16.2.3.2. Remote Monitoring: System shall monitor lighting performance and notify manufacturer if individual luminaire outage is detected so that appropriate maintenance can be scheduled
16.3. Lighting Design:
16.3.1. Selection of appropriate light levels impact the safety of the players and the enjoyment of spectators. Therefore, the lighting system shall be designed such that the light levels are guaranteed for a period of 25 years.
16.3.2. Football/track stadium: 50 footcandles
16.3.3. Soccer/Lacrosse Field: 50 footcandles
16.3.4. Baseball field (infield): 50 footcandles
16.3.5. Baseball field (outfield): 30 footcandles
16.3.6. Softball field (infield): 50 footcandles
16.3.7. Softball field (outfield): 30 footcandles

16.3.8. Targeted Up-Light – Aerial Sports: Provide specific fixtures mounted approximately 15’-30’ AGL to provide targeted illumination onto the underside of the ball

16.3.9. Architect shall develop detailed specifications for measuring the uniformity of these basic standards.

16.4. Basis of design: Musco’s Light-Structure TLC for LED. All substitutions must provide a complete submittal package at least 10 days prior to bid. Provide special manufacturing if necessary to meet specifications based on the Musco standards.

16.5. Lighting system must be designed to comply with current applicable IBC and minimum 110 mph wind speed. Crossarms shall be designed to withstand minimum 150 mph winds and maintain luminaire aiming alignment.

16.6. All components shall be designed as a system and shall include, but not be limited to:

16.6.1. Galvanized steel poles with climbing steps and safety harness

16.6.2. Pre-cast concrete foundation with concrete backfill or concrete anchor bolt type foundation

16.6.3. Exposed steel minimum 18” above grade

16.6.4. Direct buried steel poles will not be permitted.

16.6.5. Concrete or other single piece poles requiring use of heavy equipment that may damage the site will not be permitted

16.6.6. All exposed components shall be designed of appropriate corrosion resistant materials.

16.6.7. Die-cast aluminum housing for luminaire reflector system

16.6.8. Remote drivers, surge protection, fusing, safety disconnects, and all associated components for luminaries shall be located in an aluminum enclosure on each pole approximately 10’ above grade

16.6.9. Wire harness system designed for trouble-free installation

16.6.10. Lightning protection

16.6.11. UL listed components

16.6.12. Controls Equipment

16.6.12.1. NEMA Type 4 aluminum cabinet(s) containing electrically-held contactors hardwired into the electrical panel and communicating with pole-mounted LED drivers by means of powerline communication via the underground conductors feeding each light pole

16.6.13. Specifications shall describe an appropriate standard for measuring compliance of the installed system and requirements for correcting non-compliance.

17. Light Level Requirements – Where light levels are not specified for spaces, latest design standards from the Illuminating Engineering Society of North America (IESNA) should be used.

18. Emergency Responder Radio Communication System (ERRCS)

18.1. Facility will be evaluated for ERRCS need during construction. Specifications for system to be included in design documents. System shall conform to IFC 510.

18.2. ERRCS shall be to emergency power

18.3. Preference is for non-proprietary system for ease of repair and annual testing

19. Room names and numbers shall match the Architectural drawings on all electrical floor plans.

20. Provide shunt trip breakers for emergency boiler shutdown system

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DIVISION 27 COMMUNICATIONS

SECTION 27 1000 STRUCTURED CABLING

1. Data Cabling System: Provide Data Cabling System for computer network and equipment in accordance with the current Fulton County School's Technology Plan. See APPENDIX to DESIGN REQUIREMENTS – Data Cabling System.

SECTION 27 2000 DATA COMMUNICATIONS

1. Provide Wireless Access Points as indicated:
   1.1. Classrooms/labs – 1 per room
   1.2. Dividable classroom – 1 per individual area
   1.3. Special Education classroom/resource room – 1 per room
   1.4. CTAE labs – 1 per lab (or as required for coverage at Extra Large labs)
   1.5. Art lab – 1 per lab
   1.6. Blackbox theater / Drama lab – 1 per lab
   1.7. Music lab – 1 per lab (or as required for coverage at HS spaces)
   1.8. Gymnasiums – as required for coverage
   1.9. HS Auditorium – 2 along each side of auditorium, 1 in control room, plus 1 in auditorium lobby (5 total)
   1.10. Stage – 1 per stage (located in auditorium, gym, or cafeteria)
   1.11. Media Center – as required for coverage
   1.12. Team resource/workrooms – as required for coverage
   1.13. Conference rooms – 1 per room
   1.14. Counseling suite – as required for coverage
   1.15. Administrative suite – as required for coverage
   1.16. Offices – only if required for coverage
   1.17. Kitchen – 1 at Manager's office
   1.18. Dining – as required for coverage
   1.19. Main Mechanical Room – 1 per room
   1.20. Lobby & Corridors – only if specifically required
   1.21. Portables – 1 per portable
   1.22. Bus canopy – 1 per area
   1.23. Athletics – 1 per press box, 1 per concessions building

SECTION 27 3000 VOICE COMMUNICATIONS

1. Provide analog copper cable for emergency phones, elevators, and fire/security systems. See APPENDIX to DESIGN REQUIREMENTS – Data Cabling System.

SECTION 27 5116 PUBLIC ADDRESS SYSTEMS

1. Proprietary Product: Proprietary Product and Installation of Public Address Systems: Rauland Equipment with specifically approved accessories designed as a complete system furnished, and installed by SWC, Inc.
2. Sound systems shall be incorporated into the scope of work for all new school projects.
3. Provide public address systems at the following locations:
   3.1. Cafeterias (ES, MS and HS)
   3.2. Gymnasiums (ES, MS and HS)
   3.3. Auditoriums (HS)
   3.4. Drama Labs (HS)

3.5. Football Stadiums (HS)

4. Architects shall be responsible for employing qualified professionals to design and develop construction documents for public address systems.
5. Design of public address systems shall be appropriate for the acoustical conditions and volume of each space.
6. Drawings and Specifications shall be submitted to FCS Capital Improvements staff prior to incorporation into the contract documents.
7. Features and functions shall include:
   7.1. Solid state in-wall type amplifier
   7.2. Built-in speakers
   7.3. Microphones designed especially for music pickup, recording and excellent speech reproduction
   7.4. Remote microphone outlets appropriate for the type of space
   7.5. Auxiliary input for future program sources
   7.6. Input for school wide intercom program and system announcements
   7.7. Fire alarm override if required

SECTION 27 5123 INTERCOMMUNICATION SYSTEMS

1. Proprietary Product: Proprietary Product and Installation of central Control Center: Rauland Telecenter U digital Hybrid or IP intercommunication System, furnished and installed by SWC, Inc. Intercom system will include a master clock to control bells.

   1.2 New Facility – Rauland TCU IP Intercom System

   1.2.1 Provide Rauland TCU IP Intercom, classroom IP modules, call buttons, speaker assemblies, and cabling to the new or renovated classroom. Abandon any copper between outlying buildings or portable classrooms. Furthermore, utilize the data network fiber between buildings and upgrade the speakers and call buttons to Fulton County Schools design standards.

   1.2.2 SWC will provide drawings and specifications per FCS standards for the design team review.

   1.3 Renovations/Additions – Rauland TCU Hybrid Intercom at existing facility, with TCU IP Intercom in newly renovated buildings, additions, and outlying buildings or portable classrooms

   1.3.1 Provide Rauland Hybrid Gateways, classroom IP modules, call buttons, speaker assemblies, and cabling to the new or renovated classroom. Abandon any copper between outlying buildings or portable classrooms. Furthermore, utilize the data network fiber between buildings and upgrade the speakers and call buttons to Fulton County Schools design standards. Provide a post-test of the existing cabling, speakers and upgrade the classroom call button in the areas of the school with no construction and reuse or replacement as applicable.

   1.3.2 SWC will provide a site survey in CAD format showing all of the locations of field devices (speaker assemblies, call buttons, horns, and sound systems) for the existing school facilities. The survey will identify any outlying buildings (field house, portable classroom, etc.), and identify any copper cabling between the buildings to reduce potential lighting damage. SWC will Provide a pretest of the existing Rauland system and identify any damaged cabling or any non-operational field devices on the survey. The new design will incorporate the TeleCenter remote field device with local gateways and the IP module in the nearest IDF located within the isolated structure and renovated or additional classrooms.

   1.3.3 SWC will provide drawings and specifications per FCS standards for the design team review.

   1.4 Existing Intercom System Upgrade – Rauland TCU Hybrid Intercom at existing facility, with TCU IP Intercom in newly renovated buildings, additions, and outlying buildings or portable classrooms

   1.4.1 Provide new switching stations and controller modules. Call buttons within all classrooms shall be replaced with Rauland TeleCenter model TCC2211PB. The data contractor shall provide data cabling from the existing intercom headend to the nearest MDF/IDF room. The existing Rauland Intercom rack shall house the TCU Hybrid system and reinstall the existing equipment rack. All existing or new exterior speaker assemblies or horns will be in a separate zone for paging. Abandon

any copper between outlying buildings or portable classrooms. Furthermore, utilize the data network fiber between buildings and upgrade the speakers and call buttons to Fulton County Schools design standards.

1.4.2 SWC will provide a site survey in CAD format showing all of the locations of field devices (speaker assemblies, call buttons, horns, and sound systems) for the existing school facilities. The survey will identify any outlying buildings (field house, portable classroom, etc.), and identify any copper cabling between the buildings to reduce potential lighting damage. SWC will Provide a pretest of the existing Rauland system and identify any damaged cabling or any non-operational field devices on the survey. The new design will incorporate the TeleCenter remote field device with local gateways and the IP module in the nearest IDF located within the isolated structure and renovated or additional classrooms.

1.4.3 SWC will provide drawings and specifications per FCS standards for the design team review.

2 The design team shall provide CAD drawings of the new facility or renovated areas of existing facilities to SWC in order for the testing and intercom design process to begin.

3 The New TeleCenter U system shall integrate the intercommunications system to the school district's software located at the district data center. The contractor shall furnish and install all controls. Remove the existing Rauland analog intercom headend and return it to the Fulton County Schools maintenance department. The system shall be provided and installed by SWC.

4 Provide intercom call-back system with master station in administrative office and call stations in each normally occupied space. Design professional to submit detailed catalog information to FCS for approval.

5 Sound systems shall be integrated so that only in the event of an announcement or alert the sound system will be muted and the announcement or alert will be played over the sound systems.

6 If required by FCS, telephone contractor shall provide integration between the existing district-wide telephone VoIP and Rauland TCU System SIP trunk connection from the SIP server. Each school can use its own set of SIP phone extensions.

7 See APPENDIX to DESIGN REQUIREMENTS – Intercommunications Equipment, for proprietary specifications. All equipment shall be Rauland equipment (NO EXCEPTIONS) as furnished and installed by SWC, Inc.

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DIVISION 28 ELECTRONIC SAFETY AND SECURITY

SECTION 28 1005 ELECTRONIC ACCESS CONTROL

1. Front Entrance Video Intercom
   - 1.1. Provide complete Video/Intercom system described herein. The Video/Intercom system shall serve as a communication system to support the security surveillance system.
   - 1.2. Scope: Provide the following network based communication system:
     - 1.2.1. AXIS 8105E Network Video Door Station and A9801 Relay Box.
     - 1.2.2. Avigilon VMS Client loaded on a Dell Optiplex 7440 all-in-one PC
     - 1.2.3. Shortel Voice-over-IP / SIP enabled phones
   - 1.3. Components:
     - 1.3.1. Viewing and Audio Station:
       - 1.3.1.1. The Shortel IP Desktop Phone shall provide two-way audio and remote release of door
       - 1.3.1.2. The Avigilon client software installed on a Dell Optiplex 7440 all0in-one PC shall provide video that is streamed from the AXIS 8105E Door Station
     - 1.3.2. Door Stations:
       - 1.3.2.1. Vandal Resistant Video Door Station – Surface mount
         - 1.3.2.1.1. AXIS A8105 Video/Intercom Door Station
       - 1.3.2.2. Black box/Enclosure
         - 1.3.2.2.1. Included as part of base unit
       - 1.3.2.3. Programmable Relay Adapter:
         - 1.3.2.3.1. AXIS A9801 Relay Box
   - 1.4. Ethernet Cable: GC is responsible for concealing the cable in conduit in the slab, walls and or plenum.
   - 1.5. Communication Outlet: The GC is not responsible for the communication outlet. If an outlet is not available or accessible within 20', GC must notify FCS, make notation on the closeout documents; and set-up the system in a temporary location in order to demonstrate connectivity and functionality.
   - 1.6. Training Scope: GC shall provide instruction and training for End-User personnel at each school as required for operation of the IP video Intercom system.
     - 1.6.1. Answering call from the door station
     - 1.6.2. Perform door release activation
     - 1.6.3. Manage zoom/wide, pan and tilt functionality
     - 1.6.4. Adjust images
     - 1.6.5. Room-to-room communication with a master monitor station
     - 1.6.6. Entrance monitoring
     - 1.6.7. Sensor detection from connected equipment
     - 1.6.8. Option output from IP video intercom adaptor
     - 1.6.9. Balloon notification
     - 1.6.10. Recording
       - 1.6.10.1. Recording and playback
       - 1.6.10.2. Automatic image recording
       - 1.6.10.3. Automatic video recording
       - 1.6.10.4. Manual image recording
       - 1.6.10.5. Manual video recording
2. Exterior card key access
   - 2.1. Provide card key access to the following exterior doors:
     - 2.1.1. Front entrance
     - 2.1.2. Kitchen delivery entrance

2.1.3. Bus canopy entrance
2.1.4. Other locations as designated by FCS Capital Improvements staff
2.2. At new facilities prep all exterior doors for future card key functionality, including conduit for power and data, as well as doorframes

SECTION 28 2000 VIDEO SURVEILLANCE

1. Design professional for the security surveillance system shall coordinate design of the security camera system with the FCS Capital Improvements staff. See APPENDIX to DESIGN REQUIREMENTS – Security Surveillance Systems Standards.

SECTION 28 3100 INTRUSION DETECTION

Intrusion detection system shall be included in the building contract for new schools and as required in renovation projects.

1. Design professional for the intrusion detection system shall coordinate the design with the FCS Director of Maintenance Services.
2. The Intrusion Detection System will consist of an UL Listed alarm control panel, control keypad, motion detectors, field device power supplies and all associated cable. The control panel shall include communication devices to allow transmission of alarm signals to UL Listed Central Station.
3. The Intrusion Detection System shall serve as the digital dialer for the building's Fire Alarm System (provided by others). One voice grade copper phone line and one cellular dialer.
4. The Intrusion Detection alarm control panel shall be interfaced with the Building Automation System such that the Intrusion Detection System status is provided and monitored by the Building Automation System. Intrusion Detection System status: ARMED, and ALARM ACTIVATION shall be monitored by the Building Automation System. Status shall be through isolated relays that are independent from the main security panel.
5. FCS has standardized on the Honeywell VISTA V128FBP Burglar/Fire Alarm Control Panel. It is the only approved alarm control panel for Fulton County School projects. The Alarm Control Panel shall be provided with the following:
   5.1. "RED" wall mounted, metal enclosure with hinged, lockable door
   5.2. The alarm control panel shall be equipped with a 5140 DLM dual phone line communication kit and on board digital dialer.
   5.3. The alarm control panel shall provide 8 hard-wired zones and be expandable to 128 unique inputs. A combination of hardwired, looped and wireless may be utilized. All wireless transponders must have constant supervision (constantly poled for communication failure and battery status).
   5.4. The alarm control panel shall be powered by a dedicated 120 VAC/20 amp emergency power circuit.
   5.5. Local sounders or sirens, surge protection, battery back-up for the panel and all field devices as well as non-volatile memory for retaining of programming in the event of catastrophic power failure.
   5.6. Alarm control panel shall allow for the programming of unique User codes for arming and disarming. Each User shall be provided with a unique code that is transmitted and saved (for report purposes) by the Central Station.
   5.7. Include alarm control keypads, Model #6160 CR2 ("RED" and wall mounted) as follows:
      ES – Two (2) - Front office, kitchen delivery door
      MS – Two (2) - Front office, kitchen delivery door
      HS – Four (4) minimum - Front office, kitchen delivery door, separate buildings, and other locations as determined by FCS
   5.8. Separate/auxiliary buildings shall have a dedicated keypad and a separate zone
6. Dual technology motion detectors shall be provided to monitor corridors with entrances/exits on grade level, all classrooms with windows at grade level, all stairwell exit vestibules, front lobby/main entrances, Cafeterias with windows at grade level and Gymnasiums (with emergency exit doors on grade level and Loading Dock corridors.

6.1. In corridors, stairwell vestibules, front lobby/main entrances, cafeterias, gymnasiums and loading dock corridors, the Honeywell DT-907 long range and Honeywell DT-7435 short range detectors shall be deployed.
6.2. In classrooms, the GE Security AP669 ceiling mounted, 360 degree motion detector shall be deployed.
6.3. All field devices shall be powered by strategically located field device power supplies, Altronix Model # SMP3 with battery back-up.

7. A 100% device by device test must be conducted by the vendor under the supervision of an FCS representative prior to acceptance of the system. Letter of Acceptance will be issued by the FCS representative after all punch list items have been completed.

SECTION 28 4600 FIRE ALARM SYSTEM

Provide fully addressable digital fire alarm system complying with NFPA requirements.

1. Fire alarm systems shall be addressable alarm systems as manufactured by G.E. Edwards EST4, Notifier NSF2-3030, or Honeywell (FCI) E3 Series. (No exceptions).
   1.1. No proprietary tools or equipment shall be required to service the installed system.
2. All new fire alarm systems or subsystems must be tested and certified prior to occupancy in accordance with FCS Testing and Commissioning procedures. These tests include a device-by-device certification of ALL devices. This is a 100% device test.
3. Fire Alarm cabling shall be plenum rated with red tint.
4. Provide surge protection on all cabling upon entry and exits to building.
5. No existing fire alarm equipment or devices of any type may be reused in a new system installation. Conduit may be reused. Wiring between duct detectors and HVAC units may be re-used.
   5.1. Full demolition of existing duct detectors includes patching duct openings with sheet metal plates screwed and sealed to the ductwork
6. Provide a (3) loop system minimum. Proposed number of loops shall be submitted for review and approval to FCS Capital Improvements staff.
7. Communication to remote buildings shall be fiber optic.
8. Duct smoke detectors shall be furnished with separate, isolated programmable relays that are programmed for local shutdown on duct smoke detector alarm condition and trigger the fire alarm panel alarm status relay monitored by ALC. And shall provide global shutdown based upon the relay status. The contractor is required to coordinate global shutdown though ALC. The duct smoke detectors shall be programmed for alarm with latching until the alarm is reset, not supervisory.
9. Duct smoke detectors shall be furnished with integral magnetic test switches and remote test switches (keyed or magnetic). Remote switches shall be mounted in the ceiling. Where the ceiling height exceed 10 foot, the remote test switched shall be wall mounted at an elevation of 10 foot
10. The fire alarm panel shall have 2 isolated programmable relays for ALC monitoring: alarm relays and trouble relays. Alarm relay shall not return to normal if alarm is silenced but still in alarm. Trouble relay shall close for all troubles and ground faults. Relays shall be independent from alarm panel.
11. All new fire alarm systems shall be connected to the emergency generator per FCS Design Requirements section 26 0000, paragraph 9.1.3. Run time of 30 minutes is required per NFPA.
12. The fire alarm system shall dial out through Intrusion Detection System.
13. The Design professional shall include requirement for unit prices to be included in the bid for additional devices such as: strobes, smoke detectors, heat detectors, and duct detectors. Unit prices shall include all labor and material to provide newly installed devices.
14. Designer shall review with FCS what areas of the facility shall receive voice evacuation in lieu of horns
15. Carbon monoxide sensors should only be included on approval by FCS
16. Boiler shutdown

16.1. Program fire alarm as follows: Open relay upon CO exceeding 50 ppm, close relay to shunt boilers, operated dedicated strobe in room with CO sensor, and put fire alarm in trouble mode. Coordinate with section 23 0000, Boilers.

16.2. Provide warning sign near strobe that indicates “Call Maintenance if Flashing”

17. Magnetic door holds shall stay de-energized when the fire alarm panel has been silenced, but is still in alarm
18. Construction Documents shall include a table documenting the system input and output. Refer to the APPENDIX to DESIGN REQUIREMENTS – Fire Alarm Input/Output Matrix
19. Construction Documents shall include a table documenting each fire alarm device, and the number that are existing, replaced, removed, new, and the final count.
20. Design professional is required to review the existing MITEC report and add a requirement for the contractor to review and update the report when new devices are added. The revised MITEC report shall be part of the project closeout documents.
21. All new fire alarm systems shall be reprogrammed prior to commissioning to match devices in the revised MITEC report. The new device codes and zone addresses are required to match for each device.

DIVISION 31 EARTHWORK

The design professional is expected to consult with the FCS Project Geotechnical Engineering Consultant throughout the design phase and/or incorporate information contained in the Geotechnical Report (if applicable) into the plans and specifications.

SECTION 31 1000 CLEARING

1. Demolition:
   - 1.1. Selective and mass demolition shall be coordinated with FCS. Include language within plans and specifications that provide FCS with the right to salvage any materials on site.
   - 1.2. Any items that are abandoned (i.e., storm lines, utility lines, utility poles, etc.) shall be reviews with FCS and the site design professional shall coordinate the necessary removal. FCS's preference is for abandoned items to be removed, however exceptions may apply.
2. Clearing:
   - 2.1. Require contractor to clear all areas to be graded of debris and extraneous materials.
   - 2.2. Clearing consists of the removal from the general construction areas and proper disposal of all trees, brush, stumps, logs, grass, weeds, roots, decayed vegetable matter, refuse dumps, and all other objectionable matter resting on the original ground surface or appearing or being placed on these areas at any time before final acceptance of the work, except as provided for elsewhere.
   - 2.3. Clearing also includes the removal and proper disposal of any obstructions not to be salvaged, such as fences and poles, and incidental structures within the construction area which might interfere with construction.
   - 2.4. No burial shall be allowed on site.
3. Grubbing:
   - 3.1. Grubbing shall include the removal and proper disposal of all stumps, roots, and other vegetation or perishable matter that exists below the original ground surface. All sound, unsound or decayed stumps shall be removed to a depth of 2' below the original ground.

SECTION 31 2200 EARTHWORK/GRADING

1. Site Design:
   - 1.1. The design professional shall develop a site grading plan for the facility which provides for a balanced site (if possible).
   - 1.2. In the event that a balanced site is not possible, the design professional shall clearly indicate within the plans and specifications that the contractor is responsible for meeting the grades indicated, and that any haul off or haul in shall be at the contractor's expense.
     - 1.2.1. If the site does not balance and there is excess cut material, FCS's preference is for excess material to be spread on site as directed by the design professional and FCS representative (coordinate who this is with FCS). Excess material that cannot be spread on site shall be hauled off site. Plans and specifications shall stipulate that hauling and disposal of excess cut material shall be performed at no additional cost to the owner.
     - 1.2.2. Satisfactory Soil Materials are defined as those complying with ASTM D2487 soil classification groups GW, GP, GM, SW and SP or as identified in the site specific Geotechnical report.
     - 1.2.3. Unsatisfactory Soil Materials are defined as those complying with ASTM D2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT or as identified in the site specific Geotechnical report.
2. Grading:

2.1. Plans and specifications shall require the contractor to provide moisture control as indicated in the site specific Geotechnical Report.

3. Earth Excavation:
   3.1. Clearly indicate in specifications that earth excavation shall consist of all material found below the surface of the ground except active utilities and rock.
4. Rock Excavation:
   4.1. Clearly define within the specifications what shall be considered as rock (both mass and trench rock). Coordinate this with the site specific Geotechnical Report.
   4.2. Clearly define within the specifications how payment for rock removal shall be handled.
   4.3. Clearly define within the specifications what happens with rock that is removed. Coordinate this with FCS.
   4.4. Define rock limit payment lines.
5. Controlled Structural Fill:
   5.1. Clearly define within the specifications the soil classifications that will be considered as appropriate structural fill. Coordinate this with the site specific Geotechnical Report.
6. General Area Fill:
   6.1. Clearly define within the specifications the soil classifications that will be considered as appropriate general area fill. Coordinate this with the site specific Geotechnical Report.
7. Testing of Fill:
   7.1. Identify the type and frequency of testing that shall be provided.
   7.2. Provide a recommendation to FCS as to the level of service that is required by the geotechnical testing agency so that FCS can secure the appropriate services.

DIVISION 32 EXTERIOR IMPROVEMENTS

SECTION 32 0100 OPERATION AND MAINTENANCE OF EXTERIOR IMPROVEMENTS

1. Site Design:
   1.1. The design professional shall develop a master plan for the facility which provides for the programmed needs defined by FCS including considerations for future expansion to the core capacity. Coordinate with FCS the possibility of future building additions and account for this expansion in the stormwater management design.
      1.1.1. For new facilities and major renovations, design professional should account for 1 additional acre of future development in the stormwater management design.
      1.1.2. For small additions and renovations, coordinate the amount of future development with FCS.
   1.2. In addition, classroom areas should be configured so as to allow for expansion with a minimum amount of alteration of the original structure or site.
2. Future Portable Classrooms: Site design shall include pre-planned level areas for the future location of portable classroom units. Design of the stormwater management system shall account for the following number of portable classrooms.
   2.1. Elementary: 6 portable duplex classroom units (12 classrooms)
   2.2. Middle: 6 portable duplex classroom units (12 classrooms)
   2.3. High: 12 portable duplex classroom units (24 classrooms)
   2.4. Portable areas shall be adjacent to classroom wings if site constraints and conditions permit. Coordinate portable location with future building expansion areas to avoid relocation of portables when the building is expanded.
   2.5. Each portable is 1,750 sf in area, 28’ wide and 64’ long (double wide portable).
   2.6. Portables should be located as close to the school building as permitted by code. The design professional shall verify separation requirements with the permitting authority and with FCS Facility Services Department during the preliminary design phase of each school.
   2.7. Portables are typically located a minimum of 17’ apart (face to face) to accommodate required stairs, ramps and sidewalks.
   2.8. Portables should be located so that access for removal can occur without the need to drive across play fields, landscape areas, irrigation systems, etc.
   2.9. Building service utilities (electrical, gas, water) shall not be located under the footprint of future portable locations.
   2.10. Avoid locating site drainage lines and inlet structures under and within portable building sites.
   2.11. A fire hydrant must be located within 400’ of all portable classroom building sites.
   2.12. Area that is designated for portables shall be improved to support 2,000 PSF minimum.
   2.13. Design of the site shall identify an area(s) for placement of portable classroom units without impacting parking, play fields and other required amenities.
   2.14. Provide a dedicated electrical supply (150 amp per classroom) in the nearest electrical panel for the first 8 classrooms. Refer to Division 26–Electrical for additional information.
3. Site Vehicular Circulation:
   3.1. Site shall be designed with 2 vehicular entrances in and out, preferably from two separate streets.
   3.2. Site traffic circulation shall be designed with separate car and bus traffic routes that should not conflict.
   3.3. Provide direct access to service area from bus loop or other main site circulation driveway.
   3.4. Layout shall not require driving service vehicles through parking lots to access the service areas.
   3.5. Provide walkway access from adjacent streets, parking, bus loading and sports facilities.

3.6. Walkways at high traffic areas shall be sized and located to avoid trampling of adjacent lawns and landscaping especially at building entrances and at heavily traveled routes to play areas. Coordinate locations and sizes of walks with FCS.
3.7. Provide gates or bollards to restrict vehicular access onto entrance and other major walkways.
3.8. Review specific requirements for traffic gates with FCS. Consider gates at drives leading to athletic areas, bus parking, marching band practice areas and entrances.
3.9. Design professional shall prepare an AutoTurn (or equivalent) simulation for the vehicular circulation within the site. Simulation shall be shared with FCS.

4. Automobile Parking and Student Drop-off/Pick-up:
4.1. Site plan shall provide auto parking:
4.1.1. ES = Approximately three parking spaces per instructional unit, plus handicapped-accessible spaces per code.
4.1.2. MS = Approximately three parking spaces per instructional unit, plus handicapped-accessible spaces per code.
4.1.3. HS = Approximately 6.6 parking spaces per instructional unit, plus handicapped-accessible spaces per code. (Where space permits, provide an area without intermediate curbs within the paved parking area for marching band practice approximately the size of a football field.
4.2. Provide a designated separate auto drive and drop-off/pick-up area with appropriate stacking space for waiting cars.
4.3. Consider using speed humps at auto drives to reduce speeding. Table top speed humps preferred at crosswalks. Review location of proposed speed humps which may impact bus traffic with FCS Capital Improvements staff.
4.4. Provide separate parking lots for students and staff at high schools. Designer to coordinate the need for reserved parking with school administration. Reserved parking is part of the overall parking need as established in Section 4.1.

5. School Bus parking, drives and Loading/Unloading Areas:
5.1. Provide separate covered main bus and covered handicapped-accessible special education bus loading-unloading areas adjacent to school buildings.
5.2. Access to and from special education bus area shall be approximately level without extensive ramps or lifts.
5.3. Provide curbside bus loading-unloading adjacent to high school stadiums with appropriate turning radius and grades.
5.4. Paint auto parking overlay at bus staging area for additional activity parking.
5.5. Bus parking and driveway layout, including turn radius and grades for bus drives shall be reviewed and approved by FCS Executive Director of Transportation.
5.5.1. Inside radius on bus drives shall be 50’-0” minimum when feasible
5.5.2. Bus drives shall be 30’-0” minimum for two-way traffic

6. Loading Docks:
6.1. Provide standard height raised loading dock at high schools adjacent to kitchen and general storage/receiving area.
6.2. Provide 6” curb at elementary and middle school loading areas adjacent to kitchen and general storage/receiving area with 36” curb cut and ramp to grade. Provide concrete between receiving door and curb.
6.3. See Division 27–COMMUNICATIONS for delivery doorbell requirements at receiving areas.

7. Dumpster Pads:
7.1. Concrete pads for dumpsters shall be provided as follows:
7.1.1. ES - Two (1 garbage and 1 for recycling)
7.1.2. MS - Three (2 garbage and 1 recycling)
7.1.3. HS - Three but they can be left by the loading dock. (2 garbage and 1 recycling)

7.2. Provide heavy duty reinforced (steel or fiber) concrete paving at the dumpster pad area to resist wear from garbage truck turning their wheels to maneuver for dumpster pick up. The extents of the heavy duty reinforced concrete paving shall be coordinated with FCS.
7.3. Dumpster area shall be visually shielded.
7.4. Dumpster area shall to be easily accessible by sidewalk so that custodial carts can be used to transport trash to the dumpster.
7.5. Dumpster pad(s) shall be tied to the sanitary sewer system per local issuing authority codes. Dumpster pad shall be raised to prevent stormwater runoff from areas other than the dumpster pad surface to drain to dumpster pad drain.
7.6. The top of the dumpster shall be accessible. The dumpster location shall be adjacent to a loading area or dock so that trash can be thrown into the top of the dumpster. Where the dumpster is not adjacent to a loading dock, a ramp to the back or sides of the dumpsters shall to be provided.
7.7. FCS intends to pursue using compactors in the future. New school designs shall identify an appropriate location for a future compactor.
7.8. Review space required for dumpsters, and space/power requirements for future compactor with FCS Capital Improvements staff.

8. Site Signage:
8.1. Site signage shall be coordinated with Division 10 – SPECIALTIES. Evaluation and coordination with FCS Capital Improvements staff shall be required on a case by case basis.

SECTION 32 1000 PAVING AND SURFACING

1. Asphalt paving shall be used in all parking and driveway areas.
2. All asphalt paving for elementary and middle schools shall be heavy-duty.
3. For high schools, all asphalt travel lanes (including lane through parking lots) shall be heavy-duty. The parking stalls should be medium-duty.
4. Concrete paving with steel reinforcing shall be used at truck loading areas and dumpster pads. Coordinate paving section with site specific geotechnical report.
5. Sidewalks and plazas shall be steel or fiber reinforced concrete. Unless required for surface permeability, avoid the use of brick pavers for sidewalks and plazas.
6. Elementary school play courts shall be concrete. Provide black vinyl coated chain link around play court if court is not used for fire truck turn around. Coordinate location and height of fencing with FCS.
7. Middle school play courts (tennis and basketball) can be asphalt or concrete. Design professional shall coordinate play court paving with FCS. Provide black vinyl coated chain link around play court if court is not used for fire truck turn around. Coordinate location and height of fencing with FCS.
8. Asphalt and GAB thicknesses shall be standardized and so illustrated in paving cross-sections. Coordinate paving section with site specific Geotechnical Report.
8.1. Heavy Duty Asphalt: 8” G.A.B., 3” binder, 2” top course.
8.2. Medium Duty Asphalt: 6” G.A.B., 3” binder, 2” top course.
9. Final asphalt topping course shall be in place before bus run through.
10. Plans and specifications shall require a 15 year warranty on all asphalt paving.
11. Provide direct access to service area from bus loop or other main site circulation driveway.
12. Driving service vehicles through parking lots to access the service area should be avoided.
13. Asphalt striping shall be white. Thermoplastic painting should only be identified if required within the R.O.W.
14. Plans and specifications shall delineate that fire curbs be painted red.

SECTION 32 1800 ATHLETIC AND RECREATIONAL SURFACING

1. High School Stadium Track and Field: high school track and field shall have layouts in accordance with competition standards of the Georgia High School Association and the National Federation of State High School Associations. Each field shall include the following:

1.1. Orientation with long dimension north and south
1.2. Provide areas for field events including paved areas for high jump and long jump with sand pit.
1.3. Synthetic turf playing field
1.4. Polyurethane surfacing system running track (8 Lanes)
1.5. Paved areas for high jump and long jump with sand pit
1.6. See Division 11–EQUIPMENT for Athletic Equipment
1.7. Field Lighting - See Division 26–ELECTRICAL for Sports Field Lighting

2. Synthetic Turf System:
   2.1. All high school stadiums will have a synthetic turf system.
      2.1.1. Basis of Design: Field Turf Revolution 360
   2.2. Base system will include single letter logo at midfield; school name in one end zone and mascot name in the other; single letter color; and striping and markings for football (white), soccer (yellow) – reference marks only the six yard end boxes, men's and women's lacrosse (red) – reference marks only.
3. High School Track Surfacing:
   3.1. High school tracks shall be a dual-durometer polyurethane sandwich product. Basis of design: Beynon Sports Surfaces BSS 300. The polyurethane finish coat shall be red in color with line striping and event markings in accordance with current National Federation of State High School Associations standards and guidelines. Provide 8 track lanes where space permits.
4. Middle School Track and Field: Middle school track and field areas shall be constructed to appropriate grading and grassing standards but are not required to meet competition standards of the Georgia High School Association and the national Federation of State High School Associations. Each track and field shall include the following:
   4.1. Irrigated grass field inside running track
   4.2. Slope field to storm drains within field
   4.3. Asphalt running track with painted lanes
   4.4. 400 meter track with 6 lanes where space permits
   4.5. 300 meter track with 5 lanes where space is limited
   4.6. Paved ADA assess from building
   4.7. Paved areas for high jump and long jump with sand pit
      4.7.1. See Division–11 EQUIPMENT for Athletic Equipment
5. High School Baseball Field: High school baseball field shall have layout in accordance with competition standards of the Georgia High School Association and the national Federation of State High School Associations. Field shall include the following:
   5.1. Orientation with home plate at southwest and second base at northeast if feasible
   5.2. Field size: 330' long at R/L foul lines x 380' deep at center of outfield
   5.3. Outfield and Diamond of natural grass turf with irrigation system
   5.4. Warning track around the entire field
   5.5. Infield playing surface with appropriate infield mix
   5.6. Pitching mound raised 10" with pitching rubber
   5.7. Fencing 10' high with windscreen (with proper wind rated ties and air flaps). Specify top, center and bottom pipe rails.
   5.8. Backstop located 60' behind home plate, height as required for safety
   5.9. Two concrete block dugouts
   5.10. Two bullpens (One at each side, outside fence)
   5.11. One batting cage with 110V electrical outlets for pitching machine (Outside fence)
   5.12. Weather-proof water spigot within ground box behind pitcher's mound
   5.13. 110-volt electrical duplex outlet within weather proof in ground box behind pitcher's mound
   5.14. Scoreboard located between center and left field
      5.14.1. See Division–11 EQUIPMENT for Scoreboard

5.15. Two sets of bleachers 5 rows high x 10’ deep x 21’ long anchored to concrete pads:
5.15.1. See Division–13 SPECIAL CONSTRUCTION for Portable Bleachers
5.16. Field Lighting
5.16.1. See Division–26 ELECTRICAL for Sports Field Lighting
5.17. Shared Baseball/Softball Concession/Restrooms/Storage
5.17.1. See Division–11 EQUIPMENT for Concession Equipment

6. High School Softball Field: High School softball Field shall have layout in accordance with competition standards of the Georgia High School Association and the national Federation of State High School Associations. Field shall include the following:
6.1. Orientation with home plate at southwest and second base at northeast if feasible
6.2. Field size: 200’ long at R/L foul lines x 200’ deep at center of outfield
6.3. Outfield of natural grass turf with irrigation system
6.4. Warning track
6.5. Infield playing surface with appropriate infield mix
6.6. Pitching mound level with infield with pitching rubber
6.7. Fencing 10’ high with windscreen (with proper wind rated ties). Specify top, center and bottom pipe rails.
6.8. Backstop located 25’ behind home plate, height as required for safety
6.9. Double first base
6.10. Two concrete block dugouts
6.11. Two bullpens (One at each side, outside fence)
6.12. One batting cage with 110V electrical outlets for pitching machine (Outside fence)
6.13. Water spigot within weather proof in ground box behind pitcher’s mound.
6.14. 110-volt electrical duplex outlet within weather proof in ground box behind pitcher’s mound.
6.15. Scoreboard located between center and left field
6.15.1. See Division–11 EQUIPMENT for Scoreboard
6.16. Two sets of bleachers 5 rows high x 10’ deep x 21’ long anchored to concrete pads:
6.16.1. See Division–13 SPECIAL CONSTRUCTION for Portable Bleachers
6.17. Field Lighting:
6.17.1. See Division–26 ELECTRICAL for Sports Field Lighting
6.18. Shared Baseball/Softball Concession/Restrooms/Storage:
6.18.1. See Division–11 EQUIPMENT for Concession Equipment

7. Middle School Softball Field: Omitted

8. High School Practice Field: High school practice field is intended for instruction and use for multiple sports. It shall be constructed to appropriate grading and turf standards but are not required to meet competition standards of the Georgia High School Association and the national Federation of State High School Associations. Practice field shall include the following:
8.1. Orientation with long dimension north and south if feasible
8.2. 78 yards wide x 120 yards long
8.3. Field Turf Vintage series
8.4. Provide netting where necessary to prevent damage from balls entering adjacent areas.
8.5. Fixed football goalpost and movable soccer goals
8.5.1. See Division 11–EQUIPMENT for goalpost and goals.

9. ELEMENTARY School Multi-Purpose Field: Elementary school multi-purpose field is intended for informal outdoor activities and elementary level sports. It shall be constructed to appropriate grading and grassing standards. The multi-purpose field shall include the following:
9.1. Approximately 2 acres adjacent to the gym if site configuration will allow
9.2. Well drained natural turf without irrigation system

10. Tennis Courts: Provide four tennis courts at each middle school and five at each high school. Tennis courts shall have layouts in accordance with competition standards of the Georgia High School Association and the national Federation of State High School Associations.
    10.1. Regulation size
    10.2. Contrasting light blue and medium green surface between court and remaining play area. Colors should be selected from manufacturer's standard options.
    10.3. Orientation with baselines of courts perpendicular to north-south axis
    10.4. Fencing 10' high with windscreen (with proper wind rated ties and air flaps). Specify top, center and bottom pipe rails. Fencing shall be 20' from baseline, 12' from sidelines.
    10.5. Omit windscreens screens at bleachers.
    10.6. 110v duplex electrical outlet at each end of the bank of courts
    10.7. At high schools, provide one set of 5 row bleachers anchored to a concrete pad at west end of courts
        10.7.1. See Division 13–SPECIAL CONSTRUCTION for Portable Bleachers

SECTION 32 3100 FENCES AND GATES

1. Unless otherwise specifically approved by FCS, all permanent fences and gates shall be black vinyl coated chain link construction.
2. Typical fencing shall be 9-gauge core wire and 6-gauge finish thickness. Fencing mesh size shall be 2". Tennis court fencing mesh size shall be 1 ¾". Provide appropriate black vinyl coated post and gates, installed in accordance with Chain Link Fabrication Manufacturers Association criteria. Provide pipe top rail for all fencing.
3. Fence fabric shall have knuckled selvages at top and bottom of fabric.
4. Fence Posts shall be:
    4.1. Line Posts – 2-3/8" nominal O.D. for fences 4' and 6' in height
    4.2. Line Posts – 2-7/8" nominal O.D. for fences 8' and 10' in height
    4.3. End, Corner, and Pull Posts – 2-7/8" nominal O.D. for fences 4' and 6' in height
    4.4. End, Corner, and Pull Posts – 4" nominal O.D. for fences 8' and 10' in height
    4.5. Swing gate post in accordance with ASTM F 900
5. Line post spacing shall be as follows:
    5.1. For fence heights of 4', 6', and 8', line posts shall be installed uniformly at 10' o.c.
    5.2. For fence heights of 10' line posts shall be installed uniformly at 8' o.c.
6. Footing diameters shall be as follows:
    6.1. Fence post diameters up to 3" footing diameter shall be 12"
    6.2. Fence post diameters up to 4" footing diameter shall be 16"
    6.3. For fence heights over 10' footing diameter shall be a minimum of four times greater than O.D. of post
7. Footing Depths shall be as follows:
    7.1. Fence heights of four (4) and six (6) feet footing depth shall be 36".
    7.2. Fence heights of eight (8) and ten (10) feet footing depth shall be 42".
    7.3. Other fence heights; depth of footing depth shall be 24" plus an additional three (3) inches for each one (1) foot increase in the fence height over four (4) feet.
8. Fence posts shall be set 3" above bottom of footing excavation.
9. General site fencing shall be 6'-0" high with appropriately located gates. Storm detention/retention areas shall be fenced with the same material per local requirements.
    9.1. Plans shall identify access point for portables and shall allow for a 20' opening (sleeve post or double post).
10. Gates shall be provided at vehicular entrances to limit access during certain time periods.
    10.1. Gate shall be pipe gates with hold opens (4" diameter Steel bollard with birdhead holds) and reflective stop signs.

11. Perimeter and other fencing shall be installed as needed to provide safety and security of the students, teachers and staff. Exact location of fencing will be determined on-site by FCS in order to preserve natural areas and undisturbed buffers.
12. Fencing and wind screens at sports fields shall be of the height and locations described in the relevant sections of these guidelines. Fences shall be black vinyl coated chain link construction of appropriate gauge and mesh for the height required with appropriate black vinyl coated post and gates, installed in accordance with Chain Link Fabrication Manufacturers Association criteria. Wind Screens shall be forest green.

SECTION 32 3200 RETAINING WALLS

1. Retaining walls under 10' in height that do not support structural elements (buildings, drives, parking, etc.) can be identified as a "Design/Build" item for the contractor.
   1.1. Design professional shall provide performance specifications for the retaining wall system.
2. Retaining wall over 10' or walls that support structural elements (buildings, drives, parking, etc.) shall be designed and detailed by the design professional or qualified sub-consultant.
3. Type of retaining wall system (Reinforced Concrete, Mechanically Stabilized Earth (MSE), Geosynthetically Confined Soil (GCS) Wall, etc.) shall be chosen by the design professional and approved by FCS.
4. Plans and specifications for all walls shall identify the amount (frequency) and type of testing that is required for construction of the wall. Coordinate said requirements with the owner's geotechnical testing agency.
   4.1. Require that the owner's geotechnical testing agency perform all required testing for the wall construction.
5. Unsuitable soils found below the footing elevation of the wall are the responsibility of FCS. Unsuitable soils found from the top of the wall footing to the top of the wall are the contractor's responsibility.
6. Confirm that all applicable retaining wall permits are obtained.
   6.1. Contractor is responsible for obtaining wall permits for design-build walls.
   6.2. Design professional is responsible for obtaining wall permits for walls that they designed.
7. The wall designer of record shall be responsible to certify in writing that the wall was designed and constructed per the plans and specifications.

SECTION 32 8000 IRRIGATION

Commercial grade sprinkler irrigation system with automatic operation shall be provided for the grass playing field inside middle school tracks. Irrigation may be required at multi-purpose field at high schools as required by FCS. Do not provide irrigation at elementary school play fields.

Design professional shall consult with FCS Capital Improvements staff to obtain approval for proposed irrigation system prior to issuing final drawings.

1. Approved irrigation systems are Rain Bird, Toro and Hunter.
2. Include a drilled well in middle and high school specifications for irrigation purposes. The well needs to have a yield of greater than 100 gallons per minute or, if less, provide water storage facility to compensate for lesser yield.
   2.1. If a well is not feasible, design irrigation system to be supplied by public water system with separate irrigation meter.
3. Provide an irrigation controller equipped with wireless access.
4. No landscape planting irrigation is desired.
5. See Division 21–PLUMBING for Exterior Hose Bib requirements.

SECTION 32 9200 TURF AND GRASSES

1. All general areas to be grassed shall be sodded with Tifway 419 Bermuda.

2. Lawns and grass shall be watered and maintained for a period of no less than 60 days, prior to a request for inspection and acceptance by FCS and to the opening of the school year.
3. Lawns and grass shall be fully established prior to inspection.
4. Lawns and grass shall receive a minimum of 2 cuts prior to request for acceptance.
5. Lawn specifications
   5.1. Adequate seedbed preparation – 4" tilled topsoil or amended organic soil
   5.2. Rock hounding in two directions needs to be specified to pick up sticks/stones greater than 1/2" diameter.
   5.3. Areas to be planted with sod vs. seed need to be identified on the drawings. Usually all areas close to the building or inside a perimeter drive should be sod.
   5.4. All sod shall have the harvest netting removed prior to installation.
6. Plans and specifications shall require the contractor to provide FCS with a turf maintenance plan.
7. Design professional shall consult with FCS Capital Improvements staff and obtain approval for proposed lawn specifications prior to issuing final drawings.

SECTION 32 9300 PLANTS

1. The school district is generally exempt from tree ordinances and overlay planting requirements by the municipality of jurisdiction. However, the design professional shall design planting plans in general accordance with these requirements, and generally comply with additional buffers as may be directed by the local jurisdiction. Review proposed new shrubs and trees with FCS Capital Improvements staff.
2. In general, use low maintenance Xeriscape plantings. Minimize plantings on back and sides of buildings.
3. Minimize grass/sod; look at alternatives; use most practical application for each area.
4. Do not use non-native invasive plantings.
5. Require contractor to gain the approval of the design professional and the FCS Capital Improvements staff for the planting bed preparation prior to installing plants.
6. Use pine straw mulch, 6" deep, shall be provide at all new planting areas. Provide raised curb or other device to restrict washing of mulch onto adjacent paved walks and drives.
7. Keep tree plantings:
   7.1. A minimum of 20' from perimeter of building
   7.2. A minimum of 15' from sidewalks, curbs and paving
      7.2.1. Parking lot trees shall adhere to local overlay ordinances which may not meet the above criteria
      7.2.2. Review parking lot plantings to ensure that lighting and security camera coverage is not obscured
   7.3. Plantings in courtyards shall be grass or hardscape only
8. Low maintenance ground covers may be used in low-traffic areas and on slopes as appropriate. These plantings shall be maintained and weeds shall be controlled by the contractor for no less than 60 days after substantial completion.

DIVISION 33 UTILITIES

General Requirements:

- Civil engineer to include all site utilities on one drawing if possible
- All non-conductive buried utility lines shall have a conductive tracer line added

SECTION 33 1400 WATER UTILITY DISTRIBUTION PIPING

1. Domestic Piping Material:
   1.1. Domestic water service pipe installed underground 3" and less shall be Type "K" hard drawn copper tubing with wrought copper solder joint fittings conforming to ASTM B-88-72. Minimum depth of cover shall be 36".
   1.2. Domestic water pipe installed underground 4" and larger shall be cement lined ductile iron pipe conforming to ANSI A21.51. Minimum depth of cover shall be 36".
   1.3. Valves:
      1.3.1. Unless specifically indicated otherwise, the valves shall be designed for not less than 125 lbs working pressure. The valves shall be suitable for the service for which they are installed.
      1.3.2. Gate valves for copper water lines shall be Milwaukee Figure 115 bronze valve with non-rising stem (nut and valve key) and sweat ends or approved equal by Crane, Hammond, Mueller, Nibco, Stockham or Watts. Depth of valves shall be such that the valve is accessible with a standard valve key.
      1.3.3. Gate valves for ductile iron water lines shall be Watts model 406-NRS-RW flanged gate valve with non rising stem (nut and valve key) or approved equal by Crane, Hammond, Kitz, Milwaukee, Mueller, Nibco, or Stockham.
      1.3.4. Double check valves shall be Watts No. 709-RW or 007-QT as indicated, epoxy coated double check valve with two gate valves and four test cocks. The valve assembly shall be U. L. listed. Approved equal valves by Ames, Febco, Hersey or Wilkins are acceptable.
2. Fire Protection Piping Material (Underground Piping):
   2.1. Underground Piping (Ductile Iron):
      2.1.1. Underground piping shall be cement lined ductile iron pipe manufactured in accordance with ANSI 21.51.
   2.2. Fittings and Couplings:
      2.2.1. Fitting for underground piping shall be ductile iron manufactured in accordance with ANSI A21-10. All ductile iron pipe fittings shall be in accordance with AWWA C151/ANSI A21.51.
   2.3. Valves:
      2.3.1. OS & Y valves, post indicator valves and check valves shall be listed by U. L. for use in fire mains. Gate valves: Iron-Body Bronze - Mounted Gate Valves, Sizes 3" - 12", inclusive: Order Specification: Double-Disc, Parallel Seats, Non-rising stem (IS), Rated at 200-psi WWP, O-ring seals, Std 2" square wrench nut, and conforming to AWWA Specifications C500 in all respects. Check with Water Department for direction of opening.
   2.4. Backflow Prevention Valves:
      2.4.1. Double check detector valve assembly shall be Watts 709 DCDA double check valve with detector CFM meter, two OS & Y gate valves and four test cocks.
      2.4.2. Valves shall have epoxy coated cast iron bodies. The valve assembly shall be U. L. listed.
      2.4.3. Valves shall be as manufactured by Watts or approved equal by Ames, Febco or Hersey.
   2.5. Fire Hydrants:
      2.5.1. Fire hydrants shall be an AWWA listed type having two 2-1/2" hose outlets and a 4-1/2" pumper outlet with threads compatible with Local Fire Department equipment.

SECTION 33 3000 SANITARY SEWER UTILITIES

1. Plastic Pipe Systems:
   1.1. PVC Pipe:
      1.1.1. PVC pipe which is 6" through 15" in diameter shall conform to ASTM D3034 SDR35. Sizes 18" through 27" in diameter shall conform to ASTM F679 SDR35, polyvinyl chloride pipe (PVC).
   1.2. Ductile Iron Pipe
      1.2.1. Ductile iron pipe shall be 8" diameter Class 50 pipe conforming to ANSI A21.51.
2. Structures:
   2.1. Pre-cast Concrete Units:
      2.1.1. Pre-cast concrete units shall conform to ASTM C478, and shall be circular with circular reinforcement. The wall thickness shall be five inches for stack depth sections up to 32 feet. Base slab shall be eight inches thick for depths up to 25 feet and 12 inches thick for depths greater than 25 feet.
      2.1.2. Pre-cast concrete manhole tee units shall conform to ASTM C76, Class IV, and shall be circular with circular reinforcement.
   2.2. Manhole Frames and Covers:
      2.2.1. Manhole frames and covers shall conform to ASTM A48, Class 30, gray iron. The castings shall be neatly made and free from cracks, cold sheets, holes and other defects. Surfaces of casting shall be ground to assure proper fit and to prevent rocking. Manhole frames and covers shall comply with Fulton County Public Works criteria.

SECTION 33 4000 STORMWATER UTILITIES

1. FCS prefers underground detention systems in lieu of surface detention ponds. Design professional shall only use surface detention systems where underground systems are not feasible due to topography or other issues.
2. Pipe Materials:
   2.1. The design professional shall determine the appropriate pipe material for each project. Pipe materials may be:
      2.1.1. Reinforced Concrete Pipe (RCP)
      2.1.2. Corrugated Metal Pipe (CMP) with paved invert
      2.1.3. Aluminized Steel Type 2 (AST2)
      2.1.4. Polyvinyl Chloride Pipe (PVC)
      2.1.5. High Density Polyethylene Pipe (HDPE)
3. Appurtenances Material:
   3.1. Castings: All castings shall be gray iron conforming to Georgia DOT Specifications.
   3.2. Other materials required to completely install storm sewers in accordance with these specifications shall conform to all applicable articles and paragraphs of Georgia DOT Specifications.

APPENDIX

SECTION 08 71 00 FINISH HARDWARE

PART 1 – GENERAL

1.1 SUMMARY:

A. This Section includes items known commercially as door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.

B. Refer to the characteristics section for each product. The criteria listed in the specifications are based on one manufacturer. No substitution of product will be accepted.

C. This Section includes the following:

1. Butts and Hinges
2. Cylinders
3. Locksets and Trim
4. Exit Devices
5. Door Closers
6. Power Operators
7. Door Stops
8. Weatherstripping/Gasketing
9. Thresholds
10. Push Plates
11. Door Bolts/Coordinators
12. Overhead Door Stops and Holders
13. Door Pulls and Pull Plates
14. Push Pull Sets
15. Protection Plates
16. Silencers
17. Key Cabinet and System
18. Security Equipment
19. Magnetic Hold-Open Devices
20. Fasteners

D. Related Sections: The following sections contain requirements that relate to this Section:

1. Section 08 11 00: Steel Doors and Frames
2. Section 08 12 50: Aluminum and Fiberglass Doors
3. Section 08 14 00: Wood Doors
4. Section 08 33 10: Coiling Counter Doors
5. Section 08 33 20: Overhead Coiling Doors or Grilles
6. Division 26: Electrical
7. Division 28: Fire Alarm Systems

E. Items listed in other Sections and not included herein as “Door Hardware”

1. Cabinet Hardware
2. Bath Accessories
3. Nameplates, Room Numbers, Exit Signs
4. Handicapped Signs

5. Hardware for Overhead and Roll-up Doors, except Cylinders
6. Smoke Detectors, 120VAC Power, Wiring and Conduit
7. Door Position Switches
8. Acoustic Doors: Cam Lift Hinges, Astragals, Door Bottoms and Seals
9. Gate Hardware, except locking devices
10. Local Alarms and Annunciators

E. Close coordination between masons, electricians, hardware supplier(s), hardware installer(s) and the access control system integrator under contract to the Owner is essential in order to ensure the access control system components can be installed properly.

1.2 REFERENCES:

A. Standards of the following as referenced:

1. American National Standards Institute (ANSI)
2. Door and Hardware Institute (DHI)
3. Factory Mutual (FM)
4. National Fire Protection Association (NFPA)
5. Underwriters' Laboratories, Inc. (UL)
6. UL 10C – Fire Test Door Assemblies
7. Warnock Hersey

B. Regulatory standards of the following as referenced:

1. Department of Justice, Office of the Attorney General, Americans with Disabilities Act, Public Law 101-336 (ADA).
2. CABO/ANSI A117.1: Providing Accessibility and Usability for Physically Handicapped People.

1.3 SYSTEM DESCRIPTION:

A. Design Requirements:

1. Exit doors, including each leaf of a pair of doors, to be always operable from the inside by the simple turn of a lever or by pushing an exit device touchpad, without the use of a key or any special knowledge or effort. This includes doors serving toilet and storage rooms.
2. The force applied to operate exit hardware is to require not more than 15 lbs. applied in the direction of travel.
3. Refer to applicable headings in Part 3, Hardware Schedule for system description of electric and electro-pneumatic hardware products.

1.4 SUBMITTALS:

A. General: Submit the following in accordance with Conditions of Contract and Division 1 specification sections.

B. Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.

C. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size thickness, hand, function, and finish of door hardware.

1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into vertical format "headings" indicating complete designations of every item required for

each door or opening. Use specification set numbers with any variations suffixed a, b, etc. Include the following information:

a. Type, style, function, size, and finish of each hardware item.
b. Name and manufacturer of each item.
c. Fastenings and other pertinent information.
d. Location of each hardware set cross-referenced to indications on drawings, both on floor plans and in door and frame schedule.
e. Explanation of all abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for hardware.
g. Door and frame sizes and materials.
h. Keying information.
i. Cross-reference numbers used within schedule deviating from those specified.
    1) Column 1: State specified item and manufacturer.
    2) Column 2: State prior approved substituted item and its manufacturer.

2. Submittal Sequence: Submit final schedule at earliest possible date, particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.
3. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
4. Furnish complete wiring diagrams, riser diagrams, elevation drawings, and operational descriptions of electrified components and systems, listed by opening in the hardware submittals. Elevation drawings identify locations of the system components with respect to their placement in the door opening. Operational descriptions fully detail how each electrified component will function within the opening, including all conditions of ingress and egress. Furnish a copy with each hardware schedule submitted for approval. Furnish a copy with delivery of hardware to the jobsite and furnish another copy to the Owner at the time of project completion.

D. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

E. Contract closeout submittals:

1. Operation and maintenance data: Complete information for installed door hardware.
2. Warranty: Completed and executed warranty forms.

1.5 QUALITY ASSURANCE:

A. Single Source Responsibility: Unless otherwise indicated, obtain each type of hardware (latch and lock sets, hinges, exit devices, closers, etc.) from a single manufacturer.

B. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by UL, Warnock Hersey, FM, or other testing and inspecting organization acceptable to authorities having jurisdiction for use on types and sizes of doors indicated and in compliance with requirements of fire-rated door and door frame labels.

1.6 QUALITY CRITERIA:

A. Supplier Qualifications:

1. The finish hardware supplier to be a factory authorized distributor with office and warehouse facilities within a 50-mile radius of Fulton County, Georgia.
2. The distributor to have a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this project.
3. The distributor to employ an experienced Architectural Hardware Consultant (AHC) who is available for consultation to Owner, Architect, and General Contractor at reasonable times during the course of the work.
4. Estimating Responsibility: It is the responsibility of any potential supplier to thoroughly review all project documents to insure complicity with the hardware specification and all applicable codes Report any and all discrepancies to the architect no later than 7 days prior to bid. It is the responsibility of the successful supplier to supply hardware to 100% completion of project, should a door or item of hardware be omitted from this specification or should hardware other than what is specified be required to meet code, project type requirements, or functionality it is the distributor's sole responsibility to supply that material in the same brands and quality levels without cost to the architect, contractor or owner.

B. The General Contractor to schedule and attend a pre-construction meeting with the Architect, FCS Program Manager, FCS Construction Manager, a representative of the FCS Maintenance Department, electrical sub-contractor, masonry sub-contractor, frame, door and hardware installers (aluminum, hollow metal, wood, FRP), frame, door and hardware suppliers (aluminum, hollow metal, wood, FRP), finish hardware manufacturers' representative(s), and the access control system integrator under contract to the Owner to review and coordinate construction responsibilities, schedules, and timelines.

C. The General Contractor to schedule and attend a pre-installation conference with the FCS Construction Manager, a representative of the FCS Maintenance Department, frame, door and hardware installers (aluminum, hollow metal, wood, FRP), frame, door and hardware suppliers (aluminum, hollow metal, wood, FRP), and finish hardware manufacturers' representative(s) to review and coordinate product installation and adjustment in accordance with manufacturers' recommendations and Owner's requirements. If there are electrified hardware products included in the scope of work, then the electrical sub-contractor, masonry contractor, access control system integrator under contract to the Owner, and the Architect's electrical engineer to also attend this conference.

D. The General Contractor to schedule and attend an electrified hardware coordination meeting with the FCS Construction Manager, a representative of the FCS Maintenance Department, frame, door and hardware installers (aluminum, hollow metal, wood, FRP), frame, door and hardware suppliers (aluminum, hollow metal, wood, FRP), electrical sub-contractor, and the access control system integrator under contract to the Owner to coordinate the installation and termination of connections of the electrified hardware products with the access control system components. Hardware supplier to provide riser diagrams, elevation drawings, wiring diagrams, and operational descriptions as required by the General and sub-contractors.

E. The General Contractor to use a finish hardware installer(s) trained by the manufacturer(s) to install and adjust the specified door hardware products, including locksets, exit devices, door closers, and overhead stops and holders in accordance with the respective manufacturer's instructions. The door hardware installer(s) to provide a copy of Certificate of Training to the General Contractor.

F. The General Contractor must contact the FCS Construction Manager, who in turn will contact the systems integrator. The systems integrator must be trained and certified in the installation and service of Avigilon access control software, for technical information and for the provision and installation of the access control system components, including all low voltage connections of power supplies, card readers, electric strikes, electrified locks, QEL exit devices, power transfers, and controllers.

1. Coordinate with Division 28 – Electronic Access Control for specific system requirements.
2. 120VAC power and conduit, where required, are to be provided by the electrical sub-contractor.
3. The authorized systems integrator under contract to FCS is to provide all cable installation, identification, and termination in accordance with the manufacturer's technical installation guidance and all applicable code requirements.

1.7 PRODUCT HANDLING:

A. Tag each item or package separately with identification related to final hardware schedule and include basic installation instructions with each item or package.

B. Packaging of finish hardware is responsibility of distributor. As material is received by distributor from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of reviewed hardware schedule. Two or more identical sets may be packed in same container.

C. Inventory door hardware jointly with representatives of finish hardware distributor and finish hardware installer until each is satisfied that count is correct.

D. Deliver individually packaged finish hardware items promptly to place of installation (shop or project site).

E. Provide secure lock-up for finish hardware delivered to the project but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the work will not be delayed by hardware losses both before and after installation.

1.8 WARRANTY:

A. Special warranties:

1. Door Closers: Thirty (30) year period.
2. Exit Devices: Five (5) year period.
3. Mechanical Locks and Cylinders: Five (5) year period.
4. Electrified Locks and Exit Devices: One (1) year period.

1.9 MAINTENANCE

A. Maintenance Tools and Instructions: General Contractor to furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of finish hardware.

PART 2 – PRODUCTS

2.1 MANUFACTURED UNITS

A. Hinges:

1. Acceptable manufacturers:
   a. Hager BB1191, BB1279, BB1168
   b. Ives* 5BB1, 5BB1HW
   c. McKinney TA2714, TA3386, T4A3786
2. Characteristics:
   a. Templates: Provide only template-produced units.
   b. Screws: Provide Phillips flat-head screws complying with the following requirements:
      1) For metal doors and frames install machine screws into drilled and tapped holes.
      2) For wood doors and frames install threaded-to-the-head wood screws.
      3) For fire-rated wood doors install #12 x 1-1/4 inch, threaded-to-the-head steel wood screws.
      4) Finish screw heads to match surface of hinges or pivots.
   c. Hinge pins: Except as otherwise indicated, provide hinge pins as follows:
      1) Interior Doors: Non-rising pins.
      2) Tips: Flat button and matching plug. Finished to match leafs.
   d. Size: Where hinges are specified, unless otherwise noted, they are to be of the types and sizes as follows:
      1) EXTERIOR DOORS:
         a) Provide continuous gear hinges.
      2) INTERIOR DOORS:
         a) 1-3/4" thick - up to 36 inches wide, 5BB1.
         b) 1-3/4" thick - over 36 inches wide, 5BB1HW.
      3) The width of hinges to be sufficient to clear all trim.
   e. Quantity: Furnish one pair of hinges for all doors up to 90 inches high. Furnish one additional hinge for each additional 30 inches.

B. Continuous Hinges:

1. Acceptable manufacturers:
   a. Hager Roton 780-112HD for aluminum and FRP doors, 780-224HD for wood and hollow metal doors.
   b. Ives 112HD for aluminum and FRP doors, 224HD for wood and hollow metal doors.
   c. Select SL11HD for aluminum and FRP doors, SL24HD for wood and hollow metal doors.
2. Characteristics:
   a. Continuous gear hinges to be manufactured of extruded 6063-T6 aluminum alloy with anodized finish or factory painted finish, as scheduled.
   b. All hinges are to be manufactured to template. Uncut hinges to be non-handed and to be a pinless assembly of three interlocking extrusions applied to the full height of the door and frame without mortising.
   c. Vertical door loads to be carried on chemically lubricated polyacetal thrust bearings. The door and frame leaves to be continually geared together for the

entire hinge length and secured with a full cover channel. Hinge to operate to a full 180°.

d. Hinges to be milled, anodized, and assembled in matching pairs. Fasteners supplied to be steel, self-drilling, self-tapping 12-24 x 3/4".

e. The following doors to be furnished with full-length continuous gear type hinges:
   1) Student dining and performing arts entries and exits.
   2) Student Multi-Occupancy Toilets.
   3) Locker Rooms.
   4) Gymnasium exits.
   5) 42-inch wide or wider doors.
   6) Corridor doors opening to the exterior.
   7) Vestibule doors.
   8) Cross-corridor doors not equipped with hold-open devices.
   9) Stair doors.

C. Cylinders:

1. Acceptable manufacturers:
   a. Best Access Systems* Note: Permanent cores supplied by owner.
2. Characteristics:
   a. Equip locks with cylinders for small format interchangeable-core pin tumbler inserts. Furnish only temporary inserts for the construction period and remove these when directed by the owner.
   b. Installation of the permanent cores and keys by owner.
   c. Metals: Construct lock cylinder parts from brass or bronze, stainless steel or nickel silver.
   d. Key Material: Provide keys of nickel silver only.
   e. Key Quantity: Provide ten (10) construction master keys and three (3) construction control keys. Construction master keys are to be delivered to the contractor with the locksets.
   f. Deliver construction master keys and construction control keys to the Director of Maintenance Services.

D. Mortise Lock and Latch sets:

1. Manufacturer: Schlage Lock Company (owner standard), which can be contacted at SSC South, 3100 Northwoods Place, Suite A, Norcross, GA 30071 / Phone: 678-906-2103 / Fax: 770-662-0509 / Email: sscsouth@allegion.com.
2. Characteristics:
   a. Lock and latch sets to be 630/US32D finish.
   b. Use L9070HD function locks for offices, conference rooms, work rooms, etc.
   c. Use Vandlgard classroom security locks with clutching levers with in room visual verification of locked/unlocked status of outside trim at all classroom doors and where indicated, L9071HD x L283-711.
   d. Use L9080HD function locks for janitor's closets, electrical and mechanical spaces, and storage rooms.
   e. Use L9080HD function locks on staff gang toilets that open onto a corridor.
   f. Use L9480HD function locks with L283-722 "Occupied" indicator, 30-138 cylinder, and L583-363 ADA thumb turn for single use staff restrooms.
   g. Use L9466HD on doors between classrooms.
3. Mortise Lock and Latch sets: as scheduled.
   a. Lock and latch sets to be US32D finish.

b. Chassis: cold-rolled steel, handing field-changeable without disassembly.
c. Latch Bolts: 3/4-inch throw, stainless steel two-piece mechanical anti-friction type. Nylon inserts are not acceptable.
d. Lever Trim: through-bolted, accessible design, cast or solid rod lever as scheduled. Spindles: independent breakaway.
e. Thumb Turns: accessible design not requiring pinching or twisting motions to operate.
f. Deadbolts: stainless steel, 1-inch throw.
g. Provide electrified options as scheduled in the hardware groups. Where scheduled, provide modular switches and sensors integrated into the locks and latches.
h. Provide motor based electrified locksets with electrified options as scheduled in the hardware sets and comply with the following requirements:
    1) Universal input voltage – single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
    2) Fail Safe/Fail Secure – changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case
    3) Low maximum current draw – maximum 0.4 amps to allow for multiple locks on a single power supply.
    4) Low holding current – maximum 0.01 amps to produce minimal heat, eliminate “hot levers” in electrically locked applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
    5) Connections – provide quick-connect Molex system standard.
i. Strikes: 16 gage curved stainless steel, bronze, or brass with 1" deep box construction, lips of sufficient length to clear trim and protect clothing.
j. Scheduled Lock Series and Design: Unless specified otherwise in hardware groups, use Schlage L 9000 series, 07N design.
k. Certifications:
    1) ANSI A156.13, 1994, Grade 1 Operational.
    2) ANSI/ASTM F476-84 Grade 30 UL Listed.

E. Exit Devices:

1. Manufacturer: Von Duprin (no substitution), which can be contacted at SSC South, 3100 Northwoods Place, Suite A, Norcross, GA 30071 / Phone: 678-906-2103 / Fax: 770-662-0509 / Email: sscsouth@allegion.com.
2. Characteristics:
    a. All exit devices to be of one manufacturer.
        1. Exit devices to be of modular design and assembly, allowing updated and/or replacement parts to be added to existing product in the field to bring product up to current design standards.
        2. Exit devices to be able to be field modified and updated with specified “kits” necessary to upgrade for product electrification to accommodate future expansion of existing access control system including, but not limited to, request to exit, latch bolt monitoring, and electric latch retraction.
    b. All exit devices to have 630/US32D touchpads, 628/US28 chassis and 689/Powder Coat covers.
    c. Unless otherwise specified, exterior doors to be furnished with rim touch bar device. Right hand reverse active leaf - night latch function x cylinder x

hardened cylinder ring x pull x sex nuts and bolts. Left-hand reverse inactive leaf - exit only x pull x sex nuts and bolts.

d. Unless otherwise specified, interior doors to be furnished with rim touch bar device. Right hand reverse active leaf - lever handle x cylinder x sex nuts and bolts. Left hand reverse inactive leaf - exit only x sex nuts and bolts.

e. All Media Centers and education-based rooms with exit devices will be furnished with rim touch bar exit devices with lever trim with – 2SI visual indicator providing at-a-glance verification whether the door trim is locked or unlocked. The - 2SI to also provide inside the room locking or unlocking of the outside trim. Rooms with pairs of doors to have mullions with rim exit devices with - 2SI on both doors. All exit device with the – 2SI security feature to be supplied less dogging.

f. At specific locations, such as the Media Center, Auditorium, Administrative areas, etc., equip exit devices with a fluid dampening device to reduce noise associated with the operation of the exit device.

g. All exit devices to be flush mounted. Provide manufacturer's standard shim kit to accommodate molding for glass and vision lites. Exit devices that are not flush mounted must provide a filler bar on those doors where conflict with molding for glass vision lites is not an issue.

h. Exit devices to be attached with sex nuts and bolts (SNB) on all doors (aluminum, hollow metal, wood, FRP). Finish on all exposed fasteners to match devices. Provide longer SNB fasteners for 2" thick aluminum doors.

i. On exterior pairs of doors, provide keyed removable mullions, select interior pairs may also have keyed mullions. All mullions to have two (2) each mullion stabilizers #154. Refer to the drawings and door schedule for locations of keyed movable mullions.

j. Exit devices to be "UL" listed for life safety. All exit devices for fire rated openings to have "UL" labels for "Fire Exit Hardware."

k. All exit devices mounted on labeled wood doors to be mounted on the door in accordance with the door manufacturer's requirements. (Owner requires all exit devices to be thru-bolted, even on non-rated doors.)

l. All trim to be thru-bolted to the lock stile case.

m. All exit devices to be made of brass, bronze, stainless steel, or aluminum material, plated or powder coated to the standard architectural finishes to match the balance of the door hardware. Painted finishes are not acceptable.

n. Dogging mechanism to be "hook and eye" type. No plastic dogging cams or friction type dogging mechanism are permitted. Dogging component to be removed and replaced without removing the device from the door.

o. Equip surface mounted exit devices with a roller strike. Owner insists that the third locking screw be installed.

p. All exit devices to be non-handed.

q. Touchpad to extend a minimum of 1/2 of the door width. Touchpad height to exceed height of mechanism case or rail assembly to eliminate pinch points. If touchpad height does not exceed height of mechanism case/rail assembly, provide factory-installed insert/filler on top and bottom of touchpad along mechanism case/rail assembly to prevent pinch point. Plastic touchpads are not acceptable.

r. All latch bolts to be hooded deadlocking, pullman type, retracted horizontally by means of a mechanical linkage. Latch bolts to have a self-lubricating coating to reduce wear. Plated or plastic coated latch bolts are not acceptable. At selected locations, equip exit devices with XP latch bolts.

s. Exit devices to include impact resistant, flush mounted end cap design to avoid damage due to carts and other heavy objects passing through an

opening. End cap to be of heavy-duty metal alloy construction and provide horizontal adjustment to provide alignment with device cover plate. When exit device end cap is installed, no raised edges will protrude.

F. Closers and Door Control Devices:

1. Manufacturer: LCN (no substitution), which can be contacted at SSC South, 3100 Northwoods Place, Suite A, Norcross, GA 30071 / Phone: 678-906-2103 / Fax: 770-662-0509 / Email: sscsouth@allegion.com.
2. Characteristics:
   a. Door closers to be overhead type and have fully hydraulic, full rack and pinion action with a high strength cast iron cylinder. (4040XP x Metal Cover).
   b. Closers utilizing pressure relief valves (PRV) are not acceptable.
   c. All closers to be attached using through bolts and machine screws (TBWMS) on all doors (aluminum, hollow metal, wood, FRP). Provide longer TBWMS fasteners for 2" thick aluminum doors. Through bolts and self reaming and tapping screws (TBSRT) are not acceptable.
   d. All fire rated doors to have closers. Closers are not to be installed on classroom doors unless required by Fire Marshal's office.
   e. Do not use hold-open devices on exterior doors unless directed by Owner for a specific exception.
   f. Hydraulic fluid to be of a type requiring no seasonal adjustment for temperatures ranging from 120 degrees F (49 degrees C) to -30 degrees F (-35 degrees C).
   g. Spring power to be continuously adjustable over the full range of closer sizes and allow for reduced opening force for the physically handicapped. Hydraulic regulation to be by tamper-proof, non-critical valves. Closers to have separate adjustment for latch speed, general speed, and back check.
   h. Closers to be sized in accordance with manufacturer's recommendation.
   i. All closers to have solid forged steel main arms (and forearms for parallel arm closers) and, where specified, to have a cast-in solid stop on the closer shoe ("CUSH" or "SCUSH"). Where door travel on out-swing doors must be limited, use "CUSH" or "SCUSH" type closers, as scheduled. Auxiliary stops are not required when "CUSH" or "SCUSH" type closers are used.
   j. All closers (overhead surface and concealed) to be of one manufacturer and carry manufacturer's thirty (30) year warranty (electric closers to have two (2) year warranty).
   k. Access-Free Manual Closers: Where manual closers are indicated for doors that are required to be accessible to the physically handicapped, provide adjustable units complying with ADA and ANSI A-117.1 provisions for door opening force.
   l. Unless otherwise indicated, closers to be installed to allow door swing as shown on plans. Doors swinging into exit corridors to provide for corridor clear width as required by code. Where possible, mount closers inside rooms.
   m. Provide powder coated finish, certified to exceed 100 hours salt spray testing by ETL, an independent testing laboratory used by BHMA for ANSI certification. Lacquer or painted finish on metal components is not acceptable.
3. Door Closers to be Installed at the Following Doors:
   a. Exterior Doors
   b. Fire Rated Doors
   c. Corridor Doors

d. Toilet Room Doors
e. Storage Room Doors

G. Overhead Door Stops and Holders:

1. Acceptable Manufacturer:
   a. Glynn Johnson 900 Series
   b. Rixson 9 Series.
2. Characteristics:
   a. Provide heavy-duty door stops and holders of stainless steel.
   b. Surface-mounted stops and holders to be installed with the jamb bracket mounted on the stop.
3. Locations:
   a. Verify locations with the Owner.
   b. Refer to Part 3, Hardware Schedule.
   c. A typical location for use of overhead stops would be exterior doors from maintenance and/or storage.

H. Door Bolts/Coordinators:

1. Acceptable manufacturers:
   a. Ives*
   b. Rockwood
   c. Trimco
2. Characteristics:
   a. Extension flush bolts to be forged brass 6-3/4" x 1", with 1/2" diameter bolts. Plunger to be supplied with milled surface one side that fits into a matching guide.
   b. Automatic flush bolts to be UL listed as top and bottom bolts on a pair of classified fire doors. Bolt construction to be of rugged steel and brass components.
   c. Self-latching flush bolts to be UL listed as top and bottom bolts on a pair of classified fire doors. Bolt construction to be of rugged steel and brass components.
   d. Automatic flush bolts and self-latching flush bolts are to be UL listed for fire door application without bottom bolts.
   e. Furnish dust proof bottom strikes.
   f. Coordinator to be soffit mounted non-handed fully automatic UL listed coordinating device for sequential closing of paired doors with or without astragals.
   g. Provide filler piece to close the header. Provide brackets as required for mounting of soffit applied hardware.
   h. Use extension flush bolts (FB458) on hollow metal doors and non-rated wood doors. Use surface bolts on fire-rated wood doors.
   i. Use surface bolts (SB360) on fire-rated wood doors.

J. Floor Stops and Wall Bumpers:

1. Acceptable Manufacturers:
   a. Ives*
   b. Rockwood
   c. Trimco
2. Security Stops to be Ives FS18S.

3. Characteristics: Indicated in Part 3, Hardware Schedule.

K. Push Plates

1. Acceptable Manufacturers:
   a. Ives*
   b. Rockwood
   c. Trimco
2. Characteristics:
   a. Exposed Fasteners: Provide manufacturers standard exposed fasteners.
   b. Material to be stainless steel, .050 inch (U.S. 18 gage).
   c. Plates to be cut as required to accommodate hardware.
   d. Provide plates sized as indicated in Part 3, Hardware Schedule.

L. Door Pulls & Pull Plates:

1. Acceptable Manufacturers:
   a. Ives*
   b. Rockwood
   c. Trimco
2. Characteristics:
   a. Provide concealed thru-bolted trim on back-to-back mounted pulls, but not for single units.
   b. Plate material to be forged stainless steel, .050 inch (U.S. 18 gage), pull to be 1 inch diameter x 8 inches center to center.
   c. Plates to be cut as required to accommodate hardware.
   d. Provide units of types and sizes indicated in Part 3, Hardware Schedule.

M. Protective Plates:

1. Acceptable Manufacturers:
   a. Ives*
   b. Rockwood
   c. Trimco
2. Characteristics:
   a. Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.
   b. Materials:
      1) Metal Plates: Stainless Steel, .050 inch (U.S. 18 gage).
   c. Fabricate protection plates not more than 1-1/2 inches less than door width on push side and not more than 1/2 inch less than door width on pull side.
   d. Bevel all edges.
   e. Heights:
      1) Kick plates to be 8 inches in height.
      2) Mop plates to be 8 inches in height.
      3) Armor plates to be 31 inches in height. Armor plates on fire doors to comply with NFPA 80.
3. Products by the following manufacturers will be considered, provided they meet all the characteristics listed above.
   a. Trimco
   b. Rockwood

N. Thresholds:

1. Acceptable manufacturers:
   a. National Guard Products
   b. Pemko Manufacturing
   c. Zero*
2. Characteristics:
   a. Thresholds for aluminum doors: Zero 545A x MSLA-10, or as required by floor conditions.
   b. Thresholds for hollow metal doors: Zero 655A x MSLA-10, or as required by floor conditions.
   c. Provide heavy-duty thresholds where opening is subject to heavy objects passing through the opening (i.e. kitchen, dock, outdoor storage).
   d. Consult Architect's sill details for other types of thresholds required.
3. Set thresholds for exterior doors in full bed of butyl rubber or polyisobutylene mastic sealant.

O. Door Seals/Gasketing:
1. Acceptable manufacturers:
   a. Pemko
   b. Reese
   c. Zero*
2. Characteristics:
   a. Perimeter Seals for Exterior Doors: Zero 8303AA.
   b. Door Sweeps for Exterior Doors: Zero 8192AA.
   c. Mullion Seals: Zero 8780N-BK.
   d. Perimeter Seals for Interior Fire-Rated Doors: Zero 488S-FBK.
   e. Perimeter Seals for Interior Doors In Smoke Partitions: Zero 488S-BK.
   f. Perimeter Seals for Interior Doors Listed Below: Zero 488S-BK.
      1) At all Corridor doors.
      2) At all gang Toilet Room doors.
      3) At all Janitor Closet doors.
      4) At all Storage Room doors.
      5) At all Utility Room doors.
      6) At all Mechanical Room doors.
   g. Meeting Edge Seals for Interior Fire-Rated or Smoke Partition Doors:
      1) At pairs of doors normally held open: Zero 8042S-BK.
      2) At pairs of doors: Zero 328AA.
      3) At pairs of double egress doors: Zero 383FS AA.
      4) At pairs of doors with removable mullions: Zero 8780N-BK.
3. Perimeter Seals for Sound Rated Doors: Zero 44STST on one leaf.
4. Security Astragals: 43STST.
5. Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

P. Silencers:

1. Acceptable manufacturers:
   a. Hager
   b. Ives
   c. Rockwood
2. Provide three (3) for each single door; two (2) for each pair of doors.
3. Omit silencers at openings scheduled to receive perimeter gasketing.

Q. Magnetic Door Holders:
1. Acceptable Manufacturers:
   a. Edwards
   b. LCN*
   c. Rixson
2. Characteristics: Wall mounted, 24VDC units with finish to match door hardware.
   a. Coordinate voltage and installation requirements with fire alarm and electrical systems.
   b. Use wall mounted magnetic holders wherever possible.
   c. Do not use floor mounted magnetic holders. Use LCN Sentronic type closer/holder units only where wall mounted magnetic holders are impractical. Verify locations with Owner.
3. Use armature extensions where required. Use extensions manufactured by the magnetic holder manufacturer.

R. Q Key Cabinet and System:
1. Acceptable manufacturers:
   a. Telkee
   b. P. O. Moore
   c. Alladin
2. Key cabinet to be installed (mounted on the wall at a location approved by the Owner with all keys tagged and hung) on site.

S. Security Key Box:
1. Manufacturer: Knox-Box.
2. Characteristics:
   a. Provide Knox-Box 3200 series key box. Install at front entrance and key as directed by Fulton County School District.
   b. Provide three (3) school GMK in the Knox-Box for Fire Department use.

2.2 MATERIALS AND FABRICATION

A. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI/BHMA A156 series standards for each type of hardware item and with ANSI/BHMA A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.

B. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
1. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
2. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws, except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible, including "prepared for paint" surfaces to receive painted finish.
3. Use sex bolts for installation of all exit devices, door closers, and surface mounted overhead stops and holders on all doors (aluminum, hollow metal, wood, FRP).
4. Installer must use manufacturers' fasteners.
5. Fasteners for TB-60 bumpers to be presented to the architect for approval prior to use.

2.3 HARDWARE FINISHES:

A. Match items to the manufacturer's standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).

B. Provide finishes that match those established by ANSI or, if none established, match the Architect's sample.

C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

D. The designations used to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes", including coordination with the traditional U. S. finishes shown by certain manufacturers for their products.
1. Continuous Gear Hinges: 628 (US28) Clear Aluminum
2. Hinges (Interior wood doors): 652 (US26D) Satin Chrome Plated Steel
3. Hinges (Interior metal doors): 652 (US26D) Satin Chrome Plated Steel
4. Locks: 630 (US32D) Satin Stainless Steel
5. Exit Devices: 628 (US28) chassis, 630 (US32D) Push Pads and 689 (Powder Coat) covers.
6. Door Closers: 689 (Powder Coated)
7. Push Plates: 630 (US32D) Satin Stainless Steel
8. Pull Plates: 630 (US32D) Satin Stainless Steel
9. Protective Plates: 630 (US32D) Satin Stainless Steel
10. Wall Stops: 630 (US32D) Satin Stainless Steel
11. Floor Stops: 626 (US26D) Satin Chrome Plated Brass/Bronze
12. Overhead Stops and Holders: 630 (US32D) Satin Stainless Steel
13. Thresholds: 627 (US27) Mill Finish Aluminum
14. Weatherstrip: 628 (US28) Clear Anodized Aluminum

PART 3 – EXECUTION

3.1 INSTALLATION:

A. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.

1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.

B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.

1. EPT power transfers to be mounted on the frame and door above the center hinge (30" from top on 7'-0" door; 32" from top on 7'-2" door, 40" from top on 7'-10" door, 42" from top on 8'-0" door).

2. Use sex nuts and bolts (SNB) or through bolts with machine screws (TBWMS) for installation of all exit devices, door closers, and surface mounted overhead stops and holders on all doors (aluminum, hollow metal, wood, FRP). Longer fasteners to be provided by hardware supplier for 2" thick aluminum doors.
3. Installer must use manufacturers' fasteners.
4. Privacy sets with occupancy indicator to be installed with the "OCCUPIED/VACANT" indicator on the CORRIDOR SIDE.
5. Classroom security locks with lock status indicator to be installed with the "LOCKED/UNLOCKED" indicator on the CLASSROOM SIDE.

C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

D. Door hardware installers for all door types with electrified hardware are responsible for all Molex® connections from lockset and exit devices thru the door to jamb side of electric hinge or EPT. Access control system integrator will terminate system at the jamb side of the electrified hinge or EPT.

E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

F. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section "Joint Sealers."

G. Weatherstripping and Seals: Comply with manufacturers' instructions and recommendations to the extent installation requirements are not otherwise indicated.

H. Use sex nuts and bolts (SNB) and through bolts with machine screws (TBWMS) for installation of all exit devices, door closers, and surface mounted overhead stops and holders on all doors (aluminum, hollow metal, wood, FRP).

I. Installer must use manufacturers' fasteners.

3.2 ADJUSTING, CLEANING, AND DEMONSTRATING:

A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

B. Clean adjacent surfaces soiled by hardware installation.

C. Door Hardware Distributor's Field Service:
1. Inspect finish hardware items for correct installation and adjustment after complete installation of door hardware.
2. Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.
3. File written report of this inspection to Architect.

D. Hardware manufacturers' representative(s) for locks, exit devices and door closers to inspect hardware installation to confirm that all products are installed and adjusted according to manufacturers' recommendations. Provide a written report for the Architect and General Contractor. A Certificate of Compliance is to be submitted with the project closeout documents.

END OF SECTION 08 71 00

ACOUSTICAL STANDARDS

Architect/engineer shall be responsible for incorporating appropriate acoustic design measure into the Construction Documents.

1. Special Considerations:
   - 1.1. Acoustical design of stage areas to allow sound projection throughout the audience area. See also Division 9, Acoustic Treatment, and Appendix – Theatrical Systems and Accessories
   - 1.2. Separate noisy and quiet spaces
   - 1.3. Provide adequate speech privacy, especially at offices, conference rooms, and speech therapy rooms
   - 1.4. Isolate from exterior noise
   - 1.5. Isolate impact noise, including lockers and basketball backboards
   - 1.6. Address plumbing noise intrusion into acoustically sensitive rooms
2. Sound Quality Considerations:
   - 2.1. Control excessive reverberation
   - 2.2. Eliminate or minimize echoes
   - 2.3. Shape rooms to create uniform sound field in audience areas
   - 2.4. For middle and high school music areas, avoid parallel walls
3. Equipment Noise and Vibration Considerations
   - 3.1. Locate mechanical equipment with acoustical considerations
   - 3.2. Specify noise emissions of equipment
   - 3.3. Provide adequate vibration isolation. All equipment with moving parts will need isolation from the building structure to avoid vibration transfer.
4. Classroom Standards: Follow current ANSI S12.60 guidelines.
   - 4.1. Maximum allowable interior- and exterior-source background noise in classrooms: 35dBA/55dBC
   - 4.2. Reverberation Time (RT): 0.6 seconds maximum
   - 4.3. Between classrooms and corridor, stairs, office, or conference room: STC 45
   - 4.4. Between classroom and restrooms: STC 53
   - 4.5. Between classroom and music room, mechanical equipment room, cafeteria, and gymnasium: STC 60
   - 4.6. Between classrooms (floor to ceiling isolation): IIC 45 minimum
5. Miscellaneous Acoustical Considerations
   - 5.1. Reverberation Time (RT) in cafeterias and gymnasiums: 1 second
   - 5.2. Background noise level in cafeteria and gymnasiums: 40dBA/60dBC

MARKERBOARD AND TACKBOARD SCHEDULE

Marker Boards	Quantity	Width	Height	NOTES
Elementary				
K-1 classroom	1	16 '-0"	4'-0"	
2-5 classroom	1	16 '-0"	4'-0"	
2-5 classroom	1	8'-0"	4'-0"	
Art	1	12'-0"	4'-0"	
Music	2*	8'-0"	4'-0"	*(1) marker board with music staffs
Media Reading Room	2	8'-0"*	4'-0"	*Locate near help desk, and where video projection is required; width may vary
Media Collaboration Labs	1	4'-0"	4'-0"	
Media Projects Lab	2	12'-0"*	4'-0"	* Width may vary
Conference rooms	1	12'-0"	4'-0"	
Services for Exceptional Children	TBD*			* Varies - contact FCS Capital Improvements staff
Middle				
Classroom/Lab UNO	1	16'-0"	4'-0"	
Music Rehearsal Room	1	16'-0"*	4'-0"	*Marker board with music staffs
CTAE Lab	1*	16'-0"	4'-0"	* May vary - contact FCS Capital Improvements staff
Conference rooms	1	12'-0"	4'-0"	
Services for Exceptional Children	TBD*			* Varies - contact FCS Capital Improvements staff
High				
Typical Classroom UNO	2	16'-0"	4'-0"	
Typical Science Lab UNO	1	16'-0"*	4'-0"	*Sliding; also provide additional 12'x4' fixed board if space allows
Lecture Hall UNO	3*	16'-0"*	4'-0"	*Dimensions may vary depending on room layout
Visual Arts	1	12'-0"	4'-0"	
	1*	16'-0"	4'-0"	*Magnetic, as required
Music Rehearsal Rooms	2*	12'-0"	4'-0"	*(1) marker board with music staffs
CTAE Lab	TBD*			* Varies - contact FCS Capital Improvements staff
Conference rooms	1	12'-0"*	4'-0"	*Dimensions may vary depending on room layout
Services for Exceptional Children	TBD*			* Varies - contact FCS Capital Improvements staff

Tackboard	Quantity	Width	Height	NOTES
Elementary				
K-1	3	8'-0"	3'-0"	
2-5	2	8'-0"	4'-0"	
2-5	1	6'-0"	3'-0"	
2-5	1	4'-0"	4'-0"	
Art	1	8'-0"	3'-0"	
Music	2	6'-0"	4'-0"	
Media Center	2*	8'-0"	3'-0"	*Projects Lab, IT Support workroom
Administration - PTA Office	1	8'-0"	4'-0"	
Speech	1	8'-0"	4'-0"	
Services for Exceptional Children	TBD*			* Varies - contact FCS Capital Improvements staff
Middle & High				
Typical Instructional Unit, UNO	1	8'-0"	4'-0"	
Special Education	TBD*			* Varies - contact FCS Capital Improvements staff

DEDICATION PLAQUE PARAMETERS

OVERALL DIMENSIONS

- 20” wide x 30” high

SCHOOL NAME

- Should reflect school’s official name at time of opening (no abbreviations)

FULTON COUNTY BOARD OF EDUCATION

- List as “Fulton County Board of Education” – not “Fulton County School Board,” “Fulton County BOE” or “Fulton County Schools”
- List should reflect all Board Members in office at the time the project began as well as all Board Members in office at the time the project ends/building opens
    - List the Board Members in alphabetical order
    - Do not list district or president/vice president designations
    - Doctorates should be listed as Ed.D. or Ph.D. after the name

SUPERINTENDENT

- Should reflect the superintendent in office at the time the project ends/building opens
- Doctorates should be listed as Ed.D. or Ph.D. after the name
- If there is not a permanent superintendent, “interim” should be noted in parentheses after the individual’s name.
  Example: John Doe, Ed.D. (interim)

CONSTRUCTION TEAM

- Contractor, architect and program manager should be listed accordingly

FUNDING SOURCE

- Funding source should be list as ESPLOST (no I, II, etc.) unless there is a different funding source

SEE FOLLOWING PAGE FOR SAMPLE LAYOUT

CRABAPPLE MIDDLE SCHOOL

2021

Fulton County Board of Education

BOARD MEMBERS

Julia C. Bernath
Linda P. Bryant
Gail Dean
Kimberly Dove
Linda McCain
Katie Reeves
Katha Stuart
Franchesca Warren

SUPERINTENDENT

Mike Looney, Ed.D.

Contractor	Evergreen Construction
Architect	Stevens & Wilkinson
Program Manager	Jacobs

Construction Funded By ESPLOST

MANUFACTURED CASEWORK SCHEDULE

Elementary School	Quantity*	Comments
	* Linear footage is approximate	
K-1 classroom, SEC classroom		
24" deep base cabinet unit with sink, 3'-0" wide 4-drawer unit, and balance closed cabinets with shelves	10 LF MIN	
Cubbies - double row, 12" deep	32 cubbies	Provide 4" base
14" deep x 30" high upper shelving units	10 LF MIN	Kindergarten only
18" deep x 24" high upper shelving bins	8 LF MIN	
2-5 classroom		
24" deep base cabinet unit with sink, 3'-0" wide 4-drawer unit, and balance closed cabinets with shelves	10 LF MIN	
Art		
30" deep base cabinet unit with (2) sinks, (3) 2'-9" wide 4-drawer units, (3) 3'-0" wide roll-out shelving (5 shelves), and balance closed cabinets with shelves	40 LF	
30" deep computer workstation counter; provide grommets for computer cables	9 LF	
14" deep upper storage units with (4) 3'-0" wide closed cabinets, and balance open shelving	32 LF	
Art Storage Room		
84" high x 48" wide x 24" deep storage cabinet, 2 door	3 EA	
Metal storage shelving		See DIVISION 10 - Specialties
Music		
13" deep storage shelving with countertop	12 LF	
13" deep general bookshelves (tall)	6 LF	
Music storage		
84" high x 24" deep storage shelving w/ 5 adjustable shelves	12 LF MIN	
Media Reading Room		

Elementary School	Quantity*	Comments
13" deep general bookshelves	TBD	Wall shelving quantity to be determined by Media and Educational Technology Department
Circulation Desk		
30" deep work surface with (1) book return slot and clear space underneath for (1) mobile book cart, (3) 18" wide lockable drawer storage, (1) 36" wide lockable cabinet storage, and (2) 24" wide open adjustable shelving	20 LF	
30" deep work surface with (2) computer stations, and knee space for attendant	9 LF	
Media Projects Lab		
30" deep base cabinet unit with sink, and balance closed cabinets with shelves	10 LF	
30" deep computer work surface with (4) computer workstations; provide grommets for computer cables	10 LF	
84" high x 36" wide x 30" deep storage cabinet	2 EA	
Technology Safe Vault/IT Support		
30" deep work surface w/ (2) 18" wide file drawers, (1) 36" wide storage unit with drawer, and knee space for balance	20 LF	
84" high x 36" wide x 30" deep storage cabinet	2 EA	
14" deep x 30" high upper shelving units	20 LF	
Media A/V Production & Storage		
30" deep base cabinet unit with, (2) 3'-0" wide 7-drawer units, (2) 18" wide 4-drawer base storage units, and balance computer workstation; provide grommets for computer cables	16 LF	
84" high x 36" wide x 30" deep storage cabinet	2 EA	
14" deep upper storage units with open shelving	16 LF	
Media Office		

Elementary School	Quantity*	Comments
24" deep base cabinet unit with sink, (2) 3'-0" wide 7-drawer units, and balance closed cabinets with shelves	16 LF	
14" deep upper storage units with (4) 3'-0" wide closed cabinets, and balance open shelving	18 LF	
30" deep computer workstation counter w/ drawer; provide grommets for computer cables	7 LF	
Administrative Conference Room		
24" deep base cabinet unit with drawer and storage	7 LF	
Entrance Lobby (sign-in counter)		
24" deep base cabinet unit with (2) 18" wide 4-drawer units, and balance storage cabinets w/ drawer; provide grommets for computer cables.	9 LF	
24" deep base cabinet storage w/ 23" deep display unit w/ lockable sliding glass doors and glass shelves	2 EA	Display unit to sit on base cabinet
Reception work counter (behind desk)		
24" deep base cabinet unit with (2) 24" wide 4-drawer units, and balance storage cabinets w/ drawer	10 LF	
Reception Desk		
24" deep (min) x 30" high work surface with knee space, (2) 24" wide cabinets, and (2) 18" wide drawer units. Provide additional elevated 12-18" wide countertop section, with 4'-0" min clear for accessible access on either side	20 LF	L-shaped or U-shaped layout preferred. Desk location and configuration to take front entry sightlines into consideration
Mail/Work/Copy Room		
24"deep base cabinets with (2) 18" wide drawer units and balance storage cabinets with drawer	9 LF	
14" deep x 30" high upper storage cabinets	9 LF	
14" deep mailbox slots (4"x11" CLR x 120 EA)	12 LF +/-	Mailboxes to sit on work surface

Elementary School	Quantity*	Comments
24" deep work surface with adjustable shelving below	12 LF +/-	
Kitchenette		
24" deep base cabinet unit with sink, and balance closed cabinets with shelves	7 LF	
14" deep upper storage cabinets	7 LF	
Clinic		
24" deep base cabinet unit with sink, (1) 2'-0" wide 4-drawer units, and balance closed cabinets with shelves	8 LF	
14" deep upper storage cabinets	8 LF	
Teacher Dining		
24" deep base cabinet unit with sink, and balance closed cabinets with utensil drawer	12 LF	Provide space at one end for full size refrigerator (N.I.C.)
14" deep upper storage cabinets	6 LF	
Kitchen Manager's office		
24" deep work surface w/ (2) 18" wide file drawers, (1) 18" wide storage unit with drawer, and knee space for balance	14 LF	
14" deep upper storage shelving	14 LF	
84" high x 36" wide x 24" deep storage cabinet with adjustable shelving	1 EA	

Middle School	Quantity*	Comments
	* Linear footage is approximate	
Typical Classroom & SEC Classroom		
84" high x 36" wide x 24" deep Teacher cabinet, 2 drawers, adjustable shelving and coatrack	1 EA	
84" high x 36" wide x 24" deep storage cabinet with adjustable shelving	1 EA	
Science Lab		
24" deep base cabinet w/ (6) 30" wide sink cabinets, (14) 15" wide 4-drawer units, and balance storage cabinets with drawer	52 LF	Provide locks on 50% of drawers and cabinets; student sinks to have (2) faucets; dual water/gas
30" high x 24" wide x 12" deep upper storage cabinet with glass doors	13 EA	Provide locks on 50% of cabinets
5'-6" wide x 30" deep demo table with sink, (1) 24" wide 4-drawer unit, and cabinet storage	1 EA	Provide gas service at demo table; provide locks on drawers and cabinets
Science Prep Workroom		
24" deep base cabinets w/ 36" wide sink cabinet and balance storage cabinets with drawer	24 LF	
36" wide x 12" deep upper storage cabinet with glass doors	21 LF	
Art		
30" deep base cabinet unit with (2) sinks, (4) 1'-6" wide 4-drawer units, (2) 3'-0" wide vertical divider cabinets, (2) 3'-0" wide pull-out shelving (2" o.c. vertical), and balance closed cabinets with shelves	45 LF	
30" deep computer workstation counter; provide grommets for computer cables	10 LF	
14" deep upper storage units with (4) 3'-0" wide closed cabinets, and balance open shelving	20 LF	
Art Storage Room		
84" high x 48" wide x 24" deep storage cabinet, 2 door	3 EA	
Metal storage shelving		See DIVISION 10 - Specialties

Middle School	Quantity*	Comments
Band Classroom		
84" high Music storage shelving designed to accommodate an assortment of band instruments	45 LF	Coordinate with FCS Capital Improvements staff
Band Instrument Storage		
24" deep base cabinet with 20 tote trays	4 LF	
14" deep upper storage cabinets	4 LF	
84" high x 36" wide x 24" deep Teacher cabinet, 2 drawers, adjustable shelving and coatrack	1 EA	
84" high x 36" wide x 24" deep storage cabinet with adjustable shelving	1 EA	
24" deep tall sheet music storage cabinet w/ pull out shelving (2" o.c. vertical)	4 LF	
84" high x 30" deep adjustable shelving	12 LF	
Choral Classroom		
30" high x 24" deep shelving units	12 LF	
84" high x 36" wide x 24" deep Teacher cabinet, 2 drawers, adjustable shelving and coatrack	1 EA	
84" high x 36" wide x 24" deep storage cabinet with adjustable shelving	1 EA	
24" deep tall sheet music storage cabinet w/ pull out shelving (2" o.c. vertical)	4 LF	
Choral Storage		
84" high x 12" deep storage shelving	50 LF	
Orchestra Classroom		
30" high x 24" deep shelving units	12 LF	
84" high x 36" wide x 24" deep Teacher cabinet, 2 drawers, adjustable shelving and coatrack	1 EA	
84" high x 36" wide x 24" deep storage cabinet with adjustable shelving	1 EA	
84" high x 48" wide x 24" deep sheet music storage cabinet w/ pull out shelving (2" o.c. vertical)	1 EA	

Middle School	Quantity*	Comments
84" high storage shelving designed to accommodate an assortment of orchestra instruments	12 LF	Coordinate with FCS Capital Improvements staff
Orchestra Instrument Storage		
84" high music storage shelving designed to accommodate an assortment of orchestra instruments	20 LF	Coordinate with FCS Capital Improvements staff
Music storage cubbies 16" high x 12" wide x 30" deep	20 cubbies	Coordinate with FCS Capital Improvements staff
CTAE Classrooms		
Casework requirements to be determined based on program requirements at individual school		
Media Reading Room		
13" deep general bookshelves	TBD	Wall shelving quantity to be determined by Media and Educational Technology Department
Circulation Desk		
30" deep work surface with (1) book return slot and clear space underneath for (1) mobile book cart, (3) 18" wide lockable drawer storage, (1) 36" wide lockable cabinet storage, and (2) 24" wide open adjustable shelving	20 LF	Desk may be arranged in two sections surrounding work/staff area
30" deep work surface with (2) computer stations, and knee space for attendant	9 LF	
Media Projects Lab		
30" deep base cabinet unit with sink, and balance closed cabinets with shelves	12 LF	
84" high x 36" wide x 30" deep storage cabinet	1 EA	
Technology Safe Vault/IT Support		
30" deep work surface w/ (2) 18" wide file drawers, (1) 36" wide storage unit with drawer, and knee space for balance	20 LF	
14" deep upper shelving units	20 LF	

Middle School	Quantity*	Comments
84" high x 36" wide x 30" deep storage cabinet	2 EA	
Media A/V Production & Storage		
30" deep base cabinet unit with (2) 18" wide cabinet storage with drawer and shelves, and balance computer workstations; provide grommets for computer cables	16 LF	
14" deep upper storage units with open shelving	16 LF	
84" high x 36" wide x 30" deep storage cabinet	2 EA	
Media Office		
24" deep base cabinet unit with sink, (1) 18" wide 4-drawer unit, and balance closed cabinets with drawer and shelves	9 LF	
14" deep upper storage units with open shelving	9 LF	
PE Storage		
Metal storage shelving		See DIVISION 10 - Specialties
Concessions		
24" deep work surface w/ (2) 36" wide storage cabinets with drawer	20 LF	Provide space at one end for full size refrigerator (N.I.C.); coordinate with ice machine location
14" deep upper storage units with 3 LF open shelving, and balance closed cabinets	7 LF	
Administrative Conference Room		
24" deep base cabinet unit with drawer and storage	12 LF MIN	
Reception Desk/Sign-in		
24" deep (min) x 30" high work surface with knee space, (2) 24" wide cabinets, and (2) 18" wide drawer units. Provide additional elevated 12-18" wide countertop section, with 4'-0" min clear for accessible access on either side	18 LF	L-shaped or U-shaped layout preferred. Desk location and configuration to take front entry sightlines into consideration

Middle School	Quantity*	Comments
Mail/Work/Copy Room		
24"deep base cabinets with (2) 18" wide drawer units and balance storage cabinets with drawer	12 LF	
14" deep x 30" high upper storage cabinets	12 LF	
14" deep mailbox slots (4"x11" CLR x 120 EA)	12 LF +/-	Mailboxes to sit on work surface
24" deep work surface with adjustable shelving below	12 LF +/-	
Break Room		
24" deep base cabinet unit with sink, (1) 18" wide 4-drawer unit, and balance closed cabinets with drawer and shelves	12 LF	Provide space at one end for full size refrigerator (N.I.C.)
14" deep upper storage cabinets	6 LF	
Clinic		
24" deep base cabinet unit with sink, (1) 2'-0" wide 4-drawer units, and balance closed cabinets with shelves	8 LF	
14" deep upper storage cabinets	8 LF	
84" high x 36" wide x 24" deep storage cabinet	2 EA	
Teacher Dining		
24" deep base cabinet unit with sink, and balance closed cabinets with utensil drawer	12 LF	Provide space at one end for full size refrigerator (N.I.C.)
14" deep upper storage cabinets	6 LF	
Kitchen Manager's office		
24" deep work surface w/ (2) 18" wide file drawers, (1) 18" wide storage unit with drawer, and knee space for balance	14 LF	

High School	Quantity*	Comments
	* Linear footage is approximate	
Typical Classroom & SEC Classroom		
84" high x 36" wide x 24" deep Teacher cabinet, 2 drawers, adjustable shelving and coatrack	1 EA	
Teacher Planning Rooms		
24" deep x 60" wide workstation, including work surface, 18" wide 3- drawer unit, and 14" deep upper cabinets	VARIES	Quantity dependent on classrooms served
Base and/or tall storage shelving	VARIES	Quantity dependent on classrooms served
Biology/Anatomy/Chemistry Lab		
36" high x 21" deep base cabinet w/8 sinks (between tables) and open storage at table locations	60 LF MIN	Provide dual water/gas; provide ADA accessibility as required
36" high x 42" wide x 60" long 4-student peninsula table integral with wall base cabinet	8 EA	
36" high x 21" deep base cabinet w/(2) 36" wide sink cabinets and balance storage cabinets with drawer	15 LF	
30" high x 36" wide x 12" deep upper storage cabinet with glass doors	4 EA	
Pegboard w/ drip trough	2 EA	
48" wide base cabinet w/ fume hood	1 EA	Provide combination hot & cold water/gas
72" wide x 30" deep teacher demo table with sink, (1) 24" wide 4-drawer unit, and cabinet storage	1 EA	Provide combination hot & cold water/gas; provide drop-in cover for sink
Physical Science Lab		
21" deep base cabinets w/ (2) 36" wide sink cabinet and balance storage cabinets with drawer	30 LF MIN	Provide ADA accessibility as required
30" high x 36" wide x 12" deep upper storage cabinet with glass doors	8 EA	
Pegboard w/ drip trough	1 EA	
72" wide x 30" deep demo table with sink, (1) 24" wide 4-drawer unit, and cabinet storage	1 EA	Provide combination hot & cold water/gas; provide drop-in cover for sink
48" wide base cabinet w/ fume hood	1 EA	Provide combination hot & cold water/gas

High School	Quantity*	Comments
Science Prep Workroom		
36" high x 21" deep base cabinets w/ (1) 36" wide sink cabinet, 24" wide dishwasher, and balance storage cabinets with drawer	17 LF	Note: room also requires space for residential refrigerator
36" high x 18" wide x 21" deep 4-drawer cabinet	1 EA	
30" high x 36" wide x 12" deep upper storage shelves	5 EA	
Pegboard w/ drip trough	1 EA	
65" high x 18" deep storage cabinet	7 LF +/-	
84" high x 24" deep storage cabinet with glass doors	18 LF	
84" high x 16" deep open storage shelving	18 LF	
Visual Arts - Drawing and Painting Lab		
36" high x 30" deep base cabinet unit with (2) 36" wide sink cabinets, (2) 48" wide 6-drawer units, (8) 36" wide storage cabinets with drawer	40 LF	Provide ADA accessibility as required
20" deep x 58" wide stainless steel sink with integral drainboard	1 EA	
14" deep upper storage units with (8) 3'-0" wide closed cabinets, and balance open shelving	40 LF	
84" high x 48" wide x 24" deep tote tray storage cabinet, 2 door	1 EA	
84" high x 48" wide x 24" deep drawing board storage cabinet, 2 door	1 EA	
84" high x 36" wide x 22" deep open folio shelving (drying rack)	1 EA	
84" high x 36" wide x 24" deep Teacher cabinet, 2 drawers, adjustable shelving and coatrack	1 EA	
Visual Arts - 3-D Lab		
36" high x 30" deep base cabinet unit with (1) 36" wide sink cabinet, and balance storage cabinets with drawer	30 LF	Provide ADA accessibility as required
20" deep x 58" wide stainless steel sink with integral drainboard	2 EA	
36" high work surface w/ wall braces	6 LF	

High School	Quantity*	Comments
14" deep upper storage units with (8) 3'-0" wide closed cabinets, and balance open shelving	40 LF	
60" high x 48" wide x 24" deep clay wedging table	1 EA	
84" high x 48" wide x 24" deep tote tray storage cabinet, 2 door	1 EA	
84" high x 48" wide x 24" deep drawing board storage cabinet, 2 door	1 EA	
84" high x 36" wide x 24" deep Teacher cabinet, 2 drawers, adjustable shelving and coatrack	1 EA	
Visual Arts - 2-D Digital Media Lab		
36" high x 30" deep base cabinet unit with (1) 36" wide sink cabinet, (1) 48" wide 5-drawer units, (8) 3'-0" wide storage cabinets with drawer	30 LF	Provide ADA accessibility as required
20" deep x 58" wide stainless steel sink with integral drainboard	1 EA	
14" deep upper storage units with (8) 3'-0" wide closed cabinets, and balance open shelving	25 LF	
84" high x 48" wide x 24" deep tote tray storage cabinet, 2 door	1 EA	
84" high x 48" wide x 24" deep drawing board storage cabinet, 2 door	1 EA	
84" high x 36" wide x 24" deep Teacher cabinet, 2 drawers, adjustable shelving and coatrack	1 EA	
Photographic Dark Room		
30" deep x 36" wide x 34" high enlarging stations with 96" high dividers	10 EA	
84" high x 36" wide x 24" deep open folio shelving (drying rack)	1 EA	
36" high x 30" deep base cabinets w/ drawer	12 LF	
30" high x 12" deep upper storage cabinets	12 LF	
30" deep x 72" wide x 34" high photographic sink	1 EA	Basis of design: Kreolab 3475E1SH
Art Storage Room (each)		

High School	Quantity*	Comments
84" high x 48" wide x 24" tall storage cabinet, 2 door	2 EA	
84" high x 36" wide x 24" deep tote tray storage cabinet, 2 door	2 EA	
Metal storage shelving		See DIVISION 10 - Specialties
Band Classroom		
Instrument storage casework to be located in the instrument storage rooms where possible		
84" high x 36" wide x 24" deep Teacher cabinet, 2 drawers, adjustable shelving and coatrack	1 EA	
Band Instrument Storage		
84" high Music storage shelving designed to accommodate an assortment of band instruments	75 LF	Coordinate with FCS Capital Improvements staff
Sousaphone wall mounting brackets	8 EA	
Percussion Storage		
54" high x 36" deep built in carpeted wood shelf	30 LF	
10'-4" high x 36" deep built-in wood shelving with 3 carpeted shelves: 3'-8" AFF, 7' AFF, and 10'-4" AFF	30 LF	
Uniform Storage		
28" deep built-in uniform storage with 2 carpeted shelves with hanging rods below at 6'-0" AFF and 9'-8" AFF	30 LF	
9'-2" high x 36" deep storage shelving with 4 carpeted shelves: 3'-8", 5'-6", 7'-4", and 9'-2" AFF	25 LF	
Instrument Repair/Library		
36" high x 24" deep base cabinets w/ (1) 36" wide sink cabinet, (1) 18" wide 3-drawer unit, and balance storage cabinets with drawer	8 LF	
10'-4" high x 36" deep built-in wood shelving with 3 carpeted shelves: 3'-8" AFF, 7' AFF, and 10'-4" AFF	8 LF	

High School	Quantity*	Comments
Metal storage shelving		See DIVISION 10 - Specialties
Choral Classroom		
84" high x 36" wide x 24" deep Teacher cabinet, 2 drawers, adjustable shelving and coatrack	1 EA	
Choral Storage		
28" deep built-in uniform storage with 2 carpeted shelves with hanging rods below at 6'-0" AFF and 9'-8" AFF	18 LF	
10'-4" high x 36" deep built-in wood shelving with 3 shelves: 3'-8" AFF, 7' AFF, and 10'-4" AFF	22 LF	
Choral Library/Office		
File cabinets, N.I.C.		
Orchestra Classroom		
Instrument storage casework to be located in the instrument storage rooms where possible		
84" high x 36" wide x 24" deep Teacher cabinet, 2 drawers, adjustable shelving and coatrack	1 EA	
Orchestra Instrument Storage		
84" high storage shelving designed to accommodate an assortment of orchestra instruments	48 LF	Coordinate with FCS Capital Improvements staff
Orchestra Uniform Storage		
28" deep built-in uniform storage with 2 carpeted shelves with hanging rods below at 6'-0" AFF and 9'-8" AFF	40 LF	
Orchestra Library/Office		
File cabinets, N.I.C.		
Black Box Theater storage		

High School	Quantity*	Comments
24" deep base cabinet with 36" wide sink and balance storage cabinets with drawer	9 LF	
CTAE Classrooms		
Casework requirements to be determined based on program requirements at individual school		
Media Reading Room		
82" high x 13" deep general bookshelves	TBD	Wall shelving quantity to be determined by Media and Educational Technology Department
Circulation Desk		
30" deep work surface with (1) book return slot and clear space underneath for mobile book cart, (3) 18" wide lockable drawer storage, (1) 36" wide lockable cabinet storage, and (2) 24" wide open adjustable shelving	20 LF	Desk may be arranged in two sections surrounding work/staff area
30" deep work surface with (2) computer workstations and knee space for attendant; provide grommets for computer cables	9 LF	
Media Projects Laboratory		
30" deep base cabinet unit with 36" wide sink cabinet, and balance cabinets with drawer	12 LF	
84" high x 12" deep open shelving	9 LF	
84" high x 36" wide x 30" deep storage cabinet	1 EA	
Technology Safe Vault/ IT Support		
30" deep work surface w/ (2) 18" wide file drawers, (1) 36" wide storage unit with drawer, and knee space for balance	20 LF	
84" high x 36" wide x 30" deep storage cabinet	2 EA	
14" deep x 30" high upper shelving units	20 LF	
Media A/V Production & Storage		

High School	Quantity*	Comments
30" deep base cabinet unit with (2) 18" wide cabinet storage with drawer and shelves, and balance computer workstations; provide grommets for computer cables	16 LF	
14" deep upper storage units with open shelving	16 LF	
84" high x 36" wide x 30" deep storage cabinet	2 EA	
Media Office		
24" deep base cabinet unit with sink, (1) 18" wide 4-drawer unit, and balance closed cabinets with drawer and shelves	9 LF	
14" deep upper storage units with open shelving	9 LF	
Training Room		
34" high x 24" deep base cabinet unit with (1) 36" wide sink cabinet, and balance storage cabinets with drawer	12 LF	Provide ADA accessibility as required
Health Classroom (each)		
34" high x 24" deep base cabinet unit with (1) 36" wide sink cabinet, and balance storage cabinets with drawer	12 LF	
84" high x 36" wide x 24" deep Teacher cabinet, 2 drawers, adjustable shelving and coatrack	1 EA	
Concessions		
24" deep base cabinet w/ (1) 36" wide sink cabinet, (1) 48" wide sink cabinet for triple sink, (4) 18" wide drawer units, and balance storage cabinets with drawer	25 LF	Provide space at one end for full size refrigerator (N.I.C.); coordinate with ice machine location
24" deep work surface with wall brackets	5 LF	Provide at concession window
Administrative Conference Rooms		
24" deep base cabinet unit with drawer and storage	12 LF MIN	
Reception Desk/Sign-in		

High School	Quantity*	Comments
24" deep (min) x 30" high work surface with knee space, (2) 24" wide cabinets, and (2) 18" wide drawer units. Provide additional elevated 12-18" wide countertop section, with 4'-0" min clear for accessible access on either side	16 LF	L-shaped or U-shaped layout preferred. Desk location and configuration to take front entry sightlines into consideration
Mail/Work/Copy Room		
24"deep base cabinets with (2) 18" wide drawer units and balance storage cabinets with drawer	15 LF	
14" deep upper storage cabinets	15 LF	
14" deep mailbox slots (4"x11" CLR x 120 EA)	12 LF +/-	Mailboxes to sit on work surface
24" deep work surface with adjustable shelving below	12 LF +/-	
Attendance Office		
34" high work surface with knee space and (2) 18" wide drawer units	9 LF	Coordinate with Attendance check-in window
34" high base cabinets with storage	5 LF	
Break Room		
24" deep base cabinet unit with sink, (1) 18" wide 4-drawer unit, and balance closed cabinets with drawer and shelves	12 LF	Provide space at one end for full size refrigerator (N.I.C.)
14" deep upper storage cabinets	6 LF	
Clinic		
24" deep base cabinet unit with sink, (1) 2'-0" wide 4-drawer units, and balance closed cabinets with shelves	8 LF	
14" deep upper storage cabinets	8 LF	
84" high x 36" wide x 24" deep storage cabinet	2 EA	
Career Center		
24" deep x 36" high base cabinet with storage cabinets and drawer	6 LF	Coordinate location with student services work area
14" deep upper storage cabinets	6 LF	
PTSA Office		

High School	Quantity*	Comments
24" deep base cabinet unit with sink, and (2) 18" wide 4-drawer units	6 LF	
Teacher Dining		
24" deep base cabinet unit with 36" wide sink cabinet, and balance closed cabinets with utensil drawer	12 LF	Provide ADA accessibility as required; provide space at one end for full size refrigerator (N.I.C.)
14" deep upper storage cabinets	6 LF	
Kitchen Manager's office		
24" deep work surface w/ (2) 18" wide file drawers, (1) 18" wide storage unit with drawer, and knee space for balan	14 LF	

THEATRICAL SYSTEMS AND ACCESSORIES

NOTE: These requirements are currently under further development. Architect shall contact FCS Capital Improvements for updated system requirements, as well as requirements for the stage equipment designer.

Architects shall be responsible for employing a qualified professional stage equipment designer to develop appropriate design and construction documents for auditoriums, black box theaters, and other performance studios. See additional design and construction requirements below. These requirements apply to new construction.

6. HIGH SCHOOL AUDITORIUM SOUND SYSTEMS

6.1. General

6.1.1. The equipment specified is based on equipment as manufactured by Rauland and other specialty manufacturers furnished by SWC/Richardson TSI, Atlanta, Georgia, the local authorized distributor, or approved equal by Executone or Toa.

6.1.2. The audio System Contractor shall furnish all low voltage wiring required for a fully operational system. The Audio Equipment Contractor shall be an authorized dealer for all equipment provided under this section in order to assure availability of parts and service.

6.2. Description of System

6.2.1. The Sound System shall provide at least the following features and functions:

6.2.1.1. Provide microphone pickup at outlet locations designated on the drawings.

6.2.1.2. Provide single microphone “set up” for simplified public address when the multi-channel mixer is not required.

6.2.1.3. Provide power keyswitch and volume control for simplified single mic use from stage area.

6.2.1.4. Provide audio assistance system for the hearing impaired.

6.2.1.5. Provide stage communications system as outlined in the specifications.

6.2.1.6. Provide eight channels of wireless microphones

6.2.1.7. Provide for system disconnect when fire alarm is activated.

6.2.1.8. Provide cabling, switching and mounting infrastructure for owner furnished projector.

6.3. Products

6.3.1. General

6.3.1.1. Contractor shall provide and install all distribution amplifiers, mounts, cables, wiring, low voltage cable runs, connections and electrical multi-plugs to make below stated systems operational.

6.3.2. AUDIO MIXER/EXPANDERS

6.3.2.1. The control surface shall feature 25 fader strips in 6 layers and be capable of handling 48 channels. The console shall be Allen & Heath SQ-6. Provide one (1).

6.3.2.2. The audio expander rack shall accommodate 24 mic/line inputs and 12 outputs. The expander shall be Allen & Heath AR2412. Provide one (1) mounted within amplifier equipment rack.

6.3.2.3. The audio expander rack shall accommodate 16 mic/line inputs and eight outputs. The expander shall be Allen & Heath AB168. Provide one (1) with rack mount to be mounted within amplifier equipment rack.

6.3.3. SYSTEMS PROCESSOR

6.3.3.1. The 19” rack mount 12 in/8 out processor shall provide EQ, compression, and delay for the main/sub/fill speaker systems as well as delay for the lobby speakers and

hearing assistance systems. Acceptable: Biamp TesiraFORTE A1. Quantity: One (1) each with EX-LOGIC interface.

6.3.4. REMOTE VOLUME CONTROL

6.3.4.1. The remote control shall mount within a single gang box adjacent to the stage. Acceptable: Biamp TEC-1i Quantity: One (1) each

6.3.5. AUDIO POWER AMPLIFIER (MAINS/DELAYS)

6.3.5.1. The four channel power amplifier shall provide 1500 watts/channel into 8 ohms (stereo mode) and 5000 watts into 4 ohms (bridge mode). Acceptable: Danley DNA 10K4 PRO. Quantity: Two (2) each

6.3.6. AUDIO POWER AMPLIFIER (SUBS)

6.3.6.1. The four channel power amplifier shall provide 2500 watts into 4 ohms (bridge mode). Acceptable: Danley DNA5K4C. Quantity: One (1) each

6.3.6.2. AUDIO POWER AMPLIFIER (STAGE MONITORS)

6.3.6.3. The four channel power amplifier shall provide 300 watts/channel into 8 or 4 ohms. Acceptable: Crown DCi 4/300. Quantity: One (1)

6.3.7. AUDIO POWER AMPLIFIER (DISTRIBUTED SPEAKERS)

6.3.7.1. The power amplifier shall provide 300 watts/channel into a 70v line. Acceptable: Crown DCi 2/300. Quantity: One (1) each

6.3.8. WIRELESS MICROPHONE SYSTEM

6.3.8.1. The wireless system shall provide eight channels of UHF operation with both handheld and body pack transmitters/lavalier & headset mics.

6.3.8.2. The combo system shall be Shure QLXD124/85. Quantity: Eight (8).

6.3.8.3. The headset microphone shall be Shure MX153. Quantity: Eight (8).

6.3.8.4. The antenna distribution unit shall be Shure UA844+SWB/LC. Quantity: Two (2)

6.3.8.5. The active antenna amplifier shall be Shure UA834WB. Quantity: Two (2)

6.3.9. FRONT OF HOUSE SPEAKER SYSTEM (CENTER)

6.3.9.1. The front of house speaker system shall consist of 11 drivers operating as a single horn. The coverage pattern shall be 90 degrees horizontal by 60 degrees vertical. Sensitivity @1m, 2.3v input shall be 101 dBSPL. Power handling shall be 1400 watts continuous, 2800 watts program. Acceptable: Danley Sound Labs SH-96 Quantity: One (1). Architect to advise color.

6.3.10. DELAYED SPEAKER SYSTEM (CENTER)

6.3.10.1. The delayed speaker system shall consist of 11 drivers operating as a single horn. The coverage pattern shall be 90 degrees horizontal by 60 degrees vertical. Sensitivity @1m, 2.3v input shall be 101 dBSPL. Power handling shall be 1400 watts continuous, 2800 watts program. Acceptable: Danley Sound Labs SH-96 Quantity: One (1). Architect to advise color.

6.3.11. FRONT OF HOUSE SPEAKER SYSTEM (LEFT AND RIGHT)

6.3.11.1. The front of house speaker system shall consist of 2 12” woofers, 6 4” mids and a 1” HF driver. Power handling shall be 1000 watts continuous and 4000 watts peak. Sensitivity @1m, 2.3v input shall be 100 dBSPL. Acceptable: Danley Sound Labs SH60 Quantity: Two (2) Architect to advise color.

6.3.12. DELAYED SPEAKER SYSTEM (LEFT AND RIGHT)

6.3.12.1. The delayed speaker system shall consist of 2 12” woofers, 6 4” mids and a 1” HF driver. Power handling shall be 1000 watts continuous and 4000 watts peak.

Sensitivity @1m, 2.3v input shall be 100 dBSPL. Acceptable: Danley Sound Labs SH60 Quantity: Two (2) Architect to advise color.

6.3.13. SUBWOOFER SPEAKER SYSTEMS

6.3.13.1. The subwoofer speaker system shall consist of an eighteen inch driver for low frequency coverage. The power handling capacity shall be 1700 watts continuous, 6800 watts peak. Sensitivity shall be 108dB (measured as 2.83V referenced to 1M by 28.3V@10m distance) Acceptable: Danley Sound Labs TH-118 Quantity: Two

6.3.13.2. (2) Architect to advise color.

6.3.14. STAGE MONITOR SPEAKER SYSTEM

6.3.14.1. The stage monitor speaker system shall consist of a single 8" woofer and 1.25" exit high frequency driver with 115 degree conical coverage. Acceptable: Community MX8 Quantity: Four (4) w/25' cables

6.3.15. LOBBY/DRESSING ROOM SPEAKER

6.3.15.1. Shall consist of a 6.5" low frequency transducer and a coaxially mounted ¾" high frequency driver. The speaker assembly shall be complete with back box, grill and support. Acceptable: JBL Control 26CT Quantity: As required.

6.3.16. C0STUME CONSTRUCTION ROOM SPEAKER

6.3.16.1. Shall consist of a 5" CMMD woofer and two 3/4" fluid cooled tweeter. The speaker assembly shall be complete with u-bracket mount and transformer. Acceptable: JBL HST Quantity: As required.

6.3.17. VOLUME CONTROL

6.3.17.1. Shall be rated for 25 watts of power handling and mount in a single gang box. Acceptable: Lowell 25LVC; Quantity: As required.

6.3.18. VOLUME CONTROL

6.3.18.1. Shall be rated for 50 watts of power handling and mount in a single gang box. Acceptable: Lowell 50LVC; Quantity: As required.

6.3.19. ASSISTIVE LISTENING SYSTEM

6.3.19.1. The FM wireless listening system shall be designed for use by hearing impaired people. The system shall operate on special FM channels reserved for hearing assistance by the Federal Communications Commission.

6.3.19.2. The transmitter shall operate in the 72-76 MHZ Auditory Assistance Band approved by the FCC. Unit shall feature digitally selectable frequency, universal inputs, remote antenna, power supply and rack mounting hardware.

6.3.19.3. The receiver shall be a body-pack style and include a detachable belt-clip for hands free operation. It shall have a 3.5mm stereo/mono jack and a combination volume control with power on/off rotator dial. Channel selection shall be made by pushing the seek button inside the battery compartment.

6.3.19.4. Acceptable: Williams FM 457-24 PRO Quantity: One (1) system .

6.3.20. AMPLIFIER EQUIPMENT RACK

6.3.20.1. The 44 space, 19" equipment rack shall be constructed of 16 gauge steel. The rack shall be 25" deep.

6.3.20.2. The equipment rack shall include a lockable rear door with two keys, a perforated/vented front door, and a fan top with ambient temperature control.

6.3.20.3. Equipment rack to be provided with caster base. Acceptable: Middle Atlantic ERK-4425 Quantity: One (1) each

6.3.21. POWER SEQUENCING/CONTROL

6.3.21.1. The sequencer shall provide 8 steps for power up/down. Acceptable: Lowell SEQR-8K Quantity: One (1) each

6.3.21.2. Remote control shall be provided by means of a keyswitch with status indicators on a single gang plate. Acceptable: Lowell RPSB2- MKP. Quantities as required.

6.3.21.3. Power switching (15a and 20a) shall be provided by Middle Atlantic M15A and RLM-20A modules mounted within an MPR raceway. Quantities as required.

6.3.21.4. Power Switching (30A) shall be provided by stand alone modules. Acceptable: Lowell RPC-30-SHW. Quantities as required.

6.3.22. PROJECTOR MOUNT

6.3.22.1. Acceptable: Peerless PJF2, PWA-14 wall arm, ACC020 security cable Quantity: One (1) NOTE: Verify compatibility with OWNER FURNISHED PROJECTOR

6.3.23. AUDIO/VIDEO SWITCHER

6.3.23.1. Acceptable: Extron IN1608 xi Quantity: One (1)

6.3.24. A/V REMOTE PANEL

6.3.24.1. Acceptable: Extron MLC Plus 100 Quantity: Two (2)

6.3.25. DTP TRANSMITTER/AV INPUT PANEL (WALL MOUNT)

6.3.25.1. Acceptable: Extron DTP T UWP 4K 332 D Quantity: Three (3)

6.3.26. DTP RECEIVER

6.3.26.1. Acceptable: Extron DTP HDMI 4K 330 RX Quantity: Two (2)

6.3.27. MIXER/AUX CONNECTION JACK

6.3.27.1. The jack plate shall accommodate four (4) RJ45 connectors for interface of mixing console/control surface and/or auxiliary programming/control equipment at mix position with main audio equipment rack

6.3.27.2. Acceptable: Proco Type E. Quantity as required.

6.3.28. MONITOR SPEAKER JACK PLATE

6.3.28.1. The jack plate shall accommodate four (4) Neutrik NL4FC connectors for interface with monitor speakers

6.3.28.2. Acceptable: Proco Type E. Quantity as indicated on prints

6.3.29. MIICROPHONE JACK PLATE (6 INPUTS)

6.3.29.1. The jack plate shall accommodate six (6) female XLR connectors for interface with microphones and auxiliary sources.

6.3.29.2. Acceptable: Proco Type G Quantity as required.

6.3.30. MICROPHONE JACK PLATE (2 INPUTS)

6.3.30.1. The jack plate shall accommodate two (2) female XLR connectors for interface with microphones and auxiliary sources

6.3.30.2. Acceptable: Proco Type B. Quantity as required.

6.3.31. CD/iPOD PLAYER

6.3.31.1. Acceptable: Tascam CD200BT. Quantity: One (1)

6.3.32. HEADPHONES

6.3.32.1. Acceptable: Sennheiser EH250; Quantity: One (1)

6.3.33. HAND-HELD WIRED MICROPHONES

6.3.33.1. Supply unidirectional cardioid microphones with cables and stands. Acceptable: Audix OM2S w/Rauland 1122E stand & 25’ cord. Quantity: Four (4)

6.3.34. OVERHEAD MICROPHONES

6.3.34.1. The microphone shall be suspended from input jacks located over stage. Acceptable: Audix ADX40; Quantity as required

6.3.35. FLOORBOX - The floorbox shall provide accommodation for inputs/outputs as indicated on the drawings.

6.3.35.1. Acceptable: Ace Backstage Full Pocket with necessary panels/adaptors Quantity: As required.

6.3.36. LOW VOLTAGE CABLE

6.3.36.1. Microphone Cable Acceptable: West Penn 291

6.3.36.2. Distributed Speaker Cable Acceptable: West Penn 224

6.3.36.3. Mains Speaker Cable Acceptable: West Penn C207

6.3.36.4. Stage Intercom/Power Control Cable Acceptable: West Penn D430

6.3.36.5. A/V over CAT5 Cable Acceptable: Extron XTP DTP 24

6.3.36.6. CAT5e Cable Acceptable: West Penn 4245

6.3.36.7. Monitor Speaker Cable Acceptable: West Penn 225

6.3.36.8. Antenna Cable Cable Acceptable: West Penn 810

6.3.37. INTERCOM SYSTEM

6.3.37.1. Power Supply: Clearcom PS232; Quantity: One (1) mounted in main equipment rack

6.3.37.2. Single Channel Stations: Clearcom RS701; Quantity: Four (4)

6.3.37.3. Dual Channel Stations: Clearcom RS702; Quantity: Two (2)

6.3.37.4. Headset: Clearcom CC-110; Quantity: Six (6)

6.3.37.5. Dressing Room Station: Clearcom KB702GM with HS-6 handset; Quantity as required

6.3.37.6. Single Channel Wall Plate: Clearcom WP-2; Quantity as required

6.3.37.7. Dual Channel Wall Plate: Clearcom WP-6; Quantity as required.

6.3.37.8. Single Channel Cable: Clearcom IC-25; Quantity: Four (4)

6.3.37.9. Dual Channel Cable: Clearcom IC-25-6; Quantity: Two (2)

6.3.37.10. Wireless Intercom: Clearcom DX210(CZ11513) system complete with remote antennas; Quantity: One (1)

7. HIGH SCHOOL AUDITORIUM LIGHTING EQUIPMENT

7.1. General

7.1.1. One company shall be responsible for the installation of all aspects of the stage equipment in the Auditorium. Work under this section shall include the furnishing of all labor, materials, tools, transportation services, supervision, etc., necessary to complete installation of new stage equipment. Work includes the following: motorized rigging, curtains, tracks, stage lighting, stage/house dimming, and control system

7.1.2. Pre-Approved Stage Equipment Contractors

7.1.2.1. Barbizon

7.1.2.2. Magnum Companies

7.1.2.3. Stage Front

7.1.3. Acceptable Equipment Manufacturers

7.1.3.1. Basis of Design: Electronic Theatre Control of Middleton, Wisconsin

7.2. Equipment

7.2.1. Hoist

7.2.1.1. Hoists shall be purpose-designed and fabricated for overhead lifting of theatre lights, equipment, curtains and scenic elements, whether used on stage, in the auditorium

or other places of public assembly where people shall move beneath the suspended or moving load. The systems shall incorporate mechanical, electrical and safety features that shall be inherent to this equipment; they shall provide an engineered, efficient device for overhead lifting. The mechanical, electrical and safety features of this hoisting and control system shall establish the standard of quality, performance and safety by which hoisting systems of other manufacture shall be evaluated.

7.2.1.2. Basis of design: ETC Prodigy

7.2.2. Stage Dimming and Control System

7.2.2.1. The Stage Equipment Contractor shall be responsible for providing to the electrical contractor all stage lighting and dimming hardware as specifically detailed in these specifications. This shall include:

7.2.2.1.1. Furnishing all equipment specified.

7.2.2.1.2. Hanging of connector strips over stage on specified stage rigging hardware.

7.2.2.1.3. Set-up of the control console.

7.2.2.1.4. Demonstration of equipment to owner's representatives.

7.2.2.1.5. Lamping & hanging all stage lighting fixtures.

7.2.2.1.6. All low voltage lighting control terminations.

7.2.2.2. Control Panel:

7.2.2.2.1. ERN2 Control Panel as manufactured by ETC

7.2.2.3. Additional components:

7.2.2.3.1. Provide complete stage dimming and control system, including Control Panel, Architectural Control Process modules, Station Power modules, Power Control system, Power Control electronics, Dimmer modules, and Relay modules

7.2.3. Branch Circuit Emergency Lighting Transfer Switch

7.2.3.1. Basis of design: ETC SC1008

7.2.4. Network System

7.2.4.1. Basis of design: ETC Net3 network

7.2.5. Control Stations

7.2.5.1. Basis of design: ETC Unison Paradigm Touchscreen P-TS7 Series

7.2.6. Data Plug-in Stations

7.2.7. Power Distribution

7.2.8. Lighting Console and Accessories

7.2.8.1. Microprocessor-based system

7.2.8.2. Basis of design: ETC Ion Xe 20

7.2.9. Architectural LED Running Lights

7.2.9.1. Basis of design: ETC BluesSystem

7.2.10. Lighting Fixtures

7.2.10.1. Color Mixing or White light Emitting Diode Profile fixture

7.2.10.2. Basis of design: ETC Source Four LED Series 2

8. HIGH SCHOOL AUDITORIUM ADDITIONAL EQUIPMENT AND FURNISHINGS

8.1. Stage Curtain System

8.1.1. Automatic Curtain Machine and Track Assemblies

8.1.1.1. Basis of design manufacturer: Automatic Devices Co.

8.1.1.2. Automatic Curtain Machine for Stage Proscenium and Mid-stage traveler curtains: Autodrape Model 2928

8.1.2. Curtains

8.1.2.1. Acceptable manufacturers:
8.1.2.1.1. Georgia Stage, Inc.
8.1.2.1.2. Mainstage Theatrical Supply, Inc.
8.1.2.1.3. Stagecraft Industries, Inc.
8.1.2.1.4. Wenger Corporation
8.1.2.1.5. Fred Krieger Fabrics
8.1.2.2. Fabric
8.1.2.2.1.1. Main stage/proscenium curtain and valance shall be flame-retardant heavy-weight 100% polyester velour, 25 oz, color as selected by Architect from manufacturer's standard colors
8.1.2.2.1.2. Auditorium mid-stage and cyclorama curtains, ceiling borders, and side leg curtains shall be flame-retardant heavy-weight, 100% polyester Nassau Chevron Repp, color as selected by Architect from manufacturer's standard colors
8.1.2.2.1.3. Auditorium Stage rear backdrop curtain shall be flame retardant, heavy-weight, 100% cotton muslin, natural color

8.2. Acoustical Panels
8.2.1. See Section 09 8000 Acoustic Treatment
8.3. Projection Screen
8.3.1. See Section 11 5213 Projection Screens
8.4. Auditorium Seating
8.4.1. See Section 12 6500 Auditorium Seating

9. HIGH SCHOOL BLACK BOX THEATERS

9.1. Audio System
9.1.1. Provide a multi-channel digital mixing console with 24 to 32 channel capability, and iPad control capability
9.1.2. Provide wall mounted production panels with microphone input, monitor output, and intercom
9.1.3. Provide media player with iPad, CD, Bluetooth, and USB connectivity
9.1.4. Provide sound reinforcement speakers with flexible mounting locations (pipe grid or wall), subwoofers, floor monitors, digital audio processing and equalizer system, and multi-channel power amplifiers
9.1.5. Provide portable audio equipment as follows: direct boxes, vocal and instrument microphones, microphone and speaker cables, microphone stands, cases
9.2. Video System
9.2.1. Projector to be provided by FCS IT. Coordinate power and data locations with FCS Capital Improvements staff.
9.2.2. Additional TV monitor(s) to be provided by FCS IT. Coordinate power and data locations with FCS Capital improvements staff.
9.3. Control System
9.3.1. Touch panel control system or PC based control system for AV functions
9.3.1.1. Provide additional control panel at wall
9.3.1.2. Master on/off switch, source selection, source volume, master volume, camera presets, record start/stop, screen up/down
9.4. Black Box Stage Lighting
9.4.1. LED ellipsoidal color changing spots and LED PAR color changing/color wash

9.4.2. Grid and wall connections
9.4.3. Digital lighting console with touch screens
9.4.4. Dimming panel to control house and stage fixtures
9.4.5. Network gateways on lighting and pipe grid

9.5. Theater Curtains
9.5.1. Provide full-height moveable curtain panels for flexible configuration
9.5.1.1. Provide along full length of teaching wall on walk-along manual track
9.5.1.2. Curtains shall be black, 50% fullness

9.6. Pipe Grid
9.6.1. Provide 1.5” schedule 40 pipe grid to support lighting and audio equipment
9.6.1.1. 5’ to 6’ on center as required
9.6.1.2. Ceiling or wall mounted as required

9.7. Other
9.7.1. Provide magnetic white board on teaching wall (behind curtain)

DATA CABLING SYSTEM

IMPORTANT:

The network cable installer in any network-wiring project must be a Siemon certified contractor or subcontractor. In addition, all patch panels, data outlets, fiber connectors and other hardware items must be manufactured by the Siemon company. FCS/IT can and will deny access to a Data Network closet to any person(s) that is not employed by an FCS or a Siemon Certified Low-Voltage installation contractor or subcontractor. The Siemon Certified Low-Voltage installation contractor/subcontractor must be on site to start, perform, complete, and certify all work specified in the contract documents. The Siemon Certified Low-Voltage cabling contractor/subcontractor is not allowed to subcontract any part of their work to another subcontractor. All products must be purchased from an authorized Siemon distributor.

1. Horizontal Cable – Balanced twisted-pair also referred to as unshielded twisted-pair (UTP):
   - **1.1. Cat 6 cabling**
     - 1.1.1. All **end user** horizontal data network cables feeding into and terminated on a Siemon cat 6 data patch panel in any FCS data networking closet must be pulled using Siemon cat 6 cabling exclusively.
     - 1.1.2. Intercom cabling that runs to MDF or IDF rooms shall be Cat 6.
   - **1.2. Cat 6A cabling**
     - 1.2.1. **All fixed hardware:** Wireless Access Points and Security Camera horizontal data network cables feeding into and terminated on a Siemon cat 6A data patch panel in any FCS data networking closet must be pulled using Siemon Cat 6A cabling exclusively.
     - 1.2.2. All Cat 6A cables used for Security Camera and (WAP) IP devices must be terminated using a Siemon Z-PLUG direct connect plug at the IP unit end.
     - 1.2.3. A direct connection into the IP device is the preferred choice, but a plenum rated biscuit box (with a cat 6A patch cord) may have to be used in some circumstances.
   - 1.3. General:
     - 1.3.1. Cable must be manufactured by SIEMON (Cat 6 - Cat 6A), no exceptions.
     - 1.3.2. 23 AWG 4 pair, UTP Jacket color Pink cat 6/6A
       - 1.3.2.1. White (Siemon) cat 6A may be used to pull WAP or Camera drops if no Pink cat 6A is available from Siemon. Must have FCS-IT approval first.
     - 1.3.3. CMP or CMR flammability rating as determined by local codes (Plenum rated only)
     - 1.3.4. Cable must be factory certified by Siemon and include test report which meets or exceeds the performance specifications set for Siemon Category 6 cable. – Cat 6A cables should meet current Siemon 10 Gig-over-copper specs (500 MHZ)
     - 1.3.5. The manufacturers channel warranty shall support a 4-connector channel that covers all category 6 and 6A balanced twisted-pair applications approved by the (SIEMON) Institute of Electronic and Electrical Engineers (IEEE), The ATM Forum, the American National Standards Institute (ANSI) and the International Organization of Standardization (ISO) that specify compatibility with the cabling referenced herein. Examples of applications that are covered by the vendor warranty include Gigabit Ethernet (IEEE 802.3ab) and 155 Mb/s ATM.
     - 1.3.6. Meet North American Standards – ANSI/TIA/EIA-568-B.2-1 and all applicable addenda.
     - 1.3.7. Use CommScope 6NF4 Direct Burial cat 6 cable (or equivalent) for all floor box and below grade conduit runs (Media Center circulation desk, Front Office desk, etc.). **This cable cannot be run in plenum ceilings.**
2. Fiber backbone – main distribution frame (MDF) to horizontal and or intermediate distribution frame (IDF):
   - 2.1. Minimum – 12 fibers between distribution frames – adhere to manufacturer's installation procedures. All 12 fibers must be terminated with LC fiber connectors.

2.2. Star configuration
2.3. Fiber cable must be manufactured by CommScope
2.4. Use CommScope 50-micron Fiber Guard interlocking armored fiber cable.
2.5. Below grade runs must use 50-micron indoor/outdoor rated or outdoor rated water blocking fiber cable.
2.6. 50/125 µm LOMMF – OM3 laser certified multimode fiber
2.7. Transmission performance – Fiber cable must be DMD (Differential Mode Delay) tested and meet or exceed the performance specifications set for CommScope Laser Core 300 Type 5L multimode fiber:
2.8. Cables must meet OFNR or OFNP determined by local code.

Optical Characteristics	850 nm	1300 nm
Maximum attenuation	3.0 dB/km	1.0 dB/km
Bandwidth OFL	1500 MHz *km	500 MHz *km
Bandwidth Laser	2000 MHz*km	500 MHz*km
Guaranteed 10 Gigabit	300 m	

3. Copper backbone – main distribution frame (MDF) to horizontal or intermediate distribution frame (IDF):
   3.1. 25 pair copper
   3.2. Copper cable shall feed:
      3.2.1. Elevator phone
      3.2.2. Emergency phone in front office
      3.2.3. Fire alarm and intrusion alarm panels
4. Cable Supports – 3 options:
   4.1. Wire basket cable tray above ceiling – trapeze style supported with threaded rod and associated hardware
   4.2. Without wire basket using threaded rod and J-Hooks
   4.3. Grid wire and J-Hooks
      4.3.1. J-Hooks placed every 4-5 feet. Follow manufacturer's guidelines.
      4.3.2. Number of cables per J-Hook is based upon J-Hook size. Follow manufacturer's guidelines.
      4.3.3. Support method must not exceed support or cable manufacturers required weight and or cable quantity limits.
5. Surface mount raceway for horizontal (station) cables:
   5.1. Size of surface mount raceway will depend on number of cables.
   5.2. Surface mount raceway to be secured neatly to all surfaces – cut to length.
   5.3. Must be installed per the manufacturers recommendations.
6. Firestopping:
   6.1. Where data cables penetrate fire rated walls, floors and ceilings fireproof the opening. Provide conduit sleeves for cables that penetrate fire rated walls. After the cabling installation is complete install fire proofing material in and around all conduit sleeves and openings. Install fireproofing material thoroughly and neatly. Seal all floor, wall and ceiling penetrations. When installing in existing installations all breached fire stopped openings must be returned to original condition..
7. Grounding, Bonding:
   7.1. Attach a #6 bare, solid ground wire from a local ground bar to each equipment rack/cabinet/tray using appropriate ground lugs.
   7.2. Contractor to conform to NEC, EIA, ANSI, ASTM, UL, BICSI, and local regulations.

7.3. A Copper ground bus bar must be mounted in each data closet to ground the data racks.
7.4. Two (2) Copper ground bus bars are to be mounted in the MDF data closet.
7.5. One copper bus bar is to be mounted on the backboard where the outside service enters the MDF room from the street.
7.6. The other copper bus bar is to be mounted behind the data network racks.

8. UTP Cabling Installation Cat 6 and Cat 6A:
8.1. All data cabling shall be installed per ANSI/BICSI/NECA-568, ANSI/TIA/EIA 568-B.1, ANSI/TIA/EIS-568-B.2, ANSI/TIA/EIA-568-B.2-1, ANSI/TIA/EIA-568-B.3 and local building codes.
8.2. Leave 1.5 m to 3 m (5-10 ft) of service loops near both workstation and MC. Service loops are to be coiled neatly at both ends. Caution: coils should be made in large loops and preferably in figure eights to avoid transmission performance issues.
8.3. Do not exceed a total cable length of 90 meters of any data UTP cable from outlet to patch panel termination. Overall channel link – (cable and 2 patch cables) not to exceed 328 feet.
8.4. Do not lay data or voice cables on top of light fixtures, ceiling tiles, mechanical equipment or ductwork. Maintain at least 0.6 m (2ft) clearance from all shielded apparatus. All cables must be supported using approved method from Section 3.
8.5. All classrooms, offices, teacher work areas, the Media Center, and any other space that may accommodate a computer will be wired to the current data drop standard. Each new classroom must be wired to current FCS data drop standards. For computer labs and other multi-drop areas include a data connection for each network device (computer, printer, etc.). Placement of network drops in these areas shall be determined by the room layout, computer furniture and other factors. Refer to Data Drop Standards below. Submit floor plans for mark-up at the appropriate phase in design.
8.5.1. Data Drop Standards
8.5.1.1. Typical Classroom: 12 drops (2 on teaching wall, 2 below whiteboard, 1 above whiteboard [projector], 2 each on remaining walls, ceiling [WAP])
8.5.1.2. Administrative area:
8.5.1.2.1. Data Clerk: 3 double drops (6 total)
8.5.1.2.2. Records: double drop
8.5.1.2.3. Bookkeeper: quad drop
8.5.1.2.4. Front desk: quad drop for each workstation (8 total)
8.5.1.2.5. Clinic: double drop
8.5.1.2.6. SRO/command center: quad drop
8.5.1.2.7. Standard office: double drop on each side wall (4 total)
8.5.1.2.8. Conference rooms and teacher workrooms: double drop on two walls (4 total)
8.5.1.3. Media Center:
8.5.1.3.1. Circulation desk/genius bar: 6 drops for troubleshooting area, 4 drops for METI workstation
8.5.1.3.2. Collaboration rooms: Provide double drop and drop for video monitor location
8.5.1.3.3. Project lab room: Coordinate with FCS
8.5.1.3.4. STS office: 4 double drops (8 total)
8.5.1.4. Art/Music: provide drops per Typical Classroom requirements, excluding high school Digital Media Art, which require drops for each workstation; coordinate with FCS.
8.5.1.5. Gymnasium:
8.5.1.5.1. ES: Provide data drops for PA system, and other locations as identified by FCS.
8.5.1.5.2. MS (includes stage): Provide data drops for PA and/or sound system, projector location(s), and other locations as identified by FCS.
8.5.1.5.3. HS: Provide data drops for PA system, electronic scoreboards, video broadcast system, and other locations as identified by FCS.

8.5.1.6. HS Auditorium:
8.5.1.6.1. Provide quad drop in control booth
8.5.1.6.2. Provide 1 data drop for each TV display
8.5.1.6.3. Coordinate data drops with A/V equipment and lighting in stage and house areas
8.5.1.7. Black Box Theater: Provide data drops at all video monitor locations and projector locations. Provide additional double drop on each wall.
8.5.1.8. CTAE: varies per individual program (FCS to provide requirements)
8.5.1.9. Cafeteria:
8.5.1.9.1. Serving/Kitchen: Provide drops for menu monitors and POS devices, and other locations as identified by FCS.
8.5.1.9.2. Kitchen manager's office: Provide quad drop
8.5.1.9.3. ES Stage: Provide data drops for sound system, projector location, and other locations as identified by FCS.
8.5.1.10. Site Athletics:
8.5.1.10.1. Press box: Provide 2 double drops, plus additional ports for security camera and BAS requirements. Run fiber to press box.
8.5.1.10.2. Concession stands: Provide 2 double drops for POS device and BAS (4 total), plus additional port for WAP
8.5.1.11. Other spaces/equipment:
8.5.1.11.1. Other approved offices with full-time employee: two double drops
8.5.1.11.2. Mechanical room: Provide double drop for BAS panel
8.5.1.11.3. Collaboration areas/rooms: Provide double drop along walls approximately every 8' to coordinate with power outlets, plus data drop for video monitors.
8.5.1.11.4. IT Support space: 24 double ports; run fiber from MDF to area
8.5.1.11.5. Exterior doors w/ card key access: Provide data drop(s) as required
8.5.1.11.6. Axis Video Intercom: Provide data drop as required
8.5.1.11.7. All other fixed A/V equipment: provide data drop as required
8.5.1.11.8. Intercom: one drop per speaker for full digital system; as-required for hybrid system

8.6. Network drops to support ceiling mounted wireless access point devices shall be terminated with an 8 contact modular plug, Siemon part number P-8-8, on the work area end and be coiled with a 10 foot service loop. The service loop will be supported above the ceiling by wire tie to a J hook or other structural support.

9. Category 6/6A Connectivity:
9.1. Patch Panels
9.1.1. 48-port RJ45 modular to 110 with (6) or (8) ports
9.1.2. Wired 568B
9.1.3. Standard or high density – 19" wide
9.1.4. Rack or wall mount
9.1.5. Designation strips – front and rear
9.1.6. All cat 6 and cat 6A data Patch Panels and associated equipment (wire management) must be manufactured by the Siemon Company
9.2. RJ45 modular jacks 8P8C
9.2.1. Wired 568B
9.2.2. 45 degree exit
9.2.3. Siemon Dual or Single CT jacks or Siemon equivalent MAX cat 6 data Jack
9.2.4. 110 type termination
9.2.5. All cat 6/6A data jacks must be manufactured by the Siemon Company

10. 50/125 Multimode fiber connectivity:
    10.1. Connectors
        10.1.1. Duplex **LC** – composite or ceramic ferrule
    10.2. Fiber patch panels
        10.2.1. Rack and wall mount
        10.2.2. 12 fiber adapter panels (LC)
        10.2.3. Splice trays if needed
        10.2.4. All fiber patch panels and adapters must be manufactured by the Siemon Company.
11. Copper Patch cables – Category 6A: WAP color is Yellow
    11.1. Color of security camera cat 6A patch cables to be determined by FCS-IT
    11.2. Green is the color of the security camera cat 6A patch cables
    11.3. Each 7ft. data rack must have a black 12-inch-wide steel ladder rack mounted on the back top of the rack going to and mounted on the plywood backboard.
    11.4. A vertical wall mounted rack will be used to house the AVIGILON server in the MDF. It will be mounted on a fire rated plywood backboard near or behind the 7ft. data racks. FCS/IT will determine the exact location. This is the preferred method for housing the AVIGILON server.
    11.5. A repurposed 7ft. enclosed server cabinet may be used if requested by FCS/IT to house the AVIGILON server
12. Wire management: Use only Siemon Products
    12.1. Horizontal – single or double space
        12.1.1. 19” or 23” rack mount
        12.1.2. Wire managers to be mounted between patch panels except when using an A-Frame patch panel
        12.1.3. Ladder-rack from top of racks – secured to back wall in MDF and IDF’s
    12.2. Vertical
        12.2.1. Between racks – single or double-sided
13. Labeling:
    13.1. Furnish and install all labels throughout the entire system. Labels should be attached securely so that they will not peel off. All labels shall be machine generated or as approved.
    13.2. Labels should indicate telecommunications room and port number: Example IDF-2-A12 would be IDF room number 2, patch panel “A”, port number 12.
    13.3. Label the following: faceplates, cable at each outlet (within 200 mm (8 in) of the termination, cable at the rear of patch panels (within 200 mm (8 in) of the termination, front of patch panel for each termination.
    13.4. Submit proposed labeling scheme to owner for approval prior to installation
14. Testing: Category 6 and 6A cables
    14.1. Each cabling permanent link or channel shall be tested and certified. Each pair of the permanent link or channel shall be tested. The permanent link measurement is recommended although the entire channel may be tested. The entire channel includes the patch cables at the workstation end of the permanent link to the patch cables at the patch panel end. All links must be tested using test heads with Siemon Company patch cords.
    14.2. Every terminated data cable outlet must pass the following parameters for category 6 and 6A as described in the most current ANSI/TIA/EIA-568-B.2-1 specs: wire map, length, insertion loss, NEXT, Power Sum NEXT, ELFEXT, Power Sum ELFEXT, Return Loss, Propagation Delay, Delay Skew.
    14.3. All tests shall be favorable, no *PASS, *FAIL or FAIL results will be accepted. Each Cat 6A cable should be tested by using a Fluke DTX 10-Gig-over-copper test solution or equivalent tester. Meeting or exceeding current 10- Gig-over-copper specs.
    14.4. All test results shall be turned over to the owner in both electronic files and in hard copy.

15. Fiber Optics
    15.1. All fiber used should meet or exceed all current OM3, OM4 fiber specs.
    15.2. Optical fiber (backbone) cables shall be 100% tested for attenuation and length.
    15.3. Testing will be done with an optical power meter and light source.
    15.4. Length shall be recorded using an OTDR, optical length test measurement device or sequential cable measurement markings. Attenuation shall be tested at 850 nm and at 1300 nm for multimode fiber cable.
    15.5. All test results shall be turned over to the owner in both paper and electronic format.
    15.6. Each strand shall not exceed a level of 3.0 dB/km of attenuation for 850 nm
    15.7. Each strand shall be tested, and the following information be turned over to the owner:
        15.7.1. From point to point
        15.7.2. Fiber I.D. label number
        15.7.3. RX level
        15.7.4. Attenuation total
        15.7.5. Wavelength
        15.7.6. Reference level
16. MDF – Main Distribution Frame
    16.1. The minimum requirement for floor mounted two (2) post 7ft data network racks in any new MDF Network closet in FCS is three (3). A four (4) post 7ft data rack may be requested by FCS-IT as one of the three (3) floor mounted network data racks in the MDF if FCS-IT design team deems necessary.

    16.2. The main service feed requirements for AT&T to bring service from the street to the MDF network closet for FCS is:
        16.2.1. Four (4) four (4) inch PVC conduits from the street into the MDF network data closet for network service.
        16.2.2. All four (4) conduits must have continuous strings from the street to the MDF network data closet.
    16.3. Electrical Power requirements behind the MDF data racks
        16.3.1. Four dedicated (3) wire 120V, 30 amp rated circuits with red L5-30R Locking Receptacles must be provided in all schools to accommodate special equipment racks. There should be no more than 12 inches distance between the four L5-30R receptacles. The L5 120V 30-amp receptacles should be mounted on the plywood backboard just under the top of the 7ft data racks. The location of the first 30-amp L5 receptacle should be (from left to right) just past the first data rack, and every 12 inches after that.
        16.3.2. Two separate 20 ampere 120V dedicated circuits must be installed in the MDF data closet behind the 7ft data network racks. A quad red receptacle on each 20-amp 120v separate dedicated circuit. The location of the first 20-amp 120v circuit with red quad receptacle is just past the first data rack (from left to right) 18 inches from the floor. The other 20-amp 120v circuit should be 3ft 36 inches away same height from the floor
    16.4. The MDF room size
        16.4.1. The MDF room should be 10ft x 15ft long
        16.4.2. Room must have a dedicated climate control system capable of maintaining a 74-degree Fahrenheit room temperature sized at 18,000 BTU/Hr. The climate control system must be a continuously available system but should not be added to the generator.
        16.4.3. At a minimum, the entire back wall behind the network data racks should be lined with ¾" plywood that is 4x8 ft. tall. The ¾ inch 4'x8' plywood sheets should be vertically mounted on the back wall to cover both the in wall or surface mounted electrical receptacles at the bottom of the back wall. The vertically mounted 4'x8' plywood

backboard should be above the floor mounted 7ft. Data network rack(s) at the top part of the back wall. The vertical mounted 4'x8' plywood backboard should be painted with Gray fire-retardant paint. The wall that the service conduits for AT&T feed into the MDF room should use the same ¾" 4'x8' vertically mounted plywood setup installation from top to bottom for AT&T to install, mount, bond, ground, and plug-in their equipment.

16.4.4. Racks and cabinets should be placed so that there are at least 3 feet from the wall to the rear of both racks and cabinets and at least 3 feet from any wall or obstruction to the front of racks and cabinets. Racks and cabinets must have at least 3 feet of clearance on one side, preferably both sides

16.4.5. All data racks and associated equipment must be properly Bonded and Grounded.

16.5. MDF will be tied into the emergency generator system

17. IDF – Intermediate Distribution Frame:

17.1. **The minimum requirement for two (2) post 7ft floor mounted data network racks in any new IDF network closet in FCS is two (2).**

17.2. Install two (2) dedicated 20 ampere 120V red electrical circuits behind the IDF data racks. Each 20-amp dedicated circuit will be terminated with RED quad 20-amp receptacles. Each 20-amp outlet will be a separate dedicated branch circuits fed from emergency power and terminated behind the data racks 2ft. Apart

17.2.1. Install one (1) dedicated (3) wire 120V, 30 amp rated circuit with red L5-30R locking receptacle fed from emergency power and terminated between the two (2) 20-amp receptacles behind the data racks.

17.3. IDF Room must have a dedicated climate control system capable of maintaining a 74-degree Fahrenheit room temperature sized at 12,000 BTU/Hr. The climate control system must be a continuously available system but should not be added to the generator

17.4. Size of IDF closet should be no less 10' x 10'

17.4.1. Racks and cabinets should be placed so that there is at least 3 feet from wall to the rear of racks and cabinets and at least 3 feet from any wall or obstruction to the front of racks and cabinets. Racks and cabinets must have at least 3 feet of clearance on one side, preferably both sides

17.4.2. There may be cases where equipment may have to be housed inside a wall-mounted data rack enclosure.

17.4.3. All racks and equipment must be properly grounded to a copper bus bar located behind the IDF racks just below the cable tray.

17.4.4. At a minimum, the entire back wall behind the data racks shall be lined with ¾" 4'x8' vertically mounted plywood backboard painted with fire retardant paint.

17.5. IDF will be tied into the emergency generator system

18. FCS/IT Certification: This is a business-to-business Certification Designation that is issued by The Siemon Company to FCS-IT for network data cabling systems.

18.1. The Siemon Certified Certificate tells FCS/IT that the low voltage network data cabling vendor is in good standing, current, and compliant with The Siemon Company.

18.2. The Siemon Certified Certificate tells FCS/IT that the low voltage vendor is using the most current Siemon networking cabling standards and practice.

18.3. The Siemon Certified Certification status will be reviewed periodically by both The Siemon Company and FCS/IT department.

18.4. Basic outline of the Siemon certification:

18.4.1. All participants in any network data-wiring project in FCS must be Siemon certified. In addition, all patch panels, data outlets, fiber connectors and other hardware items must be manufactured by the Siemon company.

18.4.2. These Data cabling specifications apply to all construction projects. Where renovations are done and existing equipment is replaced, testing of the entire network at the facility must be performed in accordance with these specifications to ensure continuity between existing and new construction.

18.4.3. A pre-construction meeting involving the data cabling contractor and FCS/IT shall be stipulated in the project manual.

18.4.4. Periodic meetings and site visits should be conducted during the installation of all cabling systems.

18.4.5. Post-construction meeting involving the data cabling contractor and FCS Information Technology (IT) shall be stipulated in the project manual.

18.4.6. All products must be purchased from an authorized distributor of each manufacturer.

19. Wireless Cat 6A cables:
    19.1. All Cat 6A cables used for WAP's should be terminated in the ceiling using a Siemon Cat 6A Z-PLUG direct connect plug.
    19.2. All Cat 6A cables must be terminated on a separate Cat 6A patch panel in the wiring closet. The cat 6A patch panel should be placed beneath all your cat 6 patch panels.
    19.3. Only use factory terminated Cat 6A patch cables to patch in Cat 6A drops
20. Portable Classroom - Concession Stand Installation:
    20.1. Use CommScope indoor/outdoor 6 strand 50-micron fiber from the Portable classroom - Concession Stand to the closest IDF or MDF in the main building.
    20.2. Most, if not all fiber runs from the school (main building) to the Portable classrooms should be aerial fiber runs (not on canopy).
    20.3. Most, if not all fiber runs from the school (main building) to the Concession Stand should be under/above ground conduit runs (not on canopy).
    20.4. Use CommScope cat 6 outdoor weather rated cables for all exterior data cable runs to Portable classrooms - Concession stand.
    20.5. A wall mounted network data cabinet will be installed at a designated location chosen by FCS-IT.
    20.6. Each Portable classroom - Concession stand will have 1 AP drop installed in the ceiling and two (2) dual data drop locations installed in the space. That is (5) total cables per location. Location to be determined by FCS-IT.
21. Marquee Signs:
    21.1. Use CommScope outdoor weather rated 6 strand 50-micron fiber from the Marquee sign location to the closest IDF or MDF in the main building.
    21.2. Fiber runs from the school (main building) to the Marquee sign shall be underground conduit runs .
    21.3. A wall mounted network data cabinet will be installed at a designated location chosen by FCS-IT.
22. Security Camera Data cables:
    22.1. All new security camera data drops will be wired with 10-Gig Siemon UTP cat 6A cables and terminated at the IP device end with a Siemon Z-PLUG direct connect plug.
    22.2. Pink or White Siemon 10-Gig cat 6A cables can be used.
    22.3. The White Siemon cat 6A can be used based of availability and other job factors.
    22.4. All Siemon standard 10-Gig UTP cat 6A pulling, installing and terminating techniques apply to all security camera cables installed in any FCS network data closet.
    22.5. The AVIGILON Server will be vertically mounted on a separate painted fire-retardant plywood backboard. Then that plywood backboard will be vertically mounted to the ¾ inch painted fire-retardant plywood backboard in the MDF data network closet. FCS-IT will determine the location to mount the server.

22.6. Exterior cameras in some cases my require some small parts and material changes to their FCS-IT spec installation guideline to work in there outside plant environment. Only FCS-IT can instruct the vendors what changes are to be used or needed to stay in compliance with FCS-IT existing networking camera specs.

23. Networking Outside plant Campus building(s) from the Main School building
    23.1. All outside plant installation [stadium, field house, weight rooms etc.…] shall be wired like a portable classroom. That includes a six (6) strand 50-micron fiber to the main building using LC fiber connectors, with copper cables to the workstations. This will support WAP and Security Cameras devices.
24. Job site readiness prior to network equipment installation
    24.1. Every FCS construction job site (especially new) must meet the minimum FCS-IT requirements for work completion, room cleanliness and job site security before any networking and associated equipment is to be install in any MDF or IDF network closet. Some key points are:
        24.1.1. All construction tasks that create dust and debris (example) drywall sanding and painting, must be completed in all MDF-IDF networking closets prior to any network equipment installation.
        24.1.2. All MDF-IDF networking closets should be as dust-free and clean (wet mop) as possible prior to any network equipment installation.
        24.1.3. All MDF-IDF networking closet should a security door that can be locked.
        24.1.4. The job site should have a degree of basic security itself from outsider just walking onto the job site and into the building.
        24.1.5. All MDF-IDF testing, labeling and certifying of copper and fiber cables must be completed prior to any network equipment installation.
        24.1.6. All MDF-IDF electrical power outlets must be working and have faceplates on them prior to any network equipment installation.
        24.1.7. FCS-IT team must sign off on the job-site's readiness prior to any network equipment installation.
25. FCS-IT Network Data closet access:
    25.1. FCS-IT can and will deny entry to any person(s) that are not contracted by FCS, General Contractor, or Electrical Contractor to do specified data networking cabling work inside or outside any MDF/IDF network closet on FCS property. No sub of a sub will be allowed to do any data cabling work on FCS property.
26. Warranties
    26.1. The contractor shall provide a 5-year warranty on all contractor provided material and workmanship. Owner will also receive a 20-year manufacturer’s warranty. There shall be a 20-year, 500 MHz transmission warranty
27. Construction Coordination.
    27.1. A pre-construction meeting involving the data cabling contractor and FCS Information Technology shall be stipulated in the project manual.
    27.2. Periodic meetings and site visits should be conducted during the installation of all cabling systems.
    27.3. A post-construction meeting involving the data cabling contractor and FCS Information Technology shall be stipulated in the project manual.
    27.4. These cabling specifications apply to all construction projects. Where renovations are done and existing equipment is replaced, testing of the entire network at the facility must be performed in accordance with these specifications to ensure continuity between existing and new construction.

RAULAND TCU INTERCOM SYSTEM

1. PART 1 – GENERAL
   1.1. RELATED DOCUMENTS & WORK SPECIFIED ELSEWHERE
      A. The conditions of the General Contract (General, Supplementary, and other Conditions) and the General Requirements are hereby made a part of this Section.
      B. All bids shall be based on the expansion of the existing district's Intercommunication and Bell Schedule Systems and must be compatible with the current Rauland-Borg Systems - No Exceptions. Equipment as specified herein. The catalog numbers and model designations are that of the Rauland Borg.
      C. The work in this section is related to the work specified in the following sections: Section XXXXX +Basic Materials and Methods
      D. The drawings and general provisions of the Contract Documents apply to this Section.
      E. CABLE REQUIREMENTS: The wiring systems specified in these guidelines are based upon requirements and recommendations of the IEEE, ANSI, EIA\TIA 568\569, and TSB 36 & 40, and BICSI for horizontal premise wiring. All products used shall be UL listed and meet applicable local and state codes and must match the current Fulton County Public Schools standard.
      F. Copper Cable: Unshielded Twisted Pair (UTP) with a 24 AWG cabling must be used for the horizontal wiring from the MDF, IDF, or CP to the individual communications outlets.
      G. **Not included in this Section –**The owner and data network contractor shall provide: Racks, Cable Management, PoE Switches, data cabling, UPS, and Emergency Power and Cabling between the MDF and IDF(s) to intercom location. Provide fifteen (15) rack units of space in each MDF and IDF'(s) for communications equipment. See drawing for port count per MDF-IDF's and rack space needed.
      H. Replace the existing Rauland Intercom system and reuse the existing rack to house the new TCU Hybrid intercom system equipment and reconnect the existing speaker assemblies and cabling. Repair any existing conditions and make a fully operational system.
      I. Call buttons within all classrooms shall be replaced with Rauland Telecenter model TCC2211PB.
      J. Pretest of the existing cabling and speakers shall be completed prior to bid date and any repairs are to be included in the quotation so that you have a fully operation system.
      K. Remote buildings or portable classroom cabling shall be connected to nearest MDF/IDF room and provide classroom IP or zone page modules to eliminate any underground copper cabling between buildings.
      L. The TCU Hybrid cabling to the classroom is not connected directly to the data switches and is installed by the communication contractor.
   1.2. SUMMARY
      A. This section includes a fully operational IP platform for a district-wide and internal school communications system incorporating school safety notifications and general communications including but not limited to, the following:
      B. The platform shall provide complete internal communications employing state of the art IP Technology, including the minimum functions listed.
         1. Two-way internal intercommunications between staff locations and classrooms.
         2. Scheduled bell events.
         3. An emergency announcement that will override any pre-programmed zones assuring that all Emergency/Lockdown/Etc. are heard at each speaker location.
         4. The capability of prerecording emergency announcements that can be activated by a simple Soft Key or via a dedicated push button.

5. Atomic Time Synchronization with Class Change Tones utilizing multiple, programmable schedules for each zone.
6. District wide emergency, group, all school, and zone live voice paging.
7. District-wide, Emergency, Group, All School and Zone live voice paging.
8. District-wide, Emergency, group, All School and Zone visual messaging.
9. District-wide, Emergency, Group, All School and Zone paging for pre-recorded audio – tones, music, and voice.
10. Single sign on web-based user interface for multi-school functionality.

C. The system shall support a minimum of 1000 level priorities, which shall be user-definable, allowing each end point to place a minimum of 5 different priority calls at the same time.
D. Any authorized administrator shall be able to call from outside the school into any classroom, zone, or the entire school directly via the School District supplied SIP (Session Initiation Protocol) enabled Telephone Network. This shall allow remote monitoring, call-in annunciation, and two-way conversation from outside the facility as well as paging into the system. Compliance with NEMA Standard SB-40 for emergency communications in K-12 Schools.
E. Authorized system users shall be able to create a minimum of twenty (20) automated sequences with emergency instructions, tones, e-mails, and relay activations and replay them.
F. Automated message strings shall be manually initiated from single-button access on the console, on a SIP connected telephone, a panic button, from the web interface or via an interface with third-party systems.
G. Paging and two-way intercom features shall be accessible from any system console or SIP connected telephone for each campus.
H. Each single campus installation shall be locally survivable for intercom, paging, bells, and emergencies such as lockdown, even when the district connection is unavailable.
I. The system shall support displaying all schools' locations on a single map, showing school status including active emergencies.
J. Included in the emergency procedures is the ability to send specific messages and or instructions. These features can be added to the emergency sequences.
K. The ability to require an access code to initiate or clear an emergency from the administrative console.
L. An app that can run on either Android or Apple phones. This app will give the user the ability to initiate one of 18 emergency procedures programmed into the app. This app will also allow you to view all classrooms check in status. This process will update during the emergency to make sure all information is current.
M. The ability to allow the fire alarm system to signal an active fire alarm to TCU. This will allow supplemental visual and audio messaging from Telecenter U. Telecenter U can be programmed to change system state, dependent on the active emergency. Both fire and emergency will be displayed on the administrative console and mobile application.
N. Any system that requires more than one Cat drop to a classroom to control an IP speaker, up to 5 call-in switches, status lights (up to 2) and message board/digital clock will not be considered equal to the specified system.
O. Future integration shall provide the ability for a map that shows a layout of school and the system of activity of each classroom, hallway, and device status.
P. This specification establishes a minimum level of quality, features, and performance for individual components as well as the integrated system.
Q. Systems that do not comply with the feature-sets highlighted in this Specification will not be considered.

1.3. DEFINITION OF TERMS

A. Installer(s): Shall refer to the person, persons, or company who or which contracts to perform the work specified herein.

1.4. SUBMITTALS

A. Product data for each component.

B. Shop Drawings: Prior to proceeding with the work, provide detailed equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components and location of each field connection and a complete schedule of all equipment and materials with associated manufacturers cuts sheets which are to be used.

C. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring. Identify terminals to facilitate installation, operation and maintenance. Artwork drawings and lists are indicating proposed nameplate nomenclature and arrangements for control panels and plug panels prior to fabrication reflecting equipment used. Each drawing shall have a descriptive title and all sub-parts of each drawing shall be labeled. All drawings shall have the name and locations of the project, Systems Contractor's name in the title block. Details and descriptions of any other aspect of the system, which must differ from the contract documents due to field conditions or equipment furnished.

D. FCC Approval: The system shall be approved for direct interconnection to the telephone utility under Part 68 of FCC rules and regulations. Systems that are not FCC approved or utilized as an intermediary device for connection will not be considered. Provide the FCC registration number of the system being proposed as part of the submittal process.

E. Product Certificates: Signed by manufacturers of equipment certifying that products furnished comply with specified requirements.

F. Installer Certificates: Signed by manufacturer certifying that installers comply with requirements.

G. Manufacturer Certificates: Signed by manufacturers certifying that they comply with requirements.

H. Maintenance Data: For equipment to be included in maintenance manuals specified in Division 1.

1. Record of Owners' equipment-programming option decisions.
2. All instructions necessary for proper operation and manufacturer's instructions.
3. "Proof of Performance" information.
4. Manufacturer's maintenance information.
5. Copies of non-proprietary computer programs and system set up disks documenting all programmable features of the installed system.

I. Record Drawings: Prior to final acceptance, provide three (3) complete sets of drawings indicating all cable numbers and construction details in accordance with the actual system installation. Revise all shop drawings to represent actual installation conditions. These Record Drawings will be used during "Final Acceptance Testing."

J. System Training: Submit the following information describing the training programs and system trainers as outlined in paragraph 1.6 of this specification and under Division 1 specifications. (12 hours of training 3 site visits within the first year of operation)

1. Include a preliminary staff development training program in the outline form for review and approval by the owner's representative.
2. Include a current copy of the trainer's certification from the manufacturer that certifies and identifies the trainer(s) who are eligible to provide training and support for the project.

3. Include a current copy of the trainer's need's assessment form which will be reviewed with the owner's designated representative for the system's preliminary system programming and configuration.
4. Include copies of all documentation used to identify for the owner those participants attending and completing the training programs.

1.5. QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is an authorized representative of equipment manufacturer for both installation and maintenance of equipment required for this Section. Provide the following with in thirty (30) days after notification to proceed:
B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
C. Comply with NFPA 70
D. Comply with NEMA Standard SB-40 for Emergency Communications in K-12 schools.
E. Comply with UL 60950.

1.6. IN-SERVICE TRAINING

A. The contractor shall provide and implement a complete and comprehensive staff training program for all administrators, facility staff members and teachers. This mandatory training program will provide school staff with a full understanding of how to utilize and adequately operate all functions.
B. The training program shall be implemented by a staff member/trainer employed by the contractor. The trainer must be factory certified to provide training on their product.
C. All staff development training is to be coordinated through the owner's designated representative. As training sessions are completed, the trainer will provide the school's administrative staff and school district's staff a document listing all the team and faculty members who attended, received, and completed the training program.

1.7. WARRANTY

A. Provide a manufacturer's five-year warranty of the school communications network equipment against defects in material and workmanship. This warranty will cover all electronic equipment, as well as existing speakers, cabling and any field devices and call-in switches. If any defects are found within the warranty period, the defective equipment shall be replaced at no cost. Five years warranty shall be provided for labor. The existing Rauland TCU Hybrid system shall have the same warranty period and run concurrently with all the new equipment installed in this project.
B. The statement of the warranty shall be provided on the manufacturer's stationery. The standard five-year warranty is an essential element in establishing a standard in quality. Manufacturers who circumvent the five-year warranty by offering special "extended warranties" that are not part of their standard published warranty will not be accepted.
C. The contractor shall respond, excluding weekends and holidays, within 24 hours to any warranty service calls. If equipment cannot be repaired within 24 hours of the service visit, the contractor shall provide "loaner" equipment to the facility at no charge.
D. Make available a service contract offering continuing factory authorized service of the system after the initial warranty period.

1.8. ACCEPTABLE MANUFACTURERS

A. The equipment model numbers specified herein are that of the Rauland. The intent is to establish a standard of quality, the standard of equipment function, and features. It is the responsibility of the bidder to ensure that the proposed product meets or exceeds every standard set forth in these specifications. Failure to provide the identical functions of the existing district wide integrated communication system will result in the removal of the system at the end of the project and replace it at the contractor expense.

The functions and features specified are vital to the operation of this facility; therefore, inclusion in the list of acceptable manufacturers does not release the contractor from strict compliance with the requirements of this specification.

New Facility - Rauland TCU IP Intercom System

Provide Rauland TCU IP Intercom, classroom IP modules, call buttons, speaker assemblies, and cabling to the new or renovated classroom. Abandon any copper between outlying buildings or portable classrooms. Furthermore, utilize the data network fiber between buildings and upgrade the speakers and call buttons to Fulton County Schools design standards.

Renovation/Addition Facility – Rauland TCU Hybrid existing facility with TCU IP in newly renovated space, additions, and outlying buildings or portable classrooms.

Provide Rauland Hybrid Gateways, classroom IP modules, call buttons, speaker assemblies, and cabling to the new or renovated classroom. Abandon any copper between outlying buildings or portable classrooms. Furthermore, utilize the data network fiber between buildings and upgrade the speakers and call buttons to Fulton County Schools design standards. Provide a post-test of the existing cabling, speakers and upgrade the classroom call button in the areas of the school with no construction and reuse or replacement as applicable.

Existing Intercom Upgrade – Rauland TCU Hybrid existing facility with TCU IP in outlying buildings and portable classrooms.

Provide new switching stations and controller modules. Call buttons within all classrooms shall be replaced with Rauland TeleCenter model TCC2211PB. The data contractor shall provide data cabling from the existing intercom headend to the nearest MDF/IDF room. The existing Rauland Intercom rack shall house the TCU Hybrid system and reinstall the existing equipment rack. All existing or new exterior speaker assemblies or horns will be in a separate zone for paging. Abandon any copper between outlying buildings or portable classrooms. Furthermore, utilize the data network fiber between buildings and upgrade the speakers and call buttons to Fulton County Schools design standards.

2. PART 2 – PRODUCTS
   2.1. SYSTEM REQUIREMENTS
      A. The platform shall utilize state of the art IP Technology for Call-in Notification, School Safety Paging, and Evacuation Tones, Atomic Time Synchronization, Class Change Tones utilizing multiple, programmable schedules for each zone. Two-way hands-free Internal Intercommunications, Paging and Program Distribution. The system shall be easy to learn and operate. All standard programming shall be web-based and user-friendly to allow the system administrator the ability to program system features easily.
      B. Provide a complete and satisfactorily operating district/school communications and district/school safety system as described herein, using materials and equipment of types, sizes, ratings, and performances as indicated. Use materials and equipment that comply with referenced standards and manufacturers' standard design and construction, in accordance with published product information. Coordinate the features of all materials and equipment so they form an integrated system, with components and interconnections matched for optimum performance of specified functions.
      C. The platform shall be a single electronic system consisting of a minimum of 10 intercom channels for each campus, (classroom) IP speaker modules and call-in switches, IP Zone Modules connecting corridor speakers, inside and outside horns, IP Administrative Consoles, SIP-enabled PBX integration and district-wide integration for paging, emergency notifications, calendar scheduling and configuration.

D. Each Classroom shall be provided with an IP Speaker module interface and up to 5 different call-in switches, each with their annunciation path and priority. The ability to monitor the is device the operation and report via e-mail or text any failures.
E. Call-ins may automatically annunciate (display of priority and location) to administrative consoles, and SIP enabled phones and outside phones.
F. Call-ins shall be programmed to automatically change priority and annunciation route based on the age of call-in and priority.
G. Call-ins may have priority and annunciation routing changed by user action from a console or SIP-enabled phone.
H. Call-in annunciation routing shall include playing pre-recorded audio over speakers, sending a pre-configured e-mail, and activating relays.
I. The platform shall lend itself to expansion by the simple addition of hardware modules.
J. The platform shall directly connect to the WAN/LAN without the need for a separate server at each school location. Configuration, including bell schedules, calendars, and emergency sequences, can remotely be created, changed, stored, and downloaded to the system by an authorized user from a browser-based interface.
K. The platform shall provide the ability to initiate school safety paging announcements, evacuation tones and take cover tones from any telephone or connected web-browser within the facility or outside the facility to any other location within the facility or district.
L. The platform shall provide the ability to selectively communicate or monitor individual classrooms in emergency situations from any telephone within the facility or outside the facility to any other location within the facility. All communication within the classroom shall be hands free and will not require any interaction by the classroom user.
M. The platform shall provide classroom users the ability to confirm that they have safely secured their classrooms during lockdown with a single button press.
N. IP-addressable and POE powered speaker modules for individual rooms shall be system programmable and may be assigned any two, three, four, five or six-digit number as well as name and description. Any extension may be reassigned at any time.
O. IP-enabled two-way voice communication shall be available from any provided telephone or administrative console through any IP Speaker on a campus. This shall allow hands-free communication to any classroom or any individual IP loudspeaker unit. A programmable pre-announce tone shall sound immediately before the intercom path is opened and a supervisory tone shall continue to sound at regular intervals when speaker monitoring is active, complying fully with all privacy legislation. Pre-announce tone and supervisory tones shall be disabled during designated emergencies, such as lockdowns, automatically.
P. The platform shall allow users to configure multiple schedules per school, with a minimum of 500 unique events per the schedule and automatic Daylight Savings Time correction. A minimum of 5 schedules may be active on any given day for each campus. Users shall be able to select from 25 standard included tones as well as unlimited user created and uploaded audio files for class change signaling and messaging. In addition, scheduled events shall consist of relay actions, e-mail notifications and paging exclusions as system configuration changes. The platform shall allow control of the bell schedules via the district WAN/LAN without the need for a separate server at each school location. Bell schedules can be remotely created, changed, stored and assigned to calendar days for the local school by an authorized user from a browser-based interface.
Q. The platform shall allow users to configure multiple schedules per school, with a minimum of 500 unique events per the schedule and automatic Daylight Savings Time correction. A minimum of 5 schedules may be active on any given day for each campus. Users shall be able to select from 25 standard included tones as well as unlimited user created and uploaded

audio files for class change signaling and messaging also, as system configuration changed. The platform shall allow control of the bell schedules via the district WAN/LAN without the need for a separate server at each school location. Bell schedules can be remotely created, changed, stored and assigned to calendar days for the local school by an authorized user from a browser-based interface.

R. The platform shall be able to integrate with an existing PA system or operate as a fully independent IP solution. The platform shall be able to function in the combination of said configurations and allow for seamless communication within a school or district-wide, regardless of the type of setup used. The platform shall be scalable, with the ability to easily add, install, and configure additional equipment to a system.

S. The platform allows for customization of preprogrammed sequences, used for emergencies, events, and everyday communications. Preprogrammed sequences can be activated from the push of a relay button, soft key of an administrative console, a dial string of a SIP phone, or a web browser configured to the district network. Sequences can be initiated automatically as part of a schedule or on the fly. Preprogrammed sequences can be customized to utilize any combination of audio tones, emails, relays, tone exclusions, swings, delays, duplex, SIP phone notifications, and program distribution. Audio tones can include customized audio files and voice messages recorded in any language. Uploaded audio tones and messages can be preprogrammed to annunciate repeatedly or individually, as part of a scheduled sequence or on the fly. Each school in a district can have its customized sequences and can be activated separately, in groups, or district wide.

T. The platform allows for emergencies to be initiated in a drill environment, separate from real emergencies. Drill emergencies can be initiated from panic buttons, consoles, SIP phones, or a web browser.

1.2. EQUIPMENT AND MATERIAL

A. Server Software – Rauland Model TCC2000SW (Existing at District Data Center) 6.0

1. Provides district-wide paging, bell event scheduling, emergency notification, and configuration for the entire district.
2. It provides the ability to configure the system and initiate system features per school and district-wide from a web-based interface.
3. The software can sync system time to the Atomic Clock Signal or to the school's or district's network time server.
4. The software will provide a web-browser to deliver district-wide emergency paging, pre-recorded messages, and tones from any authorized computer in the facility or the district. The software must be capable of automatically notifying district personnel via the WAN of an alarm condition.
5. The software can automatically broadcast emergency instructions via associated system hardware throughout an entire district when an alarm (e.g., lockdown, lockout, security, fire) is initiated via the web-based interface. The emergency instructions are preprogrammed and require no user intervention. The system provides redundant alarm annunciation over intercom/paging speakers and is not meant to replace primary fire alarm or security systems.
6. The software can be installed in cloud, virtual, or physical server environments.
7. The web-based user interface supports secure HTTP browsing.
8. The server software supports encryption to ensure secure access.
9. The software shall support any combination of VoIP Telecenter U Campus Controllers for a minimum of 1000 facilities.
10. The software shall support a minimum of 50,000 IP Speaker Modules district wide.

B. VoIP Single Campus Controller – Rauland Model TCC2000

1. Provides call routing for paging and intercom for a single facility.
2. Connects to the district provided Telephone Network via a SIP connection.
3. Supports a flexible numbering plan allowing two, three, four, five- or six-digit extensions.
4. SIP interface to a district provided Telephone Network shall enable connected phones to display classroom call-ins, answer internal intercom call-ins, make pages, and change priorities of call-ins in progress...
5. Direct Dialing, twoway amplified voice intercom between any provided telephone or administrative console and IP speaker without the use of a presstotalk or talklisten switch.
6. Ability to place two levels of call-in from any call-in switch.
7. The ability to answer intercom call-ins registered at administrative consoles and pre-selected telephones.
8. The ability to automatically escalate incoming call-ins to an alternate telephone or group of telephones if they remain unanswered for a predetermined amount of time.
9. The ability to manually upgrade an intercom call-in to an alternate telephone or group of telephones.
10. The ability for classrooms to “check-in” via push-button when they have successfully secured their location during an emergency.
11. Administrative console shall display locations that have not “checked-in” to confirm their secured location and provide hands-free audio monitoring and communication to unsecured locations.
12. The controller shall not need a direct connection to any classroom via home run or distributed wiring. It shall communicate solely through the IP Network.
13. Single-button access from any telephone on the system to distribute emergency announcements within the facility to all or select locations equipped with speakers. Emergency announcements originating from any assigned administrative phone shall have priority over all regular system functions.
14. Ability for administrative consoles and connected phones to selectively monitor audio at any two-way speaker during an emergency.
15. Stores a minimum 48 hours of Bell Event Schedules, all emergency notification sequences as well as facility wide configuration.
16. The system can sync system time to the Atomic Clock Signal or the school’s or district's network time server.
17. System’s SIP Interface shall provide:
    a. Audio paging access from any telephone to any single intercom speaker, zone (group) of intercom/paging speakers or all speakers/paging horns throughout the entire facility.
    b. Ability to answer a call-in directed to that SIP extension.
    c. Ability to upgrade a call-in directed to that SIP extension.
    d. Single-button access from any telephone on the system to initiate alarm signals within the facility to all or select locations equipped with speakers. A minimum of 25 separate distinct alarm signals shall be provided. Alarm signals originating from any assigned administrative telephone shall have priority over all regular system functions.
    e. Ability to initiate school-wide emergencies, including lockdown and evacuate sequences.
18. The system will have the ability to utilize a web-browser and a USB microphone connected to the PC to deliver district-wide live emergency paging, pre-recorded

messages and tones from any authorized computer in the facility or district. The system must be capable of automatically notifying district personnel via the WAN of an alarm condition.

19. The system can automatically broadcast emergency instructions throughout an entire campus when an alarm (e.g., lockdown, lockout, security, fire) is tripped or manually activated. The emergency instructions are preprogrammed and require no user intervention. The system provides redundant alarm annunciation over intercom/paging speakers and is not meant to replace primary fire alarm or security systems.
20. IP Addressable Modules: - 1. The system shall provide multiple IP addressable modules for intercom, paging, and relay activation.
    a. All modules are POE 802.3af compliant.
    b. All Modules support DHCP.
    c. All Modules connect to the network with a single RJ-45 connector.

C. IP Addressable Speaker Module – Rauland Model TCC2011A
1. Speaker modules shall interface classroom devices, such as speakers and call-in switches, to provide a reliable communications link to the administrative consoles and connected phones utilizing the school's data network. Capable of delivering a full 2 Watts of audio power to an 8 Ohm speaker, the speaker module provides excellent audio coverage for all K-12 classrooms. The speaker module can be easily programmed through the web browser's volume slider interface to adjust the audio power (0.25W, 0.5W, 1W, 1.5W, and 2W) to each 8 Ohm speaker.
2. Speaker modules shall be equipped with an SPST relay that can trigger a visual indicator, such as a strobe, whenever a high-priority audio signal is present.
3. Speaker modules may belong to one or more of a minimum of 100 independent zones for zone paging, program/music distribution, and class change tone reception; this assignment is a programmable function, changeable by the time of day. Each IP Speaker Modules location shall be programmed in software to belong to any combination of software zones. IP Speaker Modules shall be designed to mount to ceiling and wall speakers specified herein and in the plenum space.

D. Twenty-Four Port Gateway – Rauland Model TCC2024 (design for renovation school projects)
1. The TCC2024 Twenty-Four Port Gateway is an integral part of the Telecenter U System. It supports all critical emergency event notification including emergency check-in. The TCC2024 supports 24 classrooms that utilize 25 Volt speakers and all current Telecenter call switches for front office notification.
2. Power Requirements: 100-240VAC, 1.5 Amp, 50/60 Hz Network Requirements: 10/100/1000 Mb, multicast enabled switch on fully switched network Connection: One (1) RJ45 socket on CAT5e or CAT6 cable 2 Female Amphenol-style connectors for field wiring (maximum of 15 feet to punch-block) 10/100/1000 network port for connection to system.
3. Classroom Field Cabling: CAT5e or CAT6 – max length of 1,200', supports 25V Speaker, call switch and analog clock 4 conductor – two (2) twisted pairs with overall shield 20AWG – Max length of 2,400' 22AWG – Max length of 1,500' 24AWG – Max length of 900' 3 conductors with overall shield 2 conductor with overall shield (speaker only applications)
4. Environmental Parameters: Operating: Temperature: 32° to 122° F (0° to 50° C) Relative Humidity: 15% to 95%, non-condensing Storage: Temperature: -4° to 158° F (-20° to 70° C) Barometric Pressure: 8.3 PSI (15,600 Ft).
5. Dimensions: 1 Rack Unit Height: 1.7" (4.4 cm) Width: 19.0" (49.2 cm) Depth: 15.25" (38.74 cm) with connector Weight: 14.3 lbs. (6.48 kg)

E. IP Addressable Zone Paging Module – Rauland Model TCC2022
   1. Zone paging modules convert the IP-based audio to an analog line-level audio signal to drive the Audio/Program Amplifiers specified herein.
   2. Zone paging modules shall connect multiple speakers for district all page, all page, zone paging, bells, audio events, and emergency notifications.
   3. Zone paging modules shall be rack mounted in the MDF/IDF's using the Rauland Model TCC2099 Universal Rack Mounting Kit.
   4. Zone paging modules shall be able to belong to one or more of 100 independent zones for live paging, bells, pre-recorded audio and emergency notifications.

F. IP Addressable Auxiliary Input/output Module – Rauland Model TCC2033
   1. Auxiliary I/O Modules provide two (2) networks enabled, individually addressable contact closures providing an interface to external systems such as fire alarm panels, security panels, strobes, and door latches.
   2. Auxiliary, I/O modules provide the ability to connect a "Panic Button" to the system.
   3. Auxiliary I/O Modules shall be rack-mounted using the Rauland Model TCC2099 Universal Rack Mounting Kit.
   4. User can program relays to be activated manually, through an event/bell schedule and during emergency notification.

G. IP Addressable Program Line Input Module – Rauland Model TCC2055
   1. Line Input Module converts stereo or mono line-level analog audio to IP-Based Data for use in the Telecenter U system.
   2. It is equipped with 3.5mm (headphone style) input socket.
   3. Desktop or rack is mountable with Rauland Model TCC2099 Universal Rack Mounting Kit.
   4. Includes a male 3.5mm to dual male RCA connector cable.

H. Audio Paging/Program Amplifier(s)
   1. The power amplifier(s) shall be provided to provide a minimum of 2 watts of power to all paging speakers and 15 watts of power to all paging horns.
   2. The maximum load on the paging/program amplifiers shall be 80% of the rated maximum output of the amps.
   3. Provide JBL CSA-Series to meet the above requirements.

I. IP Addressable Administrative Console – Rauland Model TCC2045
   1. A full-color screen with 64 soft keys, 3 lines select, volume control, push to talk, speakerphone mode, left/right and up/down scrolling.
   2. Audio paging access from any Console to any single intercom speaker, zone (group) of intercom/paging speakers or all speakers/paging horns throughout the entire school.
   3. Programmable soft key access from any console on the system to initiate alarm signals within the school to all or select locations equipped with speakers. A minimum of 25 separate distinct alarm signals shall be provided. Alarm signals originating from any assigned administrative telephone shall have priority over all regular system functions.
   4. Programmable soft key access from any console to automatically broadcast page emergency instructions throughout an entire school when an alarm (e.g., lockdown, lockout, security, fire) is tripped or manually activated. The emergency instructions are preprogrammed and require no user intervention. The system provides redundant alarm annunciation over intercom/paging speakers and is not meant to replace primary fire alarm or security systems.
   5. Ability to perform intercom communication with any single IP Addressable Speaker Module.

6. Ability to display 3 call-ins at a time on the screen, with an unlimited number of call-ins annunciating and the ability to scroll to view all call-ins.
7. Ability to upgrade a call-in via a soft key.
8. Programmable soft key access from any console for activating relays, campus wide.
9. Ability to maintain, along with controller and other IP Modules system functions, including intercom, bells, and paging for the local campus in the event of district-wide connection loss.
10. Quantiles: Elementary School 1 Console – Middle School 2 Consoles – High School 3 console – location coordinated with owner representative.

J. Check-in/Emergency Dual Pushbutton Call-in Switch – Rauland Model TCC2211PB (shall provide a monitor of call button status)
   1. Check-in/Emergency Call-in Switches indicated on the drawings shall contain the following functions and features:
      a. One (1) “Check-in” call-in switch that shall activate a distinctive “NORMAL” call annunciation from single button activation under non-emergency conditions and shall activate a “Check-in” annunciation to confirm the location is secured during lockdown conditions. The button shall be blue in color and shall be marked “CHECK IN” and will route the call-in to any one or more Administrative Telephones and Displays for a quick and easy response from an Administrative Telephone.
      b. One (1) “Emergency” call-in switch that shall activate a distinctive “EMERGENCY” level call from single button activation. The button shall be red in color and shall be marked “EMER” and will route the call-in to any one or more Administrative Telephones for quick and smooth response. Provide as indicated on the drawings.

K. Tile Ceiling Mounted Intercom Speaker – Rauland Model BAFKIT2X2L8RJ
   1. Shall be a pre-assembled 2 foot by 2-foot lay-in speaker, baffle and back box assembly consisting of a premium 8 Ohm, 8” speaker, a perforated steel baffle with a white baked epoxy finish and an integrated back box that covers the full area of the baffle.
   2. The speaker assembly shall include a female RJ-45 modular socket and mounting bracket to facilitate connection to the TCC2011A IP Speaker Module specified herein. Provide as indicated on drawings.

L. Tile Ceiling Mounted Intercom Speaker – Rauland Model BAFKIT2X2L
   1. The pre-assembled Rauland BAFKIT2X2L can immediately “lay in” to a new or existing ceiling grid and be wired to finish the installation. The BAFKIT2X2L Ceiling Speaker Assembly consists of USO188-type, 8” loudspeaker complete with a 25V line matching transformer, mounted on a 2 foot by 2 foot lay-in baffle, and an integrated backbox that runs the full length of the baffle.
   2. The speaker Type: 8 inch (20.3 cm) Permanent Magnet, Power Rating: 8 Watts RMS. Sensitivity: 93 dB @ 1 meters with 1 Watt input, Frequency Response: 65 to 17,000 Hertz. Magnet: 5 oz. (141.7 g) PM, Voice Coil Impedance: 8 ohms, Voice Coil Diameter: 0.75 inches (1.9 cm) assembly shall include a female RJ-45 modular socket and mounting bracket to facilitate connection to the TCC2011A IP Speaker Module specified herein. Provide as indicated on drawings.

M. Tile Ceiling Mounted Speaker – Quam Model Solution 5
   1. The SOLUTION 5 is a complete, shallow depth, lightweight, 2' x 2' ceiling tile replacement loudspeaker pair consisting of a primary and secondary unit, for use in larger environments where more than a single 8 Ohm unit is required for proper coverage with a single 8 Ohm source.
   2. Average Sensitivity- 92 dB SPL, 1W/1M, Loudspeaker Power Rating - 12W RMS EIA 426A Standard, Maximum Power Rating - 15W @ 8 Ohms (pair), Calculated Output - 102 dB-

SPL 12W/1M, Frequency Response - 65 Hz - 17 kHz EIA 426A Standard and Audio Connection - RJ45.

3. The speaker assembly shall include a female RJ-45 modular socket and mounting bracket to facilitate connection to the TCC2011A IP Speaker Module specified herein. Provide as indicated on drawings.

N. Tile Ceiling Mounted Paging Speaker – Rauland Model BAFKIT2X2LRJ
   1. Shall be a pre-assembled Rauland BAFKIT2X2LRJ can immediately "lay in" to a new or existing ceiling grid and be wired to finish the installation. The BAFKIT2X2LRJCeiling Speaker Assembly consists of a high efficiency USO188-type, 8" loudspeaker complete with a 25V line matching transformer, mounted on a 2 foot by 2 foot lay-in baffle, and an integrated backbox that runs the full length of the baffle. The versatile BAFKIT2X2LRJ can be used with either structured cabling or traditional field wiring. Connect the speaker by inserting an 8-pin RJ45 terminated CAT 5/6 cable or attach the 2-wire pigtail to traditional field wiring.
   2. Speaker Type: 8 inch (20.3 cm) Permanent Magnet, Power Rating: 8 Watts RMS, Sensitivity: 93 dB @ 1 meter with 1 Watt input, Frequency Response: 65 to 17,000 Hertz, Magnet: 5 oz. (141.7 g) PM, Voice Coil Impedance: 8 ohms, Voice Coil Diameter: 0.75 inches (1.9 cm), Transformer: 25V; taps at ¼, ½, 1, 2 and 4 Watts, Connection: Female RJ45 socket (8 conductor), 2-wire, 22AWG pigtail, Baffle:, White, 22-gauge cold-rolled steel, Baffle Size: Width: 23-3/4" (60.3 cm), Length: 23-3/4" (60.3 cm), Depth: 3-3/8" (8.6 cm), Weight: 6 lbs. 1 oz. (2.8 kg).

O. Gypsum Ceiling Mounted Paging Speaker Assembly – Rauland Model ACC1406
   1. Shall consist of a high-efficiency loudspeaker (Rauland Model US0188) complete with a 25/70 Volt multi-tap line matching transformer mounted on a round white epoxy steel baffle (Rauland Model ACC1000). The recessed ceiling back box shall be an 8" round enclosure with a plaster flange mounting ring and a depth of 4-1/8" (Rauland Model ACC1110). Provide as indicated on the drawings.

P. Recessed Wall Mounted Paging Speaker – Rauland Model US0188
   1. Shall be an 8" permanent magnet seamless cone type with an additional cone provided to extend high-frequency response. It shall have a frequency range of 65-17,000Hz, an 8-watt program power-handling capacity and an axial sensitivity of 93db at 1 watt with a 1-watt input. Voice coil shall be ¾" diameter with an impedance of 8 Ohms. The speaker shall be equipped with a multi-tap transformer (0.312, 0.625, 1.25, 2.5 and 5 watts) at 25V and 70V.
   2. The recessed back box shall be of heavy gauge cold-rolled steel, spot welded for stability with a rust-retardant gray primer finish. Acoustically treat the interior to eliminate mechanical resonance. The backbox shall be 10-3/4" square by 3.75" deep (Lowell Model P68X).
   3. The baffle shall be constructed of 22-gauge cold-rolled steel that is zinc-treated to resist corrosion. The finish is baked, powdered white epoxy, which is virtually scratch- and mar-proof. (Lowell Model SG8-VP). Provide as indicated on the drawings.

Q. Surface Ceiling Mounted Paging Speaker – Rauland Model US0188
   1. Shall be an 8" permanent magnet seamless cone type with an additional cone provided to extend high-frequency response. It shall have a frequency range of 65-17,000Hz, an 8-watt program power-handling capacity and an axial sensitivity of 93db at 1 watt with a 1-watt input. Voice coil shall be ¾" diameter with an impedance of 8 Ohms. The speaker shall be equipped with a multi-tap transformer (0.312, 0.625, 1.25, 2.5 and 5 watts) at 25V and 70V.

2. The surface backbox shall be 18-gauge cold-rolled steel with an attractive white epoxy finish. The interior surfaces are jute-lined to prevent metallic resonance, vibration and provide proper acoustical results. The backbox shall be 12-1/2” square by 4” deep (Lowell Model CB84-SGVP).
3. The baffle shall be constructed of 22-gauge cold-rolled steel that is zinc-treated to resist corrosion. The finish is baked, powdered white epoxy, which is virtually scratch- and mar-proof. (Lowell Model SG8-VP). Provide as indicated on the drawings.

R. Recessed Wall Mounted Exterior Paging Speaker Assembly – Lowell Model P68X
1. The speaker shall be an 8" single cone driver with a moisture-resistant cone and a 10 oz. magnet. The cone is cotton cloth with a phenolic resin treatment and a double-dipped acrylic lacquer coating to provide superior protection in areas of high humidity. The speaker shall be Lowell Model 8C10MRB-T72. The recessed back box shall be of heavy gauge cold-rolled steel, spot welded for stability with a rust-retardant gray primer finish. Acoustically treat the interior to eliminate mechanical resonance. The backbox shall be 9.6” square X 3.75” deep. The baffle shall be vandal-proof, the faceplate constructed of a special aluminum alloy with a tensile strength of 44,000PSI. The baffle front is backed with a heavy gauge, perforated steel screen which protects the speaker. Provide tamper-resistant hardware. The Baffle shall be Lowell model SG8-VP. Provide as indicated on the drawings.

S. High-Security Intercom Station - Quam Model CIS2/8
1. Shall be designed to provide two-way intercom functions in areas where high ambient noise levels are present. Two-way communications are accomplished through the use of the built-in speaker/microphone. A call origination switch is provided within the station. Quam Model CIS2/8. Provide as indicated on the drawings.
2. The speaker assembly shall include a female RJ-45 modular socket and mounting bracket to facilitate connection to the TCC2011A IP Speaker Module specified herein. Provide as indicated on drawings.

T. High-Security Intercom Station - Quam Model CIS2/25
1. The CIS2 Series is a 3-gang, vandal resistant call-in station with integrated speaker/microphone consisting of a 3" square frame loudspeaker with a2.35 oz. ceramic magnet and a phenolic impregnated, moisture resistant cone - a 1W-25V transformer, and a momentary (normally open) push-to-call button.
2. Three (3) interwoven, steel security screens are mounted between the 12-gauge brushed stainless steel faceplate and loudspeaker. Tamper resistant, 6-32 x 1” hardware included. 1W-25V, 3-Tap Transformer (1W, 0.5W, 0.25W).

U. Remote Audio Input Jack Plate - ProCo Model Type A
1. Provide a single gang plate in the office area to facilitate the connection of a headphone level audio source for a broadcast of program material through the system (ProCo Model Type A). The jack plate shall have a single 3.5mm female stereo input. The jack plate shall be engraved “INTERCOM PROG. INPUT”.

V. Classroom Breakout Module – Rauland 603101 – TCU Hybrid System
1. The 603101 Cat5e or Cat6 Breakout Module can be used for connection of Category Wiring to classroom devices. With (3) RJ45 jacks wired in parallel, connects classroom devices, including call switches, analog phones, and speakers.
2. With (3) RJ-45 Jacks, (1) RJ-11 Jack, 8-wire, color coded, 8" (20.3 cm), 22AWG, stranded, tinned and wire pigtail.
3. Mounts in TP434 – four-inch box with TP472 cover plate.

W. Classroom Surface Mount Box – Panduit NK2BXIW-A – TCU Hybrid System

1. Surface mount boxes shall have a low-profile design and shall be available in a variety of port densities. Boxes shall accept all NetKey™ Keystone Modules for fiber, copper, and audio/video applications. The boxes shall mount with screws, adhesive, or optional magnets and shall include breakouts for use with surface raceway. Cable tie slots shall be included to provide strain relief on incoming cables.

X. Delivery (Cafeteria) Call Button – Quam CIB2
1. The CIB2 is a single-gang, vandal-resistant call-in switch with momentary, normally open, push-to-call button.

Y. Cabling: West Penn, Mohawk, Quiktron, or as approved by the manufacturer.
1. Shall be West Penn, Mohawk, Quicktron, or as approved by the supplier. (All Cabling and patch and patch cords are to be pink)
   a. W.P. #25292B (25V Paging Circuits) - Pink
   b. All patch cables shall pink.
   c. All cabling and patch cables shall be plenum-rated.

3. PART 3 – EXECUTION

3.1. EXAMINATION

A. Examine conditions, with the Installer present, for compliance with requirements and other conditions affecting the performance of the School Communications and School Safety Network.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.2. INSTALLATION

A. General: Install the system following NFPA 70 and other applicable codes. Install equipment following the manufacturer's written instructions.

B. Furnish and install all material, devices, components, and equipment for a complete and operational system.

C. Impedance and Level Matching: Carefully match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.

D. Control Circuit Wiring: Install control circuits following NFPA 70 and as indicated. Provide number of conductors as recommended by the system manufacturer to provide control functions indicated or specified.

E. All housings are to be located as indicated.

F. The contractor shall provide necessary transient protection on the AC power feed, all copper station lines leaving or entering the building, and all central office trunks. All protection shall be as recommended by the equipment supplier and referenced to earth ground.

G. Wiring within Enclosures: Provide adequate length of conductors. Bundle, lace, and train the conductors to terminal points with no excess. Provide and use lacing bars.

H. Provide physical isolation from speakermicrophone, telephone, line-level wiring and power wiring. Run in separate raceways, or were exposed or in the same enclosure, provide 12-inch minimum separation between conductors to speakermicrophones, telephone wiring and adjacent parallel power. Provide physical separation as recommended by the equipment manufacturer for other system conductors.

I. Identification of Conductors and Cables: Use color coding of conductors and apply wire and cable marking tape to designate wires and cables, so all media are identified in coordination with system wiring diagrams.

J. Weatherproofing: Provide weatherproof enclosures for items to be mounted outdoors or exposed to the weather.

3.3. GROUNDING

A. Provide equipment grounding connections for Integrated Electronic Communications Network systems as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounds.
B. Ground equipment, conductor, and cable shields to eliminate shock hazards and to minimize to the greatest extent possible, ground loops, standard mode returns, noise pickup, cross talk, and other impairments. Provide a 5-ohm ground at the central equipment location. Measure, record and report ground resistance.
C. Provide all necessary transient protection on the AC power feed and all copper station lines leaving or entering the building. Note on system drawings the type and location of these protection devices as well as all wiring information.

3.4. FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide services of a duly factory-authorized service representative for this project location to supervise the field assembly and connection of components and the pre-testing, testing and adjustment of the system.
B. Inspection: Make observations to verify that units and controls are properly labeled, and interconnecting wires and terminals are identified.
C. Testing: Rectify deficiencies indicated by tests and completely re-test work affected by such deficiencies at Contractor's expense. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

3.5. FINAL ACCEPTANCE TESTING

A. The Final Acceptance Testing shall be provided to the Owner, or the Owners designated representative only. Final acceptance testing to any other trade or service provider for the project will not comply with the requirements of this section.
B. The contractor will provide a Final Acceptance Test record document signed by both the contractor and the Owner or designated Owner’s Representative establishing the “In Warranty” date. The warranty period will not commence until the Final Acceptance Test is completed.
C. Be prepared to verify the performance of any portion of the installation by demonstration, listening and viewing test, and instrumented measurements. Make additional adjustments within the scope of work and which are deemed necessary by the Owner because of the acceptance test.

3.6. COMMISSIONING

A. The contractor shall train the Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventative maintenance of the system. This training will be following the training as outlined in the In-Service Training Section of these specifications. In addition to the Training Materials provided, the contractor will also furnish Operators Manuals and Users Guides at the time of this training.
B. Schedule training with Owner through the owner’s representative with at least seven days advance notice.

3.7. OCCUPANCY ADJUSTMENTS

A. The contractor shall provide Occupancy Adjustments following these specifications. A response scenario amenable to both the owner and the contractor will be established and followed for the first year of service.

3.8. CLEANING AND PROTECTION

A. Prior to final acceptance, the contractor shall vacuum and clean all system components and protect them from damage and deterioration. All general areas within and around all equipment rack/cabinets in the facility will be swept, vacuumed, and cleaned up.

END OF SECTION

SECURITY SURVEILLANCE SYSTEMS STANDARDS

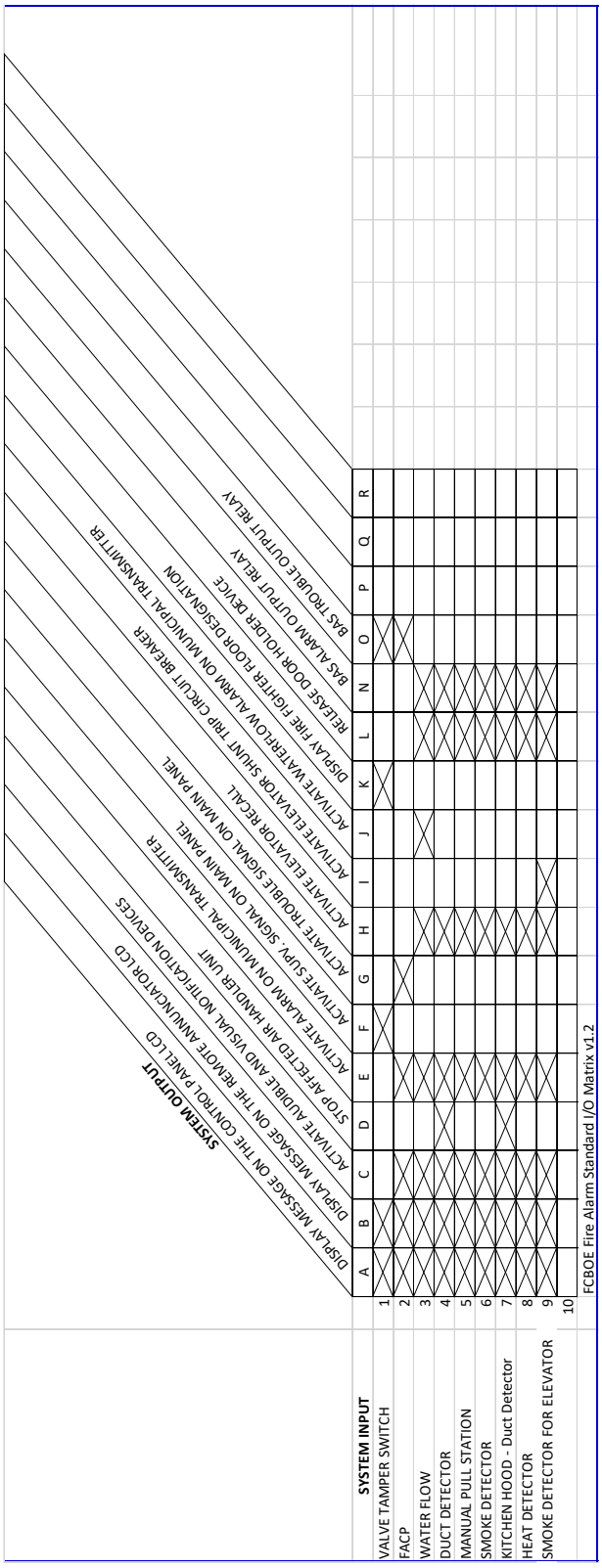
1. DESIRED OUTCOME
   1.1. A video surveillance system is intended to deter unacceptable behavior, theft and vandalism. Fulton County Schools (District) has increased its knowledge of security strategies and explored cooperative effects that will save time and money. As the District continues to grow and technology evolves, migrating the standard to a web based IP solution is recommended. The goal is to have a network based, IP Video Surveillance System (Surveillance System) that incorporates video analytics that produce sufficient and actionable coverage of specified areas.
2. SYSTEM DESCRIPTION
   2.1. An IP Video Surveillance System increases image quality, provides flexibility and expansion, and supports analytics compared to the current standard analog systems. Analytics recognize certain human or vehicular behavior patterns and trigger a higher degree of image capture and/or notification triggers which provide alerts to district personnel beyond simple motion sensing.
3. CRITERIA FOR A NETWORK BASED IP VIDEO SURVEILLANCE SYSTEM:
   3.1. The Surveillance System shall be specified as a turnkey installation that meets all specifications including labor, materials, equipment, programming, testing and training resulting in a fully operational system. The following shall be included in the design specifications:
      3.1.1. Applicable local, state and national codes
      3.1.2. Manufacturers' recommendations
      3.1.3. District requirements
      3.1.4. Manufacturer's certifications
      3.1.5. Acceptance Testing
4. APPLICATIONS:
   4.1. For newly constructed facilities, the project scope shall provide an IP Video Surveillance System designed to meet the particular project risk assessment.
   4.2. For existing facilities being renovated that include replacement of the existing video surveillance system, the project scope shall provide an IP Video Surveillance System designed to meet the particular project risk assessment. The existing system shall remain operational until the new system is fully activated
5. SYSTEM AND COMPONENT SELECTION
   5.1. Basis of design shall be the Avigilon H4 Series or better cameras with integrated analytics, and the Avigilon Premium NVR (Network Video Recorder) or better. Alternate equivalent systems may be considered in accordance with the Georgia Procurement Manual solicitation requirements.
   5.2. The Network Video Recorder shall be sized to store a minimum of 31 days of images based on an assumed 40% motion factor. Playback shall be accommodated at local viewing stations and via secure internet log on.
   5.3. Cameras shall record continuously at 1 frame per second in HD resolution. When motion is detected in the view of the camera, the frame rate shall increase to 15+ frames per second in HD resolution.
   5.4. Cameras shall be located based on risk and the reasonable expectation of privacy.
   5.5. Large spaces where students congregate shall be covered by cameras suited for the application and required image quality. For all other areas the system shall provide for adequate and actionable coverage to allow for identity and detection depending on the specific location of installation.
6. PLACEMENT OF CAMERAS:
   6.1. The system shall include both interior and exterior cameras.
      6.1.1. Minimum number of cameras per campus:

6.1.1.1. Elementary School 24
6.1.1.2. Middle School 48
6.1.1.3. High School 60

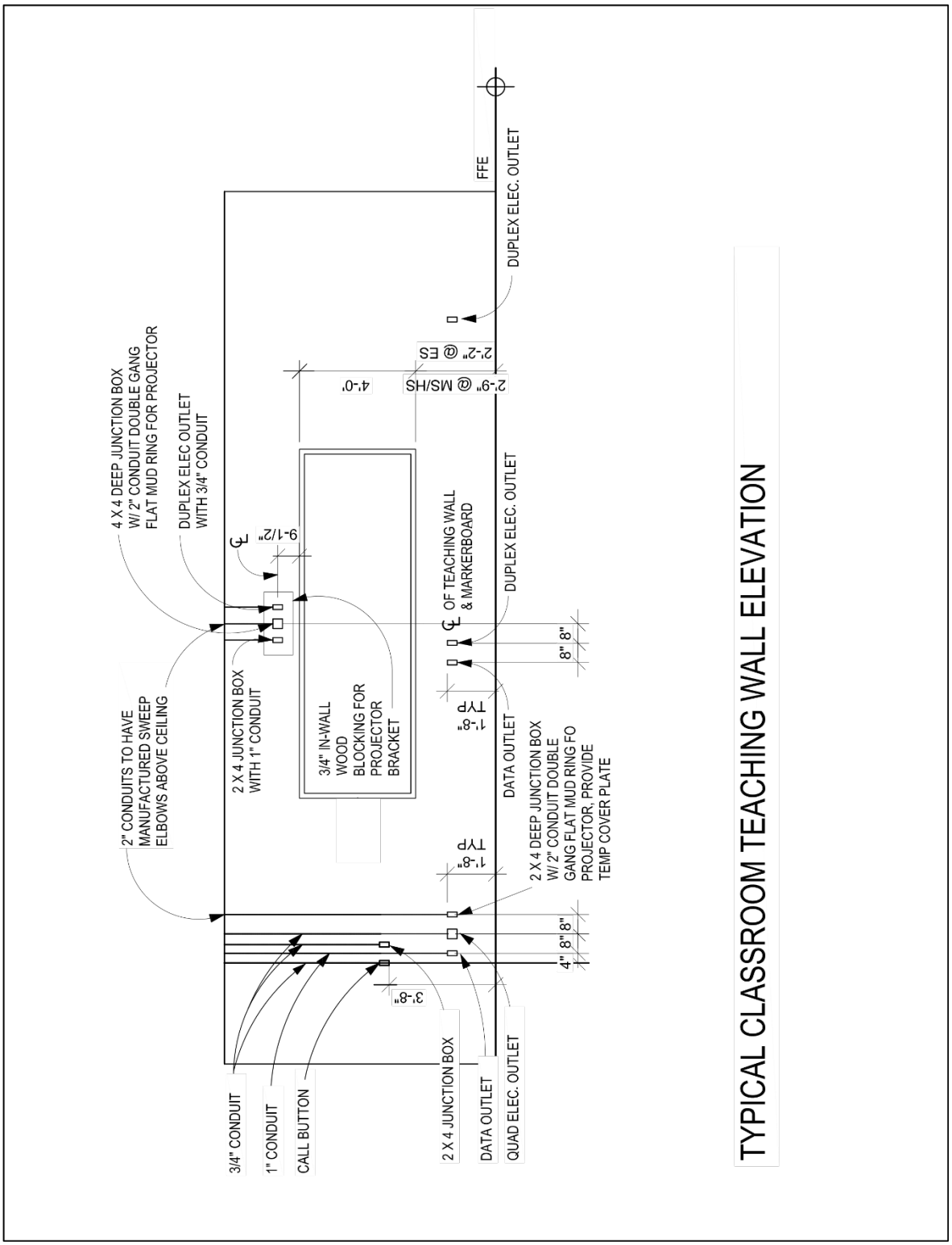
6.1.2. Recommended maximum number of cameras per campus: (Building design dependent)
6.1.2.1. Elementary School 36
6.1.2.2. Middle School 60
6.1.2.3. High School 84

6.1.3. Based on a Risk Analysis, camera locations shall include the following areas:
6.1.3.1. For All Schools
6.1.3.1.1. Exterior of building, Bus Loading and Car Rider Areas
6.1.3.1.2. All Exit Doors
6.1.3.1.3. Main Entrance, Lobby and Reception Desk
6.1.3.1.4. Cafeteria
6.1.3.1.5. Gymnasium
6.1.3.1.6. Media Center/ Common Areas
6.1.3.1.7. Hallways / Cross Corridors
6.1.3.1.8. Hallways outside of Restrooms
6.1.3.1.9. Stairwells / Stairwell Exit Doors
6.1.3.1.10. Other areas inside and outside that provide specific challenges to each individual school. (Site Based)
6.1.3.2. Elementary Schools shall also include:
6.1.3.2.1. Playgrounds
6.1.3.3. Middle Schools shall also include:
6.1.3.3.1. Athletic Fields and Courts
6.1.3.4. High Schools shall also include
6.1.3.4.1. Athletic Fields and Courts
6.1.3.4.2. Out-Buildings, Student Drop-off and Parking Lots

FIRE ALARM INPUT-OUTPUT MATRIX



TYPICAL CLASSROOM TEACHING WALL



KITCHEN DESIGN GUIDELINES

1. Contact Fulton County Schools for current list of kitchen equipment and preferred layouts
2. Walk-in Freezer and Cooler
   - 2.1. DESIGN CRITERIA
     - 2.1.1. Freezer and cooler shall have separate entrance doors, accessed directly from the kitchen
   - 2.2. BOXES
     - 2.2.1. Acceptable box manufacturers: Bally, Southeast Cooler, or Thermo-Kool
     - 2.2.2. Acceptable refrigeration manufacturers: Heatcraft, Bally, and Trenton
     - 2.2.3. Heater wire required at door jambs to prevent icing
     - 2.2.4. In renovation projects with epoxy flooring over quarry tile, floor slope shall be reworked in the area of the doors so that door sweep does get damaged by floor finish
     - 2.2.5. Floor panel shall be constructed 5” total panel, with a ¾” plywood substrate and a 1/8” aluminum treadplate floor. The floor system must have a minimum 1000 LB/SF mobile load capacity.
     - 2.2.6. Wall panels - Increase wall thickness for boxes located outside the facility
     - 2.2.7. Provide air shield at each door
     - 2.2.8. Pressure relief port: An electric heated pressure relief port shall be provided in the freezer compartment. PING PONG BALL TYPE PORTS ARE NOT ACCEPTABLE.
   - 2.3. DOOR SECTIONS
     - 2.3.1. HARDWARE: All hardware to be satin aluminum or corrosion resistant finish.
     - 2.3.2. HINGES: Each door shall have three (3) self- closing, field adjustable cam-lift type hinges. Hinges to have hold-open feature when door is over 90 degrees opened.
     - 2.3.3. LATCH: The latch shall be designed to easily open the door by breaking the magnetic force of the door gasket. Latch shall have a cylinder lock and also be equipped for a padlock. The latch shall have an inside safety release which will allow the door to be opened even if the cylinder and padlock are locked.
     - 2.3.4. SILL PLATES: Plates to be heavy duty stainless steel and be provided with non-skid strips.
     - 2.3.5. FOOT PEDAL: Each door shall be provided with a foot pedal door opener.
     - 2.3.6. DOOR SWEEP: The bottom edge of the doors shall contain an adjustable rubber wiper gasket.
   - 2.4. BAS wiring for monitoring/control shall be fed from main mechanical room BAS panel and shall be on the generator. Enclosure with relays shall be located at the freezer above the finish ceiling.
   - 2.5. Condenser phase loss monitoring by BAS required
   - 2.6. CONDENSER AND EVAPORATOR UNIT
     - 2.6.1. COOLER to hold 34 to 38 degrees F operating temperature at 110 degree entering condenser air temperature. System shall consist of an evaporator(s) and matching air-cooled condensing unit
     - 2.6.2. FREEZER to hold -10 to 0 degrees F operating at 110 degree entering condenser air temperature. System shall consist of an evaporator(s) and matching air-cooled condensing unit.
     - 2.6.3. Each condensing unit shall be completely factory assembled, piped, wired, tested and run-in. Each unit shall contain at least the following components: Heavy gauge housing for outside use, scroll motor compressor with built-in overload protection; aluminum-finned, copper tube, air-cooled condenser with direct driven condenser fan, arranged for horizontal air flow; refrigerant receiver with inlet, outlet, purge, relief and charging valves; suction and discharge line vibration eliminators; defrost controls, low-ambient pressure and starting controls and safety operating controls.
     - 2.6.4. Operating control shall be automatic recycling, low pressure cut-out switch. Low ambient control system shall be fully automatic, and shall not require any auxiliary heat or heated receivers.
     - 2.6.5. Defrost of all freezer evaporator coil surfaces, drain pans and drain lines shall be by electric defrost systems. Defrost shall be demand-based for each evaporator unit. Condensate line heater shall be sized for 25 watts

per linear foot and shall continue through the freezer wall penetration. Drain heaters must be wired in hot to emergency power.

2.6.6. Contractor shall program controller demand defrost for freezers and schedule defrost for coolers

2.6.7. Each evaporator unit shall be of the ceiling mounted, propeller-fan, free 30 delivery type, arranged for horizontal air flow. Evaporator coil shall be of copper tube, aluminum-finned constructions housed in a heavy gauge aluminum casing. Provide ECM evaporator fan motors.

2.6.8. Fixed speed fan motor not allowed

2.6.9. Head pressure control by variable speed ECM condenser fan motors, no condenser flooding type control.

2.6.10. Controllers: Heatcraft Quick response controller or KE2 Evaporator efficiency controller shall control defrost and temperature control. Provide Lead/Lag via the Building Automation System (BAS) for redundant refrigerant systems on high schools and large district freezer.

2.6.11. The Walk-In Cooler/Freezer shall be provided with a minimum of one inch thick sealed Mold resistant AP/Armaflex SS-Sealed Pipe Insulation installed in accordance with manufacturer's instructions. Provide aluminum covering for insulation to protect from UV light.

2.6.12. Kitchen Equipment condenser units set level on roof curbs with isolation absorbers.

2.6.13. Condenser units shall not be placed back-to-back

2.6.14. Insulation inside the building shall be covered with Armafinish paint.

2.6.15. R448 refrigerant required

3. Kitchen hood shall be a double shell design consisting of an inner exhaust canopy with minimum 86% supply air ratio, constructed of heavy gauge stainless steel exterior
4. Kitchen Equipment Coordination
   - 4.1. Tilt skillet must have drain trough in front of it
   - 4.2. Twelve gallon skillets must have drain trough in front of it or be plumbed to a floor drain
   - 4.3. No standing pilot lights should be provided for griddles, char broilers, or stoves
   - 4.4. Coordinate ceiling requirements with Division 9 – FINISHES
5. Teachers' dining ice machine shall be separate from the ice machine in the kitchen due to health regulations.
6. Serving lines:
   - 6.1. At high schools, there should be no more than 6" of counter depth on the serving side of the hot food units in order to allow kitchen staff to access the wells
7. Doors
   - 7.1. All doors into and inside of kitchen should be lockable with one key that is *not* the master key
   - 7.2. Doors between kitchen and cafeteria and along passthru wall should be metal with lites. Door into laundry area needs a lite.
8. Ice Machines
   - 8.1. Preferred Manufacturer – Manitowoc; Acceptable alternatives: Ice-O-Matic, Hoshizaki
   - 8.2. Refrigerant – R404A
   - 8.3. Cubed ice, not flaked
   - 8.4. Storage Capacity – 400 lbs
   - 8.5. Rate Capacity – ES/MS/HS – 450/450/600lb per 24 hours
9. Combi Ovens
   - 9.1. Preferred Manufacturer – Blodgett; Acceptable alternatives - Elmoa, Rational; Not allowed - Hobart, Vulcan
   - 9.2. Preferred basis of design - Blodgett BLCT-***E
   - 9.3. Fuel type preferred – Electric
   - 9.4. Boiler-less type
   - 9.5. Single-stack preferred if space allows
10. Convection Oven
    - 10.1. Preferred Manufacturer – Blodgett; Acceptable alternatives - Garland, Accutemp; Not allowed - Southbend
    - 10.2. Preferred basis of design - Blodgett DFG-100

10.3. Fuel type preferred – Natural gas

11. Pass through Cooler
    11.1. Preferred Manufacturer – TRUE; Acceptable alternatives - Delfield, Continental; Not allowed - Traulson, Hobart
    11.2. Refrigerant – 404a; include service valves
12. Mobile Milk Box
    12.1. Preferred Manufacturer – TRUE; Acceptable alternatives – Continental, Beverage Air; Not allowed -Colorpoint, Delfield
    12.2. Refrigerant – 404a; include service valves
13. Countertop Milk Box
    13.1. Preferred Manufacturer – TRUE; Acceptable alternatives – Randell, Beverage Air; Not allowed - Delfield
    13.2. Refrigerant – 404a; include service valves

Submit all kitchen designs to FCS Capital Improvements staff for review and approval prior to finalization