

Technical Design Guidelines

September 7, 2021

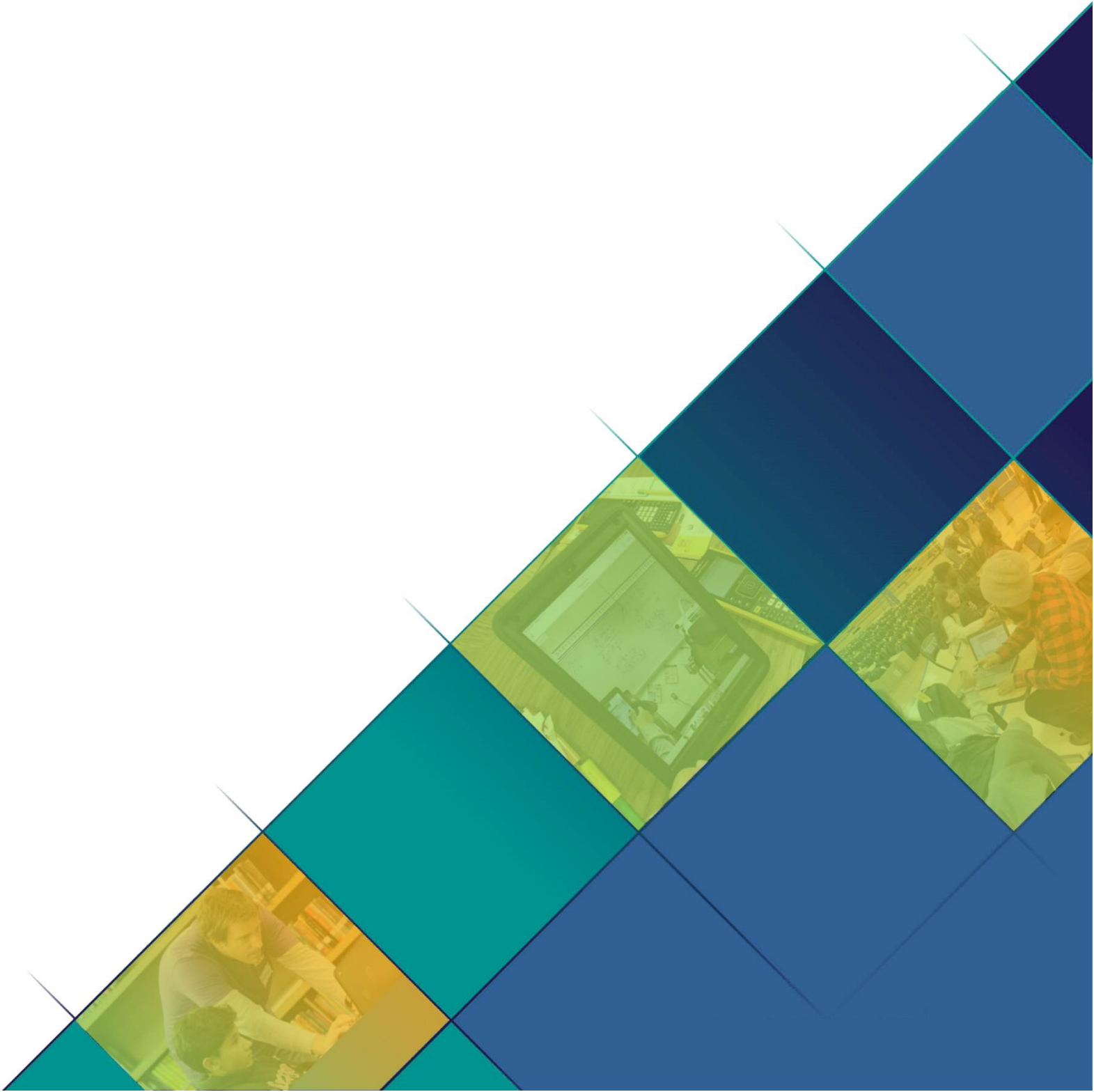




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Division 01 – General Requirements

01 10 00 Summary

1. These Technical Design Guidelines have been developed to assist the Architect in producing quality projects in a consistent, efficient and timely manner.
2. The intent is to communicate Dallas ISD's requirements for construction which have been developed to enhance maintenance opportunities, promote equity among schools and lower operating costs.
3. School classifications identified in this document are limited to elementary, middle and high schools for simplicity/clarity. For projects that do not adhere completely to one of these classifications (ex: Vanguard, PK-8, 4-8), a mix of requirements may apply. Confirm requirements with Dallas ISD designated representative on a project specific basis.
4. Project types identified in this document are limited to new construction, additions and renovations for simplicity/clarity. For projects that do not adhere completely to one of these types, a mix of requirements may apply. Confirm requirements with Dallas ISD designated representative on a project specific basis.
5. Deviations from these Technical Design Guidelines are not allowed for new construction projects. Deviations from the TDG for additions and renovations are allowed only for situations where the requirement cannot be met due to existing conditions and are to be reviewed with the Dallas ISD designated representative on a project specific basis.
6. When deviations from the Technical Design Guidelines are necessary, approval by Dallas ISD is required in the form of a Design Waiver.
7. Sole sourced manufacturers/products are not allowed unless approved in advance by Dallas ISD. For manufacturers listed with "or equal" in this TDG document, apply the following:
 - 7.1 Or Dallas ISD Approved Equal: Architect to specify more than one product in the Contract Documents. Architect is responsible for identifying a product that meets the same or greater performance criteria as the product listed and obtaining approval from Dallas ISD in the form of a Design Waiver prior to inclusion in the Contract Documents.
 - 7.2 Or Approved Equal: Same as above, however, approval from Dallas ISD is not required.
 - 7.3 Or Equal: Architect may include a basis of design product in the Contract Documents and it is the responsibility of the General Contractor to identify and provide a product that meets the same or greater performance criteria as the product listed.
8. These guidelines do not relieve the architect or the engineer-of-record of their professional responsibility. Code requirements supersede requirements of these Technical Design Guidelines.
9. Any guidelines that conflict with current codes shall be brought to the attention of the Dallas ISD designated representative.
 - 9.1 Project Analysis: Refer to Dallas ISD pre-development checklist.
 - 9.2 Any asbestos found/suspected is to be documented in writing to the Dallas ISD designated representative.
 - 9.3 Architect is responsible for verification of all existing conditions, only in the area of project scope, in accordance with the Architect's Agreement.
 - 9.4 All Design Guidelines referencing ASTM are to be taken to mean the most current publication. Notify Dallas ISD designated representative of any deviations.

10. Energy Performance and Sustainable School Design TX – CHPS:
 - 10.1 Dallas ISD has adopted the Texas Criteria from the Collaborative for High Performance Schools (TX-CHPS) as the design standard for new construction.
 - 10.1.1 TX-CHPS tools are available at the following website: <https://chps.net/us-chps-online>
 - 10.1.2 The Architects must follow the most current criteria for CHPS-Designed. No additional fees are due for compliance with these requirements.
 - 10.1.3 Each project is to be reviewed by a third party assessor, provided by Dallas ISD, for green construction and CHPS Design compliance
 - 10.1.4 Architect to provide target criteria for renovations and additions to the Dallas ISD designated representative during the pre-design/STB phase.
11. Building Site Design for Safety: Principles and strategies of Crime Prevention Through Environmental Design (CPTED) is recommended for the building, campus and site design.
12. For projects in noise level restricted zones, Architect to engage an acoustical consultant in order to analyze all building systems and specifications and to design the affected building components appropriately.
13. A Theatre Consultant and Acoustician (from Dallas ISD Approved Vendors List), contracted by the Architect, is preferred for all projects where performing arts spaces are being constructed or modified. Confirm approval for these consultants with Dallas ISD designated representative prior to project commencement on a project specific basis
14. Color Board Requirements:
 - 14.1 All color boards must be approved by the Dallas ISD designated representative by completion of 50% Construction Document phase.
 - 14.2 The color board shall include proposed finish patterns and show placement of field and accent colors by location within the building.
 - 14.3 School principals, when assigned, to be involved in preliminary reviews with Architects/PMs when reviewing pre-selected options for new finishes.
 - 14.4 Once the school principal provides input on the selected finishes, Architect to submit the color board to the Dallas ISD designated representative for final review and approval.
 - 14.5 New schools or schools without assigned principals will follow a similar process, without input from the school principal.
15. Under Floor Crawlspace:
 - 15.1 Structurally supported floor slabs with crawl spaces are required. Dallas ISD may issue a waiver to allow structured slabs on carton forms at areas where under slab utilities (ex: plumbing lines) are not present.
 - 15.2 Design Criteria:
 - 15.2.1 Crawlspace are to be placed at the existing grade rather than excavated.
 - 15.2.2 Minimum crawlspace head height to be 60 inches measured at the bottom of the lowest beam or major obstruction.
 - 15.2.3 Provide at least one pit location with 7 feet of clear head space where sump pit is located.
 - 15.2.4 Access to crawl spaces to be provided with 4 foot x 4 foot aluminum floor hatches with ladders to the ground surface.
 - 15.2.5 Crawl space areas further than 150' from a floor hatch are not allowed, for ease of crawl space access.
 - 15.2.6 Install a mud slab throughout all crawl spaces.

- 15.3 Drainage:
 - 15.3.1 The ground is to be contoured to allow provide for the natural drainage of water from the crawl space.
 - 15.3.2 Crawl space to be provided with low collection areas and gravel sumps.
 - 15.3.3 Connect drainage into the city system if it is available and close to the site.
- 15.4 To avoid interference with crawlspace utilities, provide accommodations (lime stabilization, select fill, or compaction) if the potential for heaving or shrinking of the soil is identified in the Geotechnical Report.
- 15.5 Concrete structure in the under-floor crawl spaces is preferred to steel beams and joists.
- 15.6 Lights and duplex outlets to be provided in under-floor crawl spaces at key locations, including, but not limited to, floor hatch locations.
- 15.7 Reference Division 03 for additional requirements.

01 12 00 Dallas ISD Departments and Responsibility Assignments

1. Any references to DISD or District within these Technical Design Guidelines is understood to mean Dallas ISD.
2. A "designated representative" is to be assigned for each project by Dallas ISD to protect Dallas ISD's interests, ensure adherence to process/procedures and assist in coordination with Dallas ISD stakeholders and department personnel. This representative may be a member of the Dallas ISD staff or the PMF associated with the project. This role is referenced throughout this Technical Design Guidelines document as "Dallas ISD designated representative."
3. Dallas ISD Departments required for design / construction coordination are listed by their abbreviations as defined below throughout this Technical Design Guidelines document:
 - 3.1 Academic Enrichment and Support (AES):
 - 3.1.1 Fine Arts.
 - 3.1.2 Junior Reserve Officer Training Corps (JROTC).
 - 3.1.3 Library/Media Services.
 - 3.1.4 Visual and Performing Arts (V&PA).
 - 3.2 Athletics (Dallas ISD-Athletics).
 - 3.3 Early Learning.
 - 3.4 Food and Child Nutrition Services.
 - 3.5 Health Services.
 - 3.6 Information Technology (IT):
 - 3.6.1 Campus Security Systems (CSS).
 - 3.6.2 Infrastructure.
 - 3.7 Maintenance and Operations (M&O):
 - 3.7.1 Custodial Services.
 - 3.7.2 Environmental Health and Safety.
 - 3.7.3 Grounds.
 - 3.7.4 Maintenance.

- 3.8 Police:
 - 3.8.1 Emergency Management (EM).
- 3.9 Special Education (SPED).
- 3.10 Science, Technology, Engineering and Math (STEM):
 - 3.10.1 Career and Technical Education (CTE).
 - 3.10.2 Physical Education (PE).
 - 3.10.3 Science.
- 3.11 Transportation.

4. IT and Security Responsibility Matrix: Use the following as a guide to clarify scope delineation between Architect, Contractor and Vendors. Refer to Divisions 27 and 28 for all requirements.

RESPONSIBILITY MATRIX								Updated: June 18, 2021	
Dallas ISD Organization	Dallas ISD Dept/Div/ Group	Building System	Description: Equipment & Devices	Equipment & Devices:	Pathways, Cable Trays, Conduit, Backboxes, et al:	Equipment & Devices:	Pathways, Cable Trays, Conduit, Backboxes, et al:	Power:	
				Designed & Documented for Construction by	Designed & Documented for Construction by	Provided and installed by	Provided and installed by	Provided and installed by	
M&O	Grounds	Marquee Sign	Marquee Sign	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor	
M&O	EMS/Controls	BAS	JACE: Equipment, Cabling, Devices	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor	
M&O	Elevators	Elevators	Wireless Emergency Call-Out	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor	
M&O	Elevators	Elevators	Sump High Float Local Alarm	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor	
M&O	Alarms	Fire (Sprinkler) Suppression	Flow Detection	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor	
M&O	Alarms	Fire Alarm	Fire Alarm Wireless Radio (AES) Call-out, Panels, Cabling, Devices	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor	
IT	Infrastructure	E-Rate	Technology Infrastructure	A/E IT-Consultant	A/E	IT-Infrastructure e PM	CS-General Contractor	CS-General Contractor	

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Dallas ISD Organization	Dallas ISD Dept/Div/Group	Building System	Description: Equipment & Devices	Equipment & Devices:	Pathways, Cable Trays, Conduit, Backboxes, et al:	Equipment & Devices:	Pathways, Cable Trays, Conduit, Backboxes, et al:	Power:
				Designed & Documented for Construction by	Designed & Documented for Construction by	Provided and installed by	Provided and installed by	Provided and installed by
IT	Infrastructure	Fiber Optic	Fiber Optic Cable from street to MDF UPN	IT - Fiber Contractor	A/E (including civil pads, vaults)	IT - Fiber Contractor	CS-General Contractor (including civil pads, vaults)	N/A
IT	Infrastructure	Network	Fiber Optic Cabling - Dark Fiber	IT - Fiber Contractor	A/E (including civil pads, vaults)	IT - Fiber Contractor	CS-General Contractor (including civil pads, vaults)	N/A
IT	Infrastructure	Network	Fiber Optic Backbone Cabling: MDF to IDFs	IT - Cabling Contractor	A/E		CS-General Contractor	N/A
IT	Infrastructure	Infrastructure	Fiber Optic Patch Panels, Jumpers, et al	IT - Cabling Contractor	N/A	IT - Cabling Contractor	N/A	N/A
IT/Police	CSS EM	Access Control	MDF & IDF Room Security	CSS - Security Contractor	A/E	CSS - Security Contractor	CS-General Contractor	N/A
IT	Infrastructure	Network	MDF/IDF: High Heat Alarm Signal	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor
IT/M&O	Infrastructure Electrical	Network	MDF/IDF: Lightning Protection System and Event Alert	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor
IT	Infrastructure	Network	Portables	A/E	A/E	CS-General Contractor	CS-General Contractor	N/A
IT	Infrastructure	Network	UPS	A/E	A/E	IT-Network Equipment Contractor	CS-General Contractor	CS-General Contractor
IT	Infrastructure	Network	Wireless Access Points (WAPs)	A/E IT-Consultant1	A/E	IT-Network Equipment Contractor	CS-General Contractor	N/A
IT	Infrastructure	Network	Cabling	A/E IT-Consultant1	A/E	IT - Cabling Contractor	CS-General Contractor	N/A
IT	Infrastructure	Network	Patch Panels	A/E IT-Consultant1	N/A	IT - Cabling Contractor	N/A	N/A

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Dallas ISD Organization	Dallas ISD Dept/Div/ Group	Building System	Description: Equipment & Devices	Equipment & Devices:	Pathways, Cable Trays, Conduit, Backboxes, et al:	Equipment & Devices:	Pathways, Cable Trays, Conduit, Backboxes, et al:	Power:
				Designed & Documented for Construction by	Designed & Documented for Construction by	Provided and installed by	Provided and installed by	Provided and installed by
IT	Infrastructure	Network	Racks (Floor Mounted)	A/E	N/A	CS-General Contractor	N/A	CS-General Contractor
IT	Infrastructure	Network	Racks (Wall Mounted)	A/E	N/A	CS-General Contractor	N/A	CS-General Contractor
IT	Infrastructure	Network	Patch Cables	A/E IT-Consultant1	N/A	IT - Technology Contractor	N/A	N/A
IT	Infrastructure	Network	Biometric Clocks (Bioclocks)	A/E	A/E	Cabling by IT-Cabling Contractor. Device provided by CS-GC purchased from IT-Biometric Clock Vendor	CS-General Contractor	POE by IT-Cabling Contractor. Does not require line voltage power.
IT	Infrastructure	Network	POE Switch Network	IT-Network Equipment Contractor	N/A	IT-Network Equipment Contractor	N/A	N/A
M&O	Sound Stage	Voice Communications	PA IP Integrated Electronic Communications Network	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor
M&O	Sound Stage	Network	Master Clock	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor
M&O	Sound Stage	Voice Communications	VoIP	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor
M&O	Sound Stage	Voice Communications	Sound System	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor
M&O	Sound Stage	Voice Communications	POE Switches PA/Sound	A/E	N/A	CS-General Contractor	N/A	CS-General Contractor

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				Designed & Documented for Construction by	Designed & Documented for Construction by	Provided and installed by	Provided and installed by	Provided and installed by
M&O	Sound Stage	Voice Communications	Patch Cables PA/Sound	A/E	N/A	CS-General Contractor	N/A	N/A
M&O	Sound Stage	Voice Communications	Patch Panels Sound System	A/E	N/A	CS-General Contractor	N/A	N/A
IT	Audio-Visual	Distributed Audio-Video Communications Systems	Interactive Displays	IT A/V Vendor	A/E	IT A/V Vendor	CS-General Contractor	CS-General Contractor
IT/AES	Audio-Visual Performing Arts	Distributed Audio-Video Communications Systems	Auditoriums: Sound System	A/E Theatre Consultant	A/E	CS-General Contractor purchased from IT A/V Vendor	CS-General Contractor	CS-General Contractor
IT/AES	Audio-Visual Performing Arts	Distributed Audio-Video Communications Systems	Auditorium: Video Projector and Screen	A/E Theatre Consultant	A/E	CS-General Contractor purchased from IT A/V Vendor	CS-General Contractor	CS-General Contractor
IT	Audio-Visual	Distributed Audio-Video Communications Systems	Multi-Purpose Rooms: Sound System	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor
IT	Audio-Visual	Audio-Visual	Cafeteriums: Sound System	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor
IT	Audio-Visual	Audio-Visual	Cafetorium: Video Projector and Screen	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor
M&O	Sound Stage	Distributed Audio-Video Communications Systems	Gymnasium: Sound System	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor

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				Designed & Documented for Construction by	Designed & Documented for Construction by	Provided and installed by	Provided and installed by	Provided and installed by
IT	Infrastructure	Food and Child Nutrition Services	Cafeteria Point of Sale (POS)	FCNS Contractor	A/E	FCNS Contractor	CS-General Contractor	CS-General Contractor
IT	Infrastructure	Food and Child Nutrition Services	Cafeteria Digital Displays	A/E IT-Consultant & A/E	A/E	Display: CS-General Contractor Cabling: IT-Technology Contractor	CS-General Contractor	CS-General Contractor
IT/Police	CSS/EM	Network	Patch Panels Security	CSS - Security Contractor	N/A	CSS - Security Contractor	N/A	N/A
IT/Police	CSS/EM	Network	POE Switches Security Devices	CSS - Security Contractor	N/A	CSS - Security Contractor	N/A	CS-General Contractor
M&O	Alarms	Intrusion Detection System	Intrusion Wireless Call-Out, Panels, Keypads, Cabling, Devices	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor
IT/Police	CSS/EM	Storm Shelter Operations	Control Room: Panels, monitoring and operational controls, devices, and signage	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor
IT/Police M&F	CSS/EM Electrical	UPS (Non-Network)	Storm Shelter Power and Monitoring: Generator or Battery	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor
IT/Police	CSS/EM	Secure Vestibule	See "Access Control", Div 28	CSS - Security Contractor	A/E	CSS - Security Contractor	CS-General Contractor	CS-General Contractor

RESPONSIBILITY MATRIX							Updated: June 18, 2021	
Dallas ISD Organization	Dallas ISD Dept/Div/ Group	Building System	Description: Equipment & Devices	Equipment & Devices:	Pathways, Cable Trays, Conduit, Backboxes, et al:	Equipment & Devices:	Pathways, Cable Trays, Conduit, Backboxes, et al:	Power:
				Designed & Documented for Construction by	Designed & Documented for Construction by	Provided and installed by	Provided and installed by	Provided and installed by
IT/Police	CSS/EM	Access Control	Card Access/CCTV Headend Licensing	CSS - Security Contractor	N/A	CSS - Security Contractor	N/A	N/A
IT/Police	CSS/EM	Access Control	Control Panels	CSS - Security Contractor	N/A	CSS - Security Contractor	N/A	CS-General Contractor
IT/Police	CSS/EM	Access Control	Card Readers	CSS - Security Contractor	A/E	CSS - Security Contractor	CS-General Contractor	N/A
IT/Police	CSS/EM	Access Control	Door Contacts	CSS - Security Contractor	A/E	CSS - Security Contractor	CS-General Contractor	N/A
IT/Police	CSS/EM	Access Control	Electrified Door Hardware	A/E	A/E	CS-General Contractor	CS-General Contractor	N/A
IT/Police	CSS/EM	Access Control	Electrified Door Hardware Power Supplies	A/E	A/E	CS-General Contractor	CS-General Contractor	CS-General Contractor
IT/Police	CSS/EM	Access Control	IP Intercoms: Masters	CSS - Security Contractor	A/E	CSS - Security Contractor	CS-General Contractor	N/A
IT/Police	CSS/EM	Security: Electronic Surveillance	Cameras: Exterior	CSS - Security Contractor	A/E	CSS - Security Contractor	CS-General Contractor	N/A
IT/Police	CSS/EM	Security: Electronic Surveillance	Cameras: Interior	CSS - Security Contractor	A/E	CSS - Security Contractor	CS-General Contractor	N/A
IT/SPED	CSS	Safety & Security	SPED Monitoring System Cameras and Recording	CSS - Security Contractor	A/E	CSS - Security Contractor	CS-General Contractor	CS-General Contractor
IT/Police	CSS/EM	Security: Electronic Surveillance	Cabling: Switch to Device	CSS - Security Contractor	A/E	CSS - Security Contractor	CS-General Contractor	CS-General Contractor

RESPONSIBILITY MATRIX							Updated: June 18, 2021	
Dallas ISD Organization	Dallas ISD Dept/Div/ Group	Building System	Description: Equipment & Devices	Equipment & Devices:	Pathways, Cable Trays, Conduit, Backboxes, et al:	Equipment & Devices:	Pathways, Cable Trays, Conduit, Backboxes, et al:	Power:
				Designed & Documented for Construction by	Designed & Documented for Construction by	Provided and installed by	Provided and installed by	Provided and installed by
IT/Police	CSS/EM	Security: Electronic Surveillance	Storage Servers	CSS - Security Contractor	N/A	CSS - Security Contractor	N/A	CS-General Contractor

01 55 00 Vehicular Access and Parking

1. Primary entry drive, parking lots, bus loading zones, parent drop-off / pickup areas and other vehicular routes and parking lots must be designed to handle the rush of people and vehicles at the peak unloading and loading times at the beginning and end of each day.
2. The safety and security of the vehicular and parking areas will benefit from the following design considerations:
 - 2.1 Place parking in close proximity to facilitate visual surveillance from school building.
 - 2.1.1 Provide windows at classrooms and Administration that overlook vehicular routes and parking areas.
 - 2.2 External access to parking areas is to be restricted to a limited number of controlled entrances.
 - 2.3 Parking and vehicular routes are to be adequately lit with vandal proof lighting.
 - 2.4 Signage is to be installed stating the use of the parking lot (Staff, Student or Visitor) and a reminder to "remove all valuables from vehicles".
3. The entry drive is to provide ample space for lanes coming in and out, if possible, separated by a landscaped median.
 - 3.1 Minimum 5 foot wide sidewalks located on either side of the entry drive to separate student pedestrian traffic from vehicular traffic.
 - 3.2 Landscape buffers are not to block the vision of the school or traffic entering the facility.
4. The bus loading area is to be segregated from other pedestrian and vehicular traffic.
5. The layout of parking lots, particularly those to be used by high school students, is to avoid long straight driveways that allow cars to speed through the lot endangering pedestrians.
6. Lots that double as marching band practice fields to have the ability to be sectioned off to prohibit daily parking and be used only for event overflow parking.

01 55 29 Staging Areas and Phasing Plan

1. As part of the 50% construction documents submittal, the Architect is to provide a complete Construction Site Plan indicating the proposed construction limits and extent of staging area(s).
2. As part of the 95% construction documents submittal, the Architect is to indicate in the Construction Site Plan the phasing and/or specific sequencing of construction that will be required. Include a traffic control and mitigation plan for the construction period that includes motor vehicles, bicycles, and pedestrians.

01 81 03 Space Numbering

1. District facilities are to have all rooms and spaces numbered, except as noted below.
2. Guidelines for numbering rooms in new schools and additions:
 - 2.1 Rooms are to be numbered according to the floor on which they are located.
 - 2.1.1 The level of the main entrance is to be designated as the first floor.
 - 2.1.2 First floor rooms -100s, Second floor - 200s and so on. Basement level preceded by a B, such as B01.
 - 2.2 The main administration office in each facility is to be room 100 and then a logical sequence proceeding down the corridors in a clockwise fashion with should follow even numbers on one side of a corridor and odd numbers on the other.
 - 2.3 Numbered rooms opening from the corridor shall be considered main rooms (ex: room 100). Small rooms contained within larger rooms are considered a sub part of that room. They are to be numbered 100A, 100B, 100C and so on corresponding to the room they are in.
 - 2.4 Additions are to respect the numbering systems of the existing system.
 - 2.5 Enrichment rooms (library, music, art, PE, computer lab) are to be be labeled by function and number.
 - 2.6 Restrooms, mechanical rooms, electrical closets and custodial closets are to be labeled by function and number.
 - 2.7 Room numbers are to not change once established.
3. A room numbering session must be scheduled with the Dallas ISD designated representative to review the school layout prior to Design Development phase.
 - 3.1 All plans are to utilize a consistent numbering scheme throughout subsequent phases of the project.
 - 3.2 The final room numbers are to appear on the 50% Construction Documents.
 - 3.3 The room numbers shown on the contract drawings must be the same used for building signage.
4. Voice Data Jack Numbering: For projects where voice and/or data cabling/terminations are within the General Contractor's scope of work, all jacks to be numbered in the field, marked up on plans and provided to Dallas ISD-IT a minimum of 6 months prior to project completion so that required connections can be completed prior to move in.

END OF DIVISION 01



Division 02 – Existing Conditions

02 02 00 General Requirements

1. Depending on the municipality, Specific Use Permits (SUP) and Planned Developments (PD) may be required for new facilities or additions to existing facilities.
2. A field report of existing conditions is required to be performed at the start all projects, prior to any work commencing.
 - 2.1 All disciplines, applicable to the scope of work, must participate in the site visit(s) and contribute in the preparation of the report.
 - 2.2 The field report is to include the following at a minimum:
 - 2.2.1 Overall assessment, evaluation, calculations.
 - 2.2.2 Photographic documentation of the existing field conditions.
 - 2.2.3 Location of power easements, above-ground water tanks, fuel storage tanks, underground pipelines, and any other obstruction.
3. Architect to obtain available survey information related to their project from the Dallas ISD designated representative. Any additional boundary or topographical survey work required is to be requested by the Architect within five (5) days of receiving available survey information from Dallas ISD.

02 24 00 Environmental Assessment

1. Comply with Section 191.0525 of the Antiquities Code of Texas, if applicable.
2. Design Criteria for Greenfield Development:
 - 2.1 Development of buildings, hardscape, roads or parking areas is not allowed on portions of the site that meet the following criteria:
 - 2.1.1 Prime Farmland as defined by the Natural Resources Conservation Services (NRCS) NSSH Part 622.04.
 - 2.1.2 Land at elevation lower than 5 feet above the 500 year flood elevation. Land at lower elevations may be considered down to 5 feet above the 100 flood elevation with prior approval from Dallas ISD.
 - 2.1.3 Land identified as a habitat for threatened or endangered species.
 - 2.1.4 Land within 100 feet of any wetlands or as defined by local or state regulations if more stringent.
 - 2.1.5 Land within 50 feet of a water body (ex: lakes, rivers, streams, etc.).
 - 2.2 For sites where portions of the site meet any of the above criteria, construction of permanent structures in those areas is not allowed. Non-permanent structures (ex: athletic fields) are allowed, if allowed by local code.
3. Phase I Environmental Assessments (ESA):
 - 3.1 Architect to coordinate with Dallas ISD for engagement of a third-party to provide a Phase I Environmental Site Assessment (ESA) to determine the likelihood that the identified site has contamination.
 - 3.2 The following items are to be included in the Phase I ESA:

- 3.2.1 Written verification that the site has not ever been identified as a hazardous site or solid waste disposal site or that appropriate/required corrective action has been taken and properly documented.
 - 3.2.2 Written verification that the site does not contain pipelines that would be reasonably expected to:
 - 3.2.2.1 Carry hazardous materials, substances or waste (ex: gas supply lines).
 - 3.2.2.2 Emit hazardous air emissions.
 - 3.2.3 Identification of facilities within 1/4 mile that would be reasonably expected to:
 - 3.2.3.1 Handle hazardous materials, substances or waste.
 - 3.2.3.2 Emit hazardous air emissions.
 - 3.2.4 Determination that identified contaminants can be mitigated to not affect the health of students and staff.
 - 3.2.5 Sites located within 500 feet of freeways or busy traffic corridors: Show that air pollutants pose no significant health risks.
 - 3.2.6 A risk assessment and mitigation measures to avoid exposure to sources of pollution.
 - 3.2.7 Sites that have been identified in the Phase I ESA as landfills or located within 1,000 feet of a landfill are not allowed.
 - 3.2.8 If corrective measures are necessary, governing board to document that the emissions have been mitigated prior to occupancy.
4. Phase II Environmental Assessments (ESA):
- 4.1 If contamination is suspected or is found to be presented as part of the Phase I Environmental Assessment, Architect to coordinate with Dallas ISD for engagement of a third-party to provide a Phase II Environmental Site Assessment.
 - 4.2 Brownfield Redevelopment: Remediation is required before developing any site identified as a brownfield site based on the Phase II ESA due to industrial waste or other hazardous material found.
 - 4.3 Building on a Texas Superfund site is not allowed unless remediated and certified in writing.

02 30 00 Subsurface Investigations/Geotechnical

- 1. Any necessary soil engineering investigation reports are to be requested by the Architect immediately after notice to proceed. Architect to assist in suggesting boring locations/quantities.
- 2. Site Plans to note Dallas ISD's policy regarding underground utility locations. Refer to Division 33 for additional utility information.
 - 2.1 Example language: *'Contractor is responsible for locating all underground utility lines that may be affected by the work. These efforts shall include but not limited to; Ground Penetrating Radar (GPR), review of existing plans, contacting Texas 811 and any other city, state, municipal or utility company requirements. Contractor is responsible for protecting all utility lines (underground and above ground) while performing work. Any damaged utility lines will be replaced by the Contractor at no cost to the Owner.'*

END OF DIVISION 02



Division 03 – Concrete

03 05 00 General Requirements

1. Applicable Standards:
 - 1.1 ASTM Standards.
 - 1.2 Collaborative for High Performance Schools (CHPS) Program.
 - 1.3 American Concrete Institute (ACI) 318 - Building Code Requirements for Structural Concrete and Commentary.
2. Structural Systems:
 - 2.1 Acceptable Concrete Structural Systems:
 - 2.1.1 Cast-in-Place (CIP).
 - 2.1.2 Precast.
 - 2.2 Tilt-Wall Construction: Not preferred and is to be approved by Dallas ISD in the form of a Design Waiver.
 - 2.3 Components/procedures unusual to the local building trades must be approved by Dallas ISD in the form of a Design Waiver.
 - 2.4 Roof Structure:
 - 2.4.1 Slope: 1/4 inch per foot, minimum.
 - 2.4.2 Slope to be achieved using structure and not tapered or sloped insulation.
 - 2.5 Avoid use of load bearing walls except for long span spaces such as at gyms and auditoriums.
 - 2.6 Stoops: Provide stoops outside of doors that are part of the structural system for the building minimum of 5'-0" outside of the building and slope at 1/8 inch per foot away from the building. Include a trench drain the width of the door. Trench drain to connect to drainage system at both ends of the drain.
3. Foundation Design:
 - 3.1 Careful consideration is to be given to the effects of expansive soils found in the Dallas area.
 - 3.2 Foundation design to be based on Geotechnical Engineer's recommendations.
 - 3.3 Additions: Consider the potential differential settlement between the new and existing buildings where floors are contiguous.
4. Floor Slab Design: Proposed floor slab construction is to be as recommended by the Geotechnical Report and the Structural Engineer of Record and approved by Dallas ISD Construction Services. Refer to Division 01 for additional requirements.
5. Refer to Division 01 for crawlspace requirements.
6. Wherever the Geotechnical report identifies hydrostatic pressure issues, provide keyways at all construction joints, continuous waterstops, and continuous waterproofing membrane.
7. Provide continuous vapor retarder membrane at the underside of floors with finishes sensitive to moisture.
8. Provide continuous waterproofing membrane at foundation walls and retraining walls exposed to soil.

9. Slope the top of all exposed concrete surfaces and include drip grooving underneath all cantilevered leading edges.
10. Exposed concrete grade beams greater than 12 inches are not allowed.
11. All exposed concrete to be either a smooth surface from original pour or a hand rubbed finish.
12. Foundation Vents:
 - 12.1 Only vertical vents are allowed.
 - 12.2 Must be a minimum of 12 inches above finished grade.
 - 12.3 To be equipped with cast aluminum vents or vandal resistive vents with anchoring devices that cannot be removed.
13. Exposed concrete areas are not to pose any danger of injury to building occupants (ex: half walls, protruding edges, etc.). Areas of the school requiring special attention include but are not limited to the library, cafeteria, and gymnasium.
14. At roof areas, use normal weight concrete with broom finish to enhance bond with roof system. Avoid vapor barriers, curing agents, or sealing agents that will impact adhesive bond of roof materials to the concrete surface.
15. Mechanical Rooms: Sleeve and curb all floor slab openings.
16. Kitchen:
 - 16.1 Concrete floors to be graded to floor drains and slope to not exceed 1/8" per foot.
 - 16.2 Freezer and Cooler: Provide for recessed insulated floor foundation to set freezer and cooler flush to kitchen floor, eliminating need for steps or ramps.
17. Kiln Room: Floors to be smooth, finished, and sealed concrete. Floor coverings are not allowed.
18. Refer to Division 11 for athletic equipment embedment requirements.

03 10 00 Concrete Forming and Accessories

1. Design concrete structure to allow for maximum reuse of forms where possible.
2. Size and spacing of members to be chosen for maximum uniformity.
3. Piers: Standardize type and diameters. If diameters must vary, minimize the number of sizes used.
4. Columns:
 - 4.1 Size in multiples of 2 inches.
 - 4.2 Maintain column cross-section for a minimum of two stories.
 - 4.3 Change column thickness only with an inside face setback.
5. Beams and Girders: Size in multiples of 2 inches.

03 20 00 Concrete Reinforcing

1. Standardize rebar grades, sizes, and lengths to the greatest extent possible.
2. Reinforcing steel to be domestically manufactured.

03 30 00 Cast-in-Place Concrete

1. Use normal weight concrete with a minimum compressive strength at 28 days of 3,000 pounds per square inch. Design concrete mix to meet the requirements of the American Concrete Institute for the specific exposure conditions encountered on site.
2. Supplementary cementitious material content not to exceed amount allowable by local code.

3. Utilize recycled aggregate in concrete design mixes, as applicable.
4. Concrete Finishing: Use of exposed concrete (poured-in-place) as a "finish" material is required in some areas and may be considered in others with an approved Design Waiver. Refer to Division 09 for required floor finishes.
5. Curing compounds used at existing school sites to contain no more than 10% solvents.
6. Design specifications to include a requirement that all project team members be notified of any installed concrete failing material testing.

END OF DIVISION 03



Division 04 – Masonry

04 05 00 General Requirements

1. Applicable Standards:
 - 1.1 ACI 530/ASCE 5/TMS 402 – Building Code Requirements for Masonry Structures.
 - 1.2 ACI 530.1 /ASCE 6/TMS 602 – Specifications for Masonry Structures.
 - 1.3 ASTM Standards.
 - 1.4 Collaborative for High Performance Schools (CHPS) Program.
2. Allowable Types of Masonry:
 - 2.1 Clay fired brick.
 - 2.2 Concrete masonry units (CMU).
 - 2.3 Burnished block.
 - 2.4 Cast-stone.
 - 2.5 Natural stone (from Texas quarries).
 - 2.6 Split-Faced CMU: Allowed 10 feet above exterior grade (exterior applications) or finished floor (interior applications).
3. High metallic content masonry is not allowed.
4. Exterior Masonry Joints: Only tooled or concave joints are allowed.
5. New Construction/Additions: Wall assembly mock-ups are required for approval by Dallas ISD.
6. Cleaning of Masonry at Existing Facilities:
 - 6.1 Existing masonry and mortar is not to be damaged.
 - 6.2 Power washing is not allowed.
 - 6.3 Water, solvent, steam, or other non-damaging methods to be used.
7. Reference Divisions 05, 07, 09 and 32 for additional requirements related to masonry work.

04 20 00 Unit Masonry

1. General Requirements:
 - 1.1 Design measurements to be consistent with masonry dimensions using the actual product specified.
 - 1.2 Use dimensions that reduce construction waste and ease constructability.
 - 1.3 Avoid designs with special shapes/cuts/colors of masonry.
 - 1.4 Place masonry units a minimum of 4 inches above grade.
2. Unit masonry to be approved by Dallas ISD during design. Architect to specify multiple selections for bidding purposes.
3. Additions/Renovations:
 - 3.1 Materials to be compatible with existing conditions and neighborhood characteristics and to be readily available.

- 3.2 When matching existing building materials, Architect to include manufacturer information, brick type/mix, name and location in Contract Documents.
- 4. Accessories/Related Products:
 - 4.1 Weather Barriers: To conform to manufacturer's specifications for installation with all required manufacturer's accessories.
 - 4.2 Expansion/Contraction Joints: Provide detailing in the Contract Documents as recommended by The Masonry Society (TMS) 402.
 - 4.3 Anchors:
 - 4.3.1 To be adjustable design with fasteners specifically selected for the back-up material.
 - 4.3.2 Corrugated metal ties are not allowed.
 - 4.4 Horizontal Joint Reinforcing: Required at CMU to be at 16 inches on center minimum.
 - 4.5 Through-Wall Flashing:
 - 4.5.1 Provide at wall caps, window/door headers, shelf angles and as required in other locations.
 - 4.5.2 Provide at base bearing with honeycomb-style weep holes at 24 inches on center horizontal.
 - 4.6 Weep Holes: Located at base of exterior walls and above cavity interruptions in accordance with Brick Institute of America recommendations.
 - 4.7 Coping:
 - 4.7.1 Top of Masonry Walls: Metal coping or cast stone with a detailed profile that prevents moisture intrusion, moisture build-up, and efflorescence.
 - 4.7.2 Metal copings to extend a minimum of 4 inches above top of masonry.
 - 4.7.3 Cast stone copings to receive proper sealant at all head joints.
 - 4.8 Anti-graffiti coatings are not allowed.
 - 4.9 Cleaners and Sealers: Commercial grade and as recommended by the masonry manufacturer or supplier for use at completion of masonry installation. Architect to verify specified products are not harmful to any adjacent materials.

04 40 00 Stone Assemblies

- 1. Natural stone and natural thin veneer stone systems are allowed. Locations and applications to be reviewed with and approved by Dallas ISD during the Design Development Phase.
- 2. Stone installation to comply with ACI and ASCE Specifications for Masonry Structures.
- 3. Anchors, fasteners, setting shims and buttons to be clearly indicated, as required to support loads imposed, without exceeding allowable design stresses.
- 4. Sealants to be tested and verified for compatibility with stone assemblies. Architect to request written confirmation in Contract Documents.

END OF DIVISION 04



Division 05 – Metals

05 05 00 General Requirements

1. Standards:
 - 1.1 American Institute of Steel Construction - AISC 360 - Specification for Structural Steel Buildings.
 - 1.2 Collaborative for High performance Schools (CHPS) program.
2. Steel Design:
 - 2.1 Select standardized sizes and shapes that are readily available and economical.
 - 2.2 Avoid designs requiring full moment connections.
 - 2.3 Maintain web thickness to facilitate detailing.
 - 2.4 Provide all splice plates with a full weld and show in detailing.
 - 2.5 Erection bolts are not allowed to be considered part of permanent design.
 - 2.6 Hanging or swing connections for beam ends relying on a single fastener or pin at expansion joints are not allowed.
 - 2.7 Components/procedures unusual to the local building trades must be approved by Dallas ISD in the form of a Design Waiver.
 - 2.8 Roof Structure:
 - 2.8.1 Slope: 1/4 inch per foot, minimum.
 - 2.8.2 Slope to be achieved using structure and not tapered or sloped insulation.
3. Finish: Rust inhibiting primer and painted finish.
4. Recycled Content: Meet or exceed the greater of the requirement identified below and CHPS requirement.
 - 4.1 Structural Steel: 85%.
 - 4.2 Light-Gauge Steel: 30%.
 - 4.3 Submittals: Provide data sheets indicating actual recycled content and/or material used.
5. New Construction/Additions: Wall assembly mock-ups are required for approval by Dallas ISD.

05 30 00 Metal Decking

1. General Requirements: Metal deck to meet the following requirements except as amended for Acoustic Metal Deck below:
 - 1.1 Finish to be hot dip galvanized.
 - 1.2 Limit amount of exposed metal deck.
 - 1.3 Coordinate all elements of the roofing system and required deck gauge.
 - 1.4 Metal decks with mechanically fastened insulation.
 - 1.5 Insulation boards to be 22 gauge or heavier.
 - 1.6 Follow Factory Mutual loss prevention guidelines:
 - 1.6.1 For local area and building height.

- 1.6.2 Including decreased weld spacing at corners and perimeters.
- 2. Metal decking used for composite slabs to be of sufficient gauge to support concrete placement without buckling or deforming from wheelbarrow or other traffic.
- 3. Flutes of metal decking supporting rigid insulation to be of proper size to accommodate the span capability of the specified insulation.
- 4. Acoustic Metal Deck:
 - 4.1 Acoustic metal deck may be used for sound attenuation in the Gymnasium.
 - 4.2 Finish:
 - 4.2.1 Factory painted or field painted with a dry-fall paint in a manner not to close the perforations.
 - 4.2.2 Specification to require painters to demonstrate their ability to paint the deck in the field without closing the perforations on test panel before proceeding.

05 50 00 Metal Fabrications

- 1. Miscellaneous Metal Fabrications:
 - 1.1 Metal hand rails to be fabricated with all joints and ends ground smooth and uniform. Ends to be plugged and securely mounted to withstand heavy use.
 - 1.2 Where dissimilar metals come in contact arrange with asphaltic or other separation to prevent galvanic corrosion.
 - 1.3 Exterior Conditions: Use of aluminum, copper, brass (or other metals that have salvage value) is not allowed. Exception: Factory finished dark colored security screens (Refer to Division 08 30 00 Specialty Doors and Frames item 4.3)
- 2. Exterior Ferrous Metals:
 - 2.1 All ferrous metals exposed to the elements to be galvanized.
 - 2.2 Exterior ferrous metal building components (such as shelf angles, parapet caps, etc.) to be primed and painted.

END OF DIVISION 05



Division 06 – Wood, Plastics and Composites

06 05 00 General Requirements

1. All components and heights to meet ADA and TAS requirements.
2. Casework and Millwork to be specified as 'Custom Grade', as defined by latest edition of the North America Architectural Woodwork Standards.
3. Casework is preferred. Millwork is acceptable.
4. Veneer Substrate:
 - 4.1 Dry Areas: Low/no formaldehyde medium density fiberboard (MDF).
 - 4.2 Areas Exposed to Moisture: Marine grade or A/C fir plywood.
5. Countertops:
 - 5.1 Materials:
 - 5.1.1 Typical: Laminate, unless otherwise specified.
 - 5.1.2 Wet Areas and Countertops with Sinks: Marine grade or A/C fir plywood.
 - 5.1.3 Kitchens: Stainless steel.
 - 5.1.4 Art (Middle Schools and Highschools): 1 inch lab top solid black phenolic resin.
 - 5.1.5 Science and Art Rooms: Refer to Division 12.
 - 5.2 Heights:
 - 5.2.1 Comply with current ADA and TAS standards.
 - 5.2.2 Typical, unless otherwise specified:
 - 5.2.2.1 Elementary Schools: 30 inches A.F.F.
 - 5.2.2.2 Middle Schools/High Schools: 34 inches A.F.F.
 - 5.2.3 Reception Areas:
 - 5.2.3.1 Low Countertops: 30 inches A.F.F.
 - 5.2.3.2 High Countertops: 42 inches A.F.F.
 - 5.3 Standard Edgebanding for Laminate Countertops:
 - 5.3.1 Provide at nosing and outside edges of countertops.
 - 5.3.2 Shapes: Rounded edge.
 - 5.3.3 Materials:
 - 5.3.3.1 Thickened ABS.
 - 5.3.3.2 Thickened PVC.
6. Hardware:
 - 6.1 General Requirements:
 - 6.1.1 Meet ANSDI/BHMA 156.9 Grade 1 - AWS Schools/Hospitals.
 - 6.1.2 Grade: Heavy duty.

- 6.1.3 Finish: Satin-brushed.
- 6.2 Components:
 - 6.2.1 Locks:
 - 6.2.1.1 Type: Tumbler locks of standardized type and brand. Coordinate specific requirements with Dallas ISD designated representative during Construction Document phase.
 - 6.2.1.2 Teacher Cabinets: Built-in keyed locks.
 - 6.2.2 Keying: All cabinets in a single room to be keyed alike, except for teacher cabinets which are to be keyed separately.
 - 6.2.3 Hinges:
 - 6.2.3.1 Heavy duty overlay hinges with hospital tips.
 - 6.2.3.2 Quantity:
 - 6.2.3.2.1 Doors 24 inches or less: Two (2).
 - 6.2.3.2.2 Doors over 24 inches: Three (3).
 - 6.2.3.3 European type hinges are not allowed.
 - 6.2.4 Pulls:
 - 6.2.4.1 Type: Heavy duty wire pulls. Knobs are not allowed.
 - 6.2.4.2 Material: Aluminum and brass bent wire pulls are not allowed.
 - 6.2.5 Glides: Full extension, rated for 100 pounds support.
 - 6.2.6 Catches: Two (2) on all doors exceeding 24 inches in either dimension.
- 7. Stains/Finishes: Low-VOC content.
- 8. Renovations: Match existing conditions in design, lamination, species, and finish when replacement carpentry, casework, or millwork will be adjacent to or near existing.
- 9. Computer and Technology Considerations: Refer to Division 27.
- 10. Contract Documents:
 - 10.1 Incorporate all blocking requirements.
 - 10.2 Elevations for casework or millwork to include associated components.
 - 10.3 Refer to Figures 06 05 00-1 and 2 for examples.

06 22 00 Millwork

- 1. Species: Red Oak or Birch. Ash or Maple not allowed.
- 2. Stains:
 - 2.1 Colors to match the following plastic laminate selections:
 - 2.1.1 Wilsonart PLAM 7209-60 Nepal Teak (ex: Kelly Moore 2832 Early American).
 - 2.1.2 Wilsonart PLAM 7110-60 Montana Walnut (ex: Kelly Moore 2831 Spanish Oak or Sherwin Williams Ranch Oak SW3125-O).
 - 2.1.3 Alternate colors may be submitted for Dallas ISD approval.

- 2.2 Finish: Semi-transparent, semi-gloss.
3. Shelves:
 - 3.1 Materials: Plywood or hardwood.
 - 3.2 Thickness: 3/4 inch thick minimum, not including finish.
 - 3.3 Span: 36 inches maximum.
4. Drawers: Fronts to be attached using both glue and screws.
5. Joints: Caulked with clear sealant at back splash, end fillers, and walls. (Also applies when vinyl wall covering is the scheduled finish.)

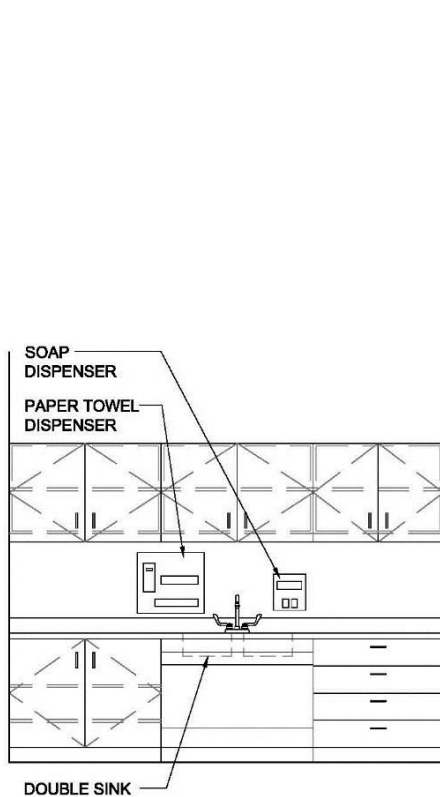


Figure 06 05 00 – 01: Millwork Notes

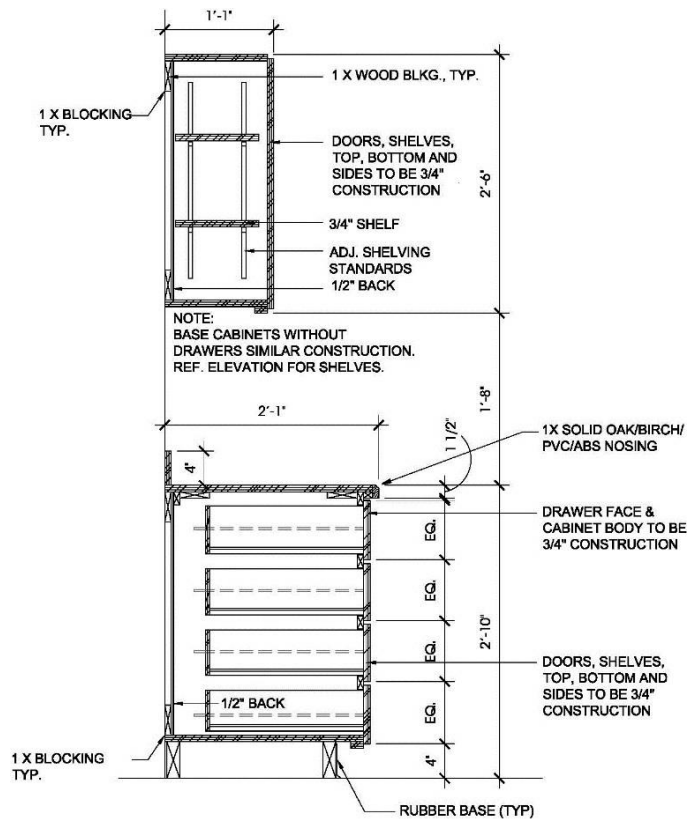


Figure 06 05 00 – 02: Millwork Notes

06 41 00 Architectural Wood Casework

1. Pre-Finished Colors:
 - 1.1 Wilsonart PLAM 7209-60 Nepal Teak or Tesco Nepal Teak
 - 1.2 Wilsonart PLAM 7110-60 Montana Walnut or Tesco Montana Walnut.
 - 1.3 Alternate pre-finished casework colors may be submitted for approval.
2. Library Casework: Refer to Division 12.
3. Science and Laboratory Casework: Refer to Division 12.

4. Art Room Casework:
 - 4.1 Provide adjustable shelving in at least 50% of secured cabinets.
 - 4.2 Confirm with Dallas ISD designated representative if cabinets are to include grounded quad receptacles on a case by case basis.

END OF DIVISION 06

Division 08 – Openings

08 05 00 General Requirements

1. General Clarifications Regarding Project Budget: Allowances are not to be used items are to be specified.
2. Building orientation and opening locations to consider natural day-lighting, energy efficiency and solar heat gain.
3. Natural Daylight:
 - 3.1 Provide natural day-lighting in all teaching spaces, libraries and habitable rooms meeting the requirements of the most current version of CHPS, except in band and orchestra spaces where glazing materials negatively impact acoustics.
 - 3.2 Location and safety of glazing in relation to surroundings to be considered in design.
 - 3.3 Design glazed openings to provide a high level of natural light, avoid glare and ensure good quality day-lighting distribution.
4. Exterior: Wood door and window systems are not allowed.
5. Skylights are not allowed.
6. Clerestory designs need approval in early stages. Sill elevation to be a minimum of 12 inches above adjacent roof for proper flashing.
7. Floor to ceiling glazing is not allowed at the end of corridors. Minimum sill height for glazing at these locations is 42 inches AFF.
8. If existing second floor glazing sill is below 42 inches, provide protective guardrail per code.
9. Horizontal louver blinds are required. Refer to Division 12 for requirements.
10. Place window in computer rooms and library with concerns to safety, security, light reflection and light disturbance. Expansive glazing on west facing walls is not allowed.
11. New Construction/Additions: Wall assembly mock-ups are required for approval by Dallas ISD.
12. Renovations: When the scope includes window replacement, a complete replacement is preferred. When an existing campus is receiving partial window replacement, the exact scope and type of window/glazing/screen is to be approved by Dallas ISD designated representative prior to completion of the STB process. Finish and design is to match existing portions to remain.

08 10 00 Doors and Frames

1. General Requirements:
 - 1.1 Doors to be 3 feet x 7 feet typically.
 - 1.2 Gap at the bottom of any door not to exceed 3/4 inches.
2. Interior Wood Door Construction:
 - 2.1 Use structural composite lumber core wood doors.
 - 2.2 MDF and plastic laminate doors are not allowed.
 - 2.3 Core to be bonded to hardwood stiles and rails.
 - 2.4 Veneer to be five (5) or seven (7) ply. Top rail and bottom rail to be 2-3/8 inches minimum. Stiles to be 2-1/2 inches minimum.

- 2.5 Provide appropriate lock blocking and reinforcements for exit devices and through bolt closers at all doors.
3. Interior Wood Door Finishes:
 - 3.1 New Construction/Additions or if 100% of a space or area is being replaced: Architect to select durable, timeless stains.
 - 3.2 Renovations: Doors to match existing conditions (species/stain) when door replacement is included in approved scope. Historically, doors are red oak with a medium oak stain with a transparent finish. Architect to verify existing.
4. Hollow Metal Door/Frame Construction:
 - 4.1 Interior doors and frames to meet requirements of Steel Door Institute (SDI) 100, Grade 2, Heavy Duty.
 - 4.1.1 Doors to be 18 gauge or better, steel, foamed core with welded seams.
 - 4.1.2 Frames to be 18 gauge.
 - 4.1.3 If door exceeds 36 inches width, specify 16 gauge door/frames.
 - 4.2 Exterior doors and frames to meet requirements of Steel Door Institute (SDI) 100, Grade 3, Extra Heavy Duty.
 - 4.2.1 Doors to be 16 gauge or better, steel, foamed core with welded seams.
 - 4.2.2 Frames to be 16 gauge.
 - 4.2.3 If door exceeds 36 inches width, specify 14 gauge door/frames.
 - 4.3 Resin impregnated fibrous honey comb is acceptable.
5. Architect to include the following requirement at a minimum in the Contract Documents: Hollow metal manufacturers to be members of the SDI.

08 30 00 Specialty Doors and Frames

1. Food Service:
 - 1.1 Kitchen Delivery Door:
 - 1.1.1 48 inch wide door.
 - 1.1.2 Material: Foam filled, hollow metal.
 - 1.2 Provide access from serving area to kitchen.
 - 1.3 Interior doors into dining room to have typical half-lite.
 - 1.4 Security grille to be provided between serving area and dining room.
 - 1.4.1 Electrical operator with emergency egress.
 - 1.4.2 Locate keyed control adjacent to security grille.
2. Laundry Rooms:
 - 2.1 Requirement applies at all laundry rooms including but not limited to food service and student dining, custodial/laundry, physical education laundry room, culinary labs, career and technical education (CTE) dry cleaning labs, auto shops, and cosmetology.
 - 2.2 42 inches x 7 feet or pair of 3 feet x 7 feet doors.
3. Kiln Room Door:
 - 3.1 48 inch wide.

- 3.2 Fire rated.
- 3.3 Provide with vision panel.
- 4. Art Room Door: 48 inch wide door.
- 5. Band Delivery Door:
 - 5.1 48 inches x 7 feet or pair of 3 feet x 7 feet doors.
 - 5.2 Fixed center mullions are not allowed. Waiver may be obtained from Dallas ISD to use removable center mullion if required for deliveries.
- 6. Scene Shop: Provide coiling overhead door from the dock or loading area.
- 7. Auditoriums:
 - 7.1 Coiling door to provide direct access from the scene shop on to the stage.
 - 7.2 Minimum acoustic rating of STC 30.
 - 7.3 Verify noise isolation requirements with Acoustician (if approved).
- 8. Acoustically Rated Door Assemblies:
 - 8.1 Requirement applies to any sound sensitive space, specifically all spaces used for performing arts (dance, theatre, music).
 - 8.2 Provide high STC rated door assemblies.
 - 8.3 Confirm required partition and door STC ratings with Acoustician (if approved).

08 40 00 Aluminum Entrances and Curtains Walls

- 1. Curtain Wall Systems:
 - 1.1 Design to carry redundancy in water protection.
 - 1.2 Repairing of an Existing System: Specify performance test upon completion of installation.
- 2. Aluminum storefront systems with glazed curtainwalls and/or aluminum framed entrances and doors to be from a single manufacturer.
- 3. Aluminum Entrances (Interior and Exterior Use):
 - 3.1 Door Type: Wide Stile.
 - 3.1.1 Vertical Stile: 5 inch.
 - 3.1.2 Top Rail: 5 inch.
 - 3.1.3 Bottom Rail: 10 inch.
 - 3.2 Frame to be complete with factory installed head and jamb weather-stripping, threshold, and door sweep.
 - 3.3 Integral panic devices are not allowed.
- 4. Warranty: Two (2) year manufacturer’s warranty for materials and workmanship, including substantial non-compliance with applicable specification which results in premature failure of system. Specify a ten (10) year warranty for insulated glass seal failure.
- 5. Architect to include the following requirements at a minimum in the Contract Documents:
 - 5.1 Curtain wall installer to have a minimum 10 years experience with the supplied system.
 - 5.2 Prime installer to be on-site full time during installation.

- 5.3 Aluminum Extrusions: Alloy and temper as recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070 inch wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.

08 50 00 Windows

1. Aluminum Window Systems:
 - 1.1 Finish: Clear anodized or factory finish paint system.
 - 1.2 All components and related hardware to be of 'heavy duty' classification.
 - 1.3 Awning, hopper, pivot or crank type windows are not allowed.
 - 1.4 Insect screens are not allowed.
2. Infill/Spandrel at Existing Window Systems:
 - 2.1 'Mapes-R, Insulated Composite Panels' or approved equal. Proposed infill panels to be reviewed by Dallas ISD designated representative during the Design Development phase.
 - 2.2 Spandrel panels to be used adjacent to or at foot traffic height in lieu of glazing up to minimum 36 inches.
 - 2.3 Use of spandrel panels in additional areas to be evaluated to improve building energy performance.
3. Window Security Screens:
 - 3.1 Locations:
 - 3.1.1 Install at all ground floor level windows at classrooms, instruction spaces, and offices.
 - 3.1.2 Include entries and windows accessible from adjacent one-story roof levels.
 - 3.2 Screen installation to include a sub-frame, permanently fixed to the window framing members, and an operable main frame with a perforated or wire mesh in-fill panel.
 - 3.3 Integral security screen to be accessible and easily operated for maintenance purposes, including window cleaning and general maintenance.
 - 3.4 Provide separation between window system and security screen to prevent moisture or water accumulation.
 - 3.5 Finish: Aluminum to be factory finished. Steel to be powder coated. Anodized aluminum finish is not allowed.
 - 3.6 Color: Dark color to enhance visual obstruction. Black is preferred.
 - 3.7 Specify with non-removable stainless steel security screws with washers.
 - 3.8 New Construction/Additions:
 - 3.8.1 Tubular steel or aluminum main frame.
 - 3.8.2 Infill with 16 gauge steel wire mesh or aluminum perforated panel.
 - 3.8.3 Thermoplastic polyester powder coat finish.
 - 3.9 Renovations: For alterations at existing schools, or any continuous elevation window replacement, match existing conditions.
 - 3.9.1 Steel and aluminum are acceptable.
 - 3.9.2 Rust resistant hardware and installation methods to be used.

- 3.10 Architect to verify screen design/installation does not void window warranty.
 - 3.10.1 Detailing of screen attachment and subframe at opening to be verified during design.
 - 3.10.2 Attachment to be per window and screen manufacturers' recommendations to maintain warranty.

08 70 00 Hardware

1. General Requirements:

- 1.1 When proposed hardware schedule is ready for review, notify the Dallas ISD designated representative to schedule a review meeting.
- 1.2 The following documents are to be used in estimating and detailing and considered as a standard of quality and performance:
 - I.B.C. International Building Codes
 - NFPA-8 Fire Door Windows (current year adopted).
 - NFPA-101 Life Safety Code (current year adopted).
 - NFPA-105 Smoke Control Door Assembly (current year adopted).
 - ANSI-117.1 Providing Accessibility and Usability for Physically Handicapped People (current year adopted).
 - A.D.A.A.G. Federal Register for Americans with Disabilities Act Accessibility Guidelines.
 - T.A.S. Texas Accessibility Standards.
 - U.L. Underwriter Label Requirements
- 1.3 All door hardware to meet Underwriter Laboratories, Inc. label requirements (U.L.).
- 1.4 Refer to Divisions 26, 27 and 28 for additional requirements.

2. Locks, Latches, Deadbolts & Cores:

- 2.1 Best Access Systems removable cores. Include all materials and installation.
- 2.2 Exterior handles to be fixed to spindles, preventing loss of security. Provide with vandal resistant trim.
- 2.3 Student Occupied Spaces (including classrooms): Provide security classroom mortise lock.
- 2.4 Restrooms: When restroom doors are provided, equip with continuous hinges, push plate, pull bar and single cylinder deadlock to ensure that the students do not throw the deadbolt from the inside.
- 2.5 Practice Areas (including ensemble spaces in a band hall): Provide passage latch sets only.
- 2.6 Teachers' Lounge and Administration Areas: Provide office function mortise lock.
- 2.7 Storage Spaces within Fine Arts or Library Areas: Provide storage room locksets.
- 2.8 Renovations: Provide escutcheon trim at all existing doors being reused. Verify the necessary coverage.

3. Keying:

- 3.1 Construction Cores: Individually keyed on all projects.
- 3.2 Keying Groups: All locks within group to be keyed alike.
 - 3.2.1 Mechanical, equipment and custodial rooms.

- 3.2.2 Food service area doors.
- 3.2.3 Lobbies, corridors and stairs.
- 3.2.4 New or Existing Secured Vestibules: Key one interior door to match exterior entry. Schedule remainder as 'exit only'.
- 3.3 New Construction: Provide key control system and cabinet to allow for at least a 50% expansion.
- 3.4 Renovations/Additions: Keyed alike with existing building.
- 4. Specialty Door/Hardware Requirements:
 - 4.1 Provide silencers at all hollow metal frames.
 - 4.1.1 Single doors under 8 feet: Three (3) each.
 - 4.1.2 Single doors at or over 8 feet: Four (4) each.
 - 4.1.3 Pair doors: Six (6) each.
 - 4.2 Vestibules:
 - 4.2.1 Provide 'NL' function exit device with vandal resistant pulls to match exterior entry.
 - 4.2.2 For secured vestibule doors, provide exit dummy bars with vandal resistant pulls, match exterior openings.
 - 4.3 Kitchen:
 - 4.3.1 Kitchen facility doors to be lockable, including main doors and gates from dining to kitchen.
 - 4.3.2 Provide 16 gauge stainless steel kick plates.
 - 4.3.3 Exterior Door:
 - 4.3.3.1 Door to be self-closing with hold open device.
 - 4.3.3.2 Provide insect and rodent proof, heavy duty perimeter seals, automatic door bottom and threshold.
 - 4.3.3.3 Provide 190 degree one-way wide angle viewer peep hole mounted at an accessible height.
 - 4.3.3.4 Door buzzer to sound at kitchen and managers office.
 - 4.3.4 Dressing Room and Restroom Doors:
 - 4.3.4.1 Provide automatic closers.
 - 4.3.4.2 Specify anti-microbial finish on locks, push and pull plates.
 - 4.4 Athletics Doors: Provide 16 gauge stainless steel kick plates.
 - 4.5 MDF/IDF Rooms: Refer to Divisions 27 and 28 for access control and security requirements.
 - 4.6 Storm Shelter: Refer to Division 13 for access control and security requirements.
- 5. Products:
 - 5.1 *Indicates basis of design manufacturer/product. Others listed are to be considered approved/acceptable manufacturers.

Screws and Fasteners: Provide all fasteners with phillips head, unless security type screws (spanner-head or torx- head) are specified.
 - 5.2 Hinges:
 - 5.2.1 Typical (unless noted otherwise): Five (5) knuckle ball bearing hinges, minimally one hinge for each 30 inches of door height.

- 5.2.1.1 Standard Weight Hinges: Five (5) knuckle, ball bearing, full mortise, brass or stainless steel.
- 5.2.1.2 Heavy Weight Hinges: Five (5) knuckle, ball bearing, full mortise, brass or stainless steel.
- 5.2.2 Doors swinging out at storage rooms, library, kitchen and administrative suites to have non-removable pins (NRP).
- 5.2.3 Exterior doors, main corridor doors, aluminum systems and other doors of high frequency use: Provide a continuous, gear type hinge of appropriate weight.
- 5.2.4 Width of the hinges to be sufficient to clear all trim that is mounted to the door frame and per manufacturer's recommendations.
- 5.2.5 Use all threaded screws at applications with edge mounted hinges.
- 5.2.6 When anchor hinges are used they are to be one piece construction.
- 5.2.7 New Construction/Additions: Hinges to be sized for thickness of door according to manufacturer's recommendations.
- 5.2.8 Renovations: Where existing interior frames are used, specify 5 inch x 4-1/2 inch heavy-weight hinges.
 - 5.2.8.1 Provide hinges with height and weight to match frame prep where existing frames are being reused. Suppliers to field verify and match all existing hinges for appropriate size and weight.
 - 5.2.8.2 Metal Doors 3 feet or less in width: 1-1/2 inch pair heavy-weight hinges.
 - 5.2.8.3 Metal Doors greater than 3 feet in width: 2 inch pair heavy-weight hinges.
 - 5.2.8.4 Doors (except metal) 3 feet or greater in width: 1-1/2 inch pair heavy-weight hinges.
 - 5.2.8.5 Doors 7 feet 6 inches or greater in height: 2 inch pair heavy-weight hinges.
- 5.2.9 Acceptable Manufacturers: Ives*, Stanley, McKinney, Hager.
- 5.3 Aluminum Geared Continuous Hinges:
 - 5.3.1 Continuous hinges to consist of three (3) interlocking extrusions in a pinless assembly applied to the full height of the door.
 - 5.3.2 All continuous geared hinges to be manufactured to template screw locations and be non-handed.
 - 5.3.3 All full mortise hinges and half mortise hinges to cover and wrap door edge completely.
 - 5.3.4 Doorframe heads to be extended for clearance on full or half mortise hinges versus downsizing doors for ease of repair and replacement.
 - 5.3.5 All frames to be properly reinforced per manufacturer's standards.
 - 5.3.6 Heavy Duty Full Mortise Hinges:
 - 5.3.6.1 For 1-3/4 inch doors.
 - 5.3.6.2 Spread bearing design non-handed.
 - 5.3.6.3 48 inch maximum door width.
 - 5.3.6.4 Beveled or square edge doors.
 - 5.3.6.5 For doors up to 450 pounds.
 - 5.3.6.6 Narrow Frame and Door Leaf: Flush mounted.
 - 5.3.6.7 Door Edge Protector: 1/16 inch door inset.

- 5.3.7 Renovations: When reusing wood frames, evaluate conditions and consider surface mounted continuous hinges.
- 5.3.8 Acceptable Manufacturers: Ives*, Hager, Pemko, Select, Zero.
- 5.3.9 Warranty: Standard warranty for the life of the opening.
- 5.4 Locks and Cores:
 - 5.4.1 All locks to incorporate a seven (7) pin tumbler system core that will be keyed to the existing grandmaster system.
 - 5.4.2 Mortise style ANSI 156.2 series 1000, Grade 1 as listed in the hardware schedule. Include wrought boxes for installation behind strikes.
 - 5.4.3 Provide locks and cylinders complete with separately keyed construction cores on all projects.
 - 5.4.4 Acceptable Manufacturers:
 - 5.4.4.1 Locks:
 - 5.4.4.1.1 Schlage* (no substitutions allowed).
 - 5.4.4.1.2 L9000B Series (including for construction cores).
 - 5.4.4.2 Cores: Best* (no substitutions allowed).
 - 5.4.4.3 L9050 at teacher's lounge and administration areas.
 - 5.4.4.4 L9071 at all classroom doors with locksets.
- 5.5 Interior Lock Trim:
 - 5.5.1 Mortise locks are to be furnished with lever handle trim, with levers having a return to within 1/2 inch of the door face, as listed in the hardware schedule.
 - 5.5.2 Renovations: Provide "N" escutcheons on all new locks for renovation projects.
 - 5.5.3 Acceptable Manufacturer:
 - 5.5.3.1 Schlage* (no substitutions allowed).
 - 5.5.3.2 New Construction/Additions: 17A trim.
 - 5.5.3.3 Renovations: 17N trim.
- 5.6 Cylinder Housings:
 - 5.6.1 Cams and tailpieces to be coordinated with locking mechanism.
 - 5.6.2 Provide blocking rings as required to adapt cylinder housing to the locking mechanism.
 - 5.6.3 Acceptable Manufacturers.
 - 5.6.3.1 Best* (no substitutions allowed).
 - 5.6.3.2 Rim and mortise cylinder housings to be Best/Stanley Cormax interchangeable cores.
- 5.7 Surface Bolts:
 - 5.7.1 Surface bolts to be U.L. listed for use on the inactive leaf of a pair of labeled doors.
 - 5.7.2 Provide 8 inch bolts for ease of access to bolt lever.
 - 5.7.3 Provide with universal top strike, mortise bottom strike and all required fasteners.
 - 5.7.4 Acceptable Manufacturers: Ives*, Rockwood, Trimco.

- 5.8 Exit Devices and Mullions:
 - 5.8.1 Provide touch-pad exit device with 'T' design not to extend full length of exit device. Latches to be dead latching type with roller strikes. Cross bar design is not allowed.
 - 5.8.2 Provide exit devices as required for interior set of doors at secured vestibules for assembly occupancy spaces. Interior set of doors at non-secured vestibules to have push/pull plates when allowable by code.
 - 5.8.3 Exit Devices: Rim devices unless otherwise noted in the hardware schedule.
 - 5.8.3.1 Provide with sex nuts and bolts through-bolted at all locations.
 - 5.8.3.2 Include fluid dampener.
 - 5.8.4 Provide 'Hex Key Dogging' to lock push-pad down.
 - 5.8.5 Mullions:
 - 5.8.5.1 Removable mullions are not allowed. Approval from Dallas ISD is required for use in applications where door width for deliveries cannot be achieved.
 - 5.8.5.2 Factory finished.
 - 5.8.5.3 Provide with stabilizers.
 - 5.8.6 Acceptable Manufacturers:
 - 5.8.6.1 Von Duprin* or approved equal. Model numbers listed below use Von Duprin as a basis of design. All trim to be coordinated with selected manufacturer.
 - 5.8.6.2 Device: 99 Series, Interior Trim: 996L-2 #17 lever, Exterior Trim: SL11HDS.
 - 5.8.6.3 Vestibule Doors: VR trim unless specified as exit only function.
 - 5.8.6.4 Provide 330 series push bars for vestibule doors not requiring exit devices.
 - 5.8.6.5 Interior Doors (except vestibule doors): 99 Series, 996-L2, #17 lever trim (classroom security lever trim) unless specified as exit only function.
 - 5.8.6.6 Paired Interior: 9949 x LBL, 996-L2 - #17 lever trim.
 - 5.8.6.7 Exterior Doors: XP99 series.
 - 5.8.7 Warranty: All devices to have published three-year warranty.
- 5.9 Door Closers:
 - 5.9.1 Required Locations:
 - 5.9.1.1 Doors from occupied spaces to a corridor.
 - 5.9.1.2 Secured areas.
 - 5.9.1.3 Kitchen.
 - 5.9.1.4 Offices (except within a suite) and other special spaces.
 - 5.9.1.5 Restrooms.
 - 5.9.1.6 Dressing rooms.
 - 5.9.1.7 Mechanical equipment and custodial rooms.
 - 5.9.2 Door closers to be cast iron, rectangular design and furnished with a full cover.
 - 5.9.3 Factory non-sized with full spring adjustments power range size 1 through 5.
 - 5.9.4 Classroom doors to swing open to 180 degrees. Where conditions do not allow for 180 degree swing, use integral spring hold-open cush-n-stop arm (SHCUSH) closer.

- 5.9.5 Mounting: Through-bolted through door with sex bolts. Parallel arm mounting on out swinging doors. Mount closers top jamb typically. Mounting on brackets and/or drop plates is acceptable where special conditions require it.
 - 5.9.5.1 Exterior: Inside of door.
 - 5.9.5.2 Interior: Mounted opposite side of public area.
- 5.9.6 Hydraulic Fluid: Temperature stable constant viscosity with temperature range of -20° F to 110° F.
- 5.9.7 Provide with back check feature.
- 5.9.8 Exterior Doors:
 - 5.9.8.1 Provide solid forged heavy duty or heavy duty parallel arm design furnished with backcheck, delayed action, hold-open and advanced backcheck.
 - 5.9.8.2 High frequency and heavy duty closers to be independently certified to a minimum of 10,000,000 cycles in accordance with ANSI testing requirements.
- 5.9.9 Concealed closers are not allowed.
- 5.9.10 Spring hinges are not allowed.
- 5.9.11 Acceptable Manufacturers: LCN* or approved equal.
- 5.10 Push Plates and Door Pulls:
 - 5.10.1 Push Plates: 4 inch x 16 inch, .050 brass, bronze or stainless steel with four (4) beveled edges, drilled and countersunk for screws.
 - 5.10.2 Door Pulls: 1 inch diameter, 11 inch overall, 10 inch center-to-center, 3-1/2 inch projection, 2-1/2 inch clearance, 4-1/4 inch offset.
 - 5.10.2.1 Thru bolted or back-to-back mounted.
 - 5.10.2.2 Supplied with mounting bolts for high abuse areas with a minimum of 3/8 inch-16, heavy-duty bolts.
 - 5.10.3 Acceptable Manufacturers: Ives*, Rockwood, Trimco.
- 5.11 Protective Plates:
 - 5.11.1 16 gauge (.050 inch) brass, bronze or stainless steel, with three (3) beveled edges, drilled and countersunk for screws.
 - 5.11.2 Types:
 - 5.11.2.1 Mop: 6 inch height.
 - 5.11.2.2 Kick: 10 inch height.
 - 5.11.2.3 Armor: 34 inch height.
 - 5.11.3 Doors with closers, push plates or exit devices are to have kick or armor plates.
 - 5.11.3.1 Single Doors: 2 inches less than door width of door x 10 inches high (1/2 inch from base).
 - 5.11.3.2 Double Doors: 1 inch less than door width x 10 inches high (1/2 inch from base).
 - 5.11.4 Plates to be mounted to avoid louvers and/or glass kits.
 - 5.11.5 Acceptable Manufacturers: Ives*, Rockwood, Trimco.

5.12 Door Holders:

5.12.1 Interior Wall Mounted Holders:

- 5.12.1.1 Masonry or Gypsum Walls (with appropriate verified blocking): Automatic wall type door holder with spring loaded roller, mounting height (from bottom of door) per manufacturer's recommendation and minimum 1/2 inch from lockstile to edge of holder.
- 5.12.1.2 Gypsum Walls (no blocking): Renovations only, floor type door stop and automatic holder, mounting height (from bottom of door) per manufacturer's recommendation and center mount at 2 inches from edge of door.
- 5.12.1.3 Surface applied kick-down hold opens are not allowed.

5.12.2 Exterior Overhead Type Holders:

- 5.12.2.1 Heavy stainless steel construction.
- 5.12.2.2 Sliding member in channel to be bronze with accessible adjustment screw to regulate hold open tension.
- 5.12.2.3 Channel to be applied to the door by sex bolts.
- 5.12.2.4 Shock blocks, components, end caps to be metal. No plastic allowed.

5.12.3 Acceptable Manufacturers:

- 5.12.3.1 Interior: Ives*, Rockwood, Trimco.
- 5.12.3.2 Exterior: Glynn Johnson*, Rixon.

5.13 Door Stops:

5.13.1 Provide a wall mounted door stop at all doors unless conditions require alternate type.

- 5.13.1.1 Brass or bronze.
- 5.13.1.2 High grade concave rubber bumper secured to mounting back plate, concealed tamper-proof mounting.

5.13.2 Floor stops at exterior out swinging doors to be provided only when not considered a trip hazard.

- 5.13.2.1 Brass or stainless steel.
- 5.13.2.2 Heavy duty dome type, with high grade rubber bumper.

5.13.3 Provide an overhead holder at doors that do not strike a wall.

5.13.4 Provide proper blocking for wall bumpers at stud walls, and at door for overhead stops.

5.13.5 Acceptable Manufacturers: Ives*, Rockwood, Trimco.

5.14 Thresholds, Weatherstrip, Seals and Gasketing:

5.14.1 Exterior Doors:

5.14.1.1 Provide thresholds, weatherstrips, and drips at all exterior doors. Verification with site conditions is required.

5.14.1.2 Thresholds:

5.14.1.2.1 Saddle type with no more than 1/2 inch in rise with stainless steel fasteners.

5.14.1.2.2 Set in full bed of exterior grade caulk near interior and exterior edges.

5.14.1.3 Weatherstripping: Aluminum alloy 6063 housing black neoprene perimeter insert and have elongated holes for adjustment.

- 5.14.1.4 Door Sweeps: Surface mounted anodized aluminum alloy 6063 housing with specified insert and slotted screw holes.
- 5.14.1.5 Gasketing: 3/8 inch wide x 1/4 inch tall, synthetic rubber polymer, self-adhesive silicone, flame resistant, moisture resistant, brown. Certified to ANSI/BHMA A156.22.
- 5.14.1.6 Smoke Seal: 1/2 inch wide x 1/4 inch tall, synthetic rubber polymer, self-adhesive silicone, flame resistant, moisture resistant, brown. Certified to ANSI/BHMA A156.22.
- 5.14.1.7 Overhead Drip Caps: Aluminum, 2-1/2-inch projection, 4 inches wider than the door opening.
- 5.14.2 Interior Doors:
 - 5.14.2.1 Provide thresholds at all restroom doors. Refer to Division 09 for requirements.
 - 5.14.2.2 Provide thresholds at doors to all rooms where commercial or residential grade washers / dryers are located. Include food service / student dining, custodial / laundry, physical education laundry room, CTE dry cleaning labs, special ed, choral uniform storage, dance storage, costume shop, CTE laundry, CTE observation room, laundry storage for child development center, family and consumer science labs, culinary labs, automotive shops, cosmetology labs, and fashion design.
- 5.14.3 Astragals:
 - 5.14.3.1 Astragals are not allowed. Approval from Dallas ISD is required for use where fixed or removable mullions cannot be accommodated.
 - 5.14.3.2 If astragals are used, meet the following requirements:
 - 5.14.3.2.1 All pairs of doors with overlapping astragals to have coordinators.
 - 5.14.3.2.2 Anodized aluminum alloy 6063, T5 temper, neoprene smoke rated astragal with slotted screw holes.
- 5.14.4 Acceptable manufacturers: NGP*, Pemko, Reese, Zero.
- 5.15 Door Viewer: Acceptable Manufacturers/Products:
 - 5.15.1 Standard: Ives 698* or approved equal.
 - 5.15.2 Fire Rated: Ives U698* or approved equal.
- 5.16 Electronic Hardware:
 - 5.16.1 Ensure that exterior door hardware/frame is compatible with electrical requirements for controlled access systems (including storefront installation).
 - 5.16.2 Refer to Division 26 for coordination of power requirements.
 - 5.16.3 Acceptable Manufacturers/Products:
 - 5.16.3.1 Electronic Locks: Schlage, CO series x spa lever as required* (no substitutions allowed).
 - 5.16.3.2 Power Transfers: Von Duprin, EPT series* or approved equal. (Manufacturer to be same as exit device manufacturer.)
 - 5.16.3.3 Magnetic Door Holders:
 - 5.16.3.3.1 Surface Mounted: LCN SEM7830*, ABH 2510.
 - 5.16.3.3.2 Recessed: LCN SEM7850*, ABH 2100 series.
 - 5.16.4 Magnetic Door Holders: LCN*, ABH.

6. Finishes:

- 6.1 All hardware on wood or hollow metal doors is to be brushed stainless steel or brushed chrome.
- 6.2 Hardware finishes to match and be maintained to BHMA standard finish listings.
- 6.3 Additions/Renovations: Match existing hardware.

HARDWARE ITEM	FINISH AND BASE MATERIAL
Hinges	
Exterior	US32D/630 Satin Stainless Steel
Interior	652 Satin Chrome Plated Steel
Continuous	628 Satin Aluminum Clear Coated
Flush Bolts	626 Satin Chrome Plated Brass/Bronze
Exit Devices	626 with 630 touchpad Satin Chrome Plated Brass/Bronze with Satin Stainless Steel
Locks and Latches	626 Satin Chrome Plated Brass/Bronze
Cylinders	Match device
Push Plates and Pulls	630 Satin Stainless Steel
Coordinators	600 Primed for Paint – Steel
Closers	689 Painted Aluminum
Protective Plates	630 Satin Stainless Steel
Overhead Stops	689 Painted Aluminum
Stops	626 or 630 Satin Chrome Plated Brass/Bronze or Satin Stainless Steel
Threshold	Mill Aluminum
Weatherstrip, Sweeps, Drip Caps	US28/628 Clear Anodized Aluminum
Wall Magnets	689 Painted Aluminum
Magnetic Locks	628 Satin Aluminum – Clear Coated
Miscellaneous	626 Satin Chrome Plated Brass/Bronze

7. Key Control:

7.1 Key Control Cabinets:

- 7.1.1 Provide key cabinet(s) of sufficient capacity to handle all keys, plus 50% expansion.
- 7.1.2 Provide key control cross-reference chart and accountability (sign-out) tags.

7.2 Acceptable Manufacturers:

7.2.1 Key Cabinets:

- 7.2.1.1 Telkee: RWC-AWC.
- 7.2.1.2 Lund: 1200-1205AA.
- 7.2.1.3 Key Control: M228-2480.

- 7.2.2 Key System: Best, 1CX7 Cormax small format interchangeable core (no substitutions allowed).
8. Architect to include the following requirements at a minimum in the Contract Documents:
- 8.1 Core/Keying Requirements:
- 8.1.1 Best Access Systems and General Contractor to coordinate with Dallas ISD-M&O for install of permanent cores and delivery of keys.
- 8.1.2 Construction Cores:
- 8.1.2.1 Install keyed brass construction cores in every cylinder and cylinder housing included in the project.
- 8.1.2.2 Provide one (1) construction key for each core. All temporary construction cores to have a minimum of two levels:
- 8.1.2.2.1 Level One: Pass key can be issued to individual users limiting access to a single space period.
- 8.1.2.2.2 Level Two: Master to be issued to school principal and/or designated site staff.
- 8.1.2.3 Contractor to provide the following quantities of master keys:
- 8.1.2.3.1 Elementary Schools: Six (6) master keys
- 8.1.2.3.2 Middle Schools: Eight (8) master keys
- 8.1.2.3.3 High Schools: Twelve (12) master keys
- 8.1.3 Permanent Cores:
- 8.1.3.1 Furnish combined cores so as not to breach security of existing system. CORMAX keying system to be guaranteed of no duplication of existing change keys, master keys or grandmaster keys located in this project.
- 8.1.3.2 Provide new permanent cores for all new cylinder housings and locks as well as any existing locks that have been modified
- 8.1.4 All work completed by Best Access Systems or their approved subcontractor is paid for by the General Contractor.
- 8.1.5 Contractor to install key cabinet with cabinet set up by Best Access Systems.
- 8.1.6 Best Access Systems is to coordinate with Dallas ISD-M&O on keying system design, provide permanent cores, and key cabinet set up. General Contractor to assist with General coordination of this work scope. All costs associated with Best Access Systems's work to be the responsibility of the General Contractor.
- 8.1.7 Installation of the permanent cores and keys to be coordinated with Dallas ISD-M&O. All work to be provided by Best Access Systems or a subcontractor trained and approved by Best Access Systems. Installation of permanent cores to be completed prior to Final Completion and paid for by the General Contractor.
- 8.1.8 Best Access Systems to deliver keys directly to the Dallas ISD-M&O Lock Supervisor with no 3rd party or General Contractor involvement in that transfer. Once the permanent cores are installed, the District assumes primary responsibility for the security of the building and its contents.
- 8.1.9 Best Access Systems to return construction cores to the General Contractor.

- 8.1.10 After installation of permanent cores, Dallas ISD will provide access for Contractor or authorized Sub- Contractor(s) to enter the building for completion of all work remaining.
- 8.2 Submittals:
 - 8.2.1 Schedules: Furnish six (6) copies of detailed schedule of finish hardware (see DHI's Sequence and Format of the Hardware Schedule) for approval. Hardware schedule to be complete with Title Page, Door Index/Keying Schedule and Manufacturers legend. After "Approval," provide eight (8) copies, unless otherwise requested, of the approved schedule for field use, distribution and files. Provide one (1) copy, with catalog cutsheets, marked "Installer's Copy" and deliver to the job site.
 - 8.2.2 Keying: Provide a keying schedule, listing the levels of keying, (GGMK, GKD, MKD or KA) and explanation of the key system's function, the key symbols used and the door numbers of the doors controlled. Provide in conjunction with the door index/keying schedule (which lists the door number schedule heading, lock type and individual key symbol and remarks or special instructions). This project is to be masterkeyed and/or grand masterkeyed. Provide ten (10) grandmaster keys, fifteen (15) master keys and five (5) keys per lockset or cylinder. (Security keying)
 - 8.2.3 Operations and Maintenance Data: 120 days prior to project completion, provide Dallas ISD- M&O- Locksmith Department (972-925-5239) a copy of the latest, updated schedule of finish hardware. 100% Construction Documents with catalog cuts and keying schedule and one (1) copy of maintenance and parts manuals.
- 8.3 Examination: Examination of project requirements on site prior to submitting bids is required of all bidders of finish hardware. Suggestions and/or problems to be addressed and answered by the Architect and/or Hardware Consultant. If any decision affects bidding documents, Addenda to be issued with complete explanation.
- 8.4 Marking and Packaging: All items of hardware to be delivered to the jobsite in the manufacturer's original cartons or boxes. Each item of hardware to be marked with the abbreviation set forth on the shop drawings to ensure the product reaches its installation destination without needing specific hardware product number knowledge.
- 8.5 Installation: Qualified installer must have minimum five (5) years experience in the installation of commercial grade hardware. Manufacturer's instructions to dictate templating and installation.
 - 8.5.1 General Contractor to deliver any special installation tools, hex dogging keys, etc. to Dallas ISD- M&O at construction close-out.
 - 8.5.2 Renovations (existing doors to be reused with new locking hardware):
 - 8.5.2.1 Install a metal wrap at the lock location to cover any exposed holes from previous lock prep.
 - 8.5.2.2 Existing door jambs to be prepped to accept flush mounted ANSI strikes. Prep to factory specifications.
 - 8.5.2.3 Any deviation from the Dallas ISD standard mortise lock requires Dallas ISD approval.
- 8.6 Field Quality Control: A final inspection to take place by the hardware installer and hardware supplier to insure correct installation and operation and check for any damaged or defective items. Verify that all hardware has been installed to its correct destination in proper working order.

- 8.7 Quality Assurance:
- 8.7.1 Substitutions: Request for substitutions is not allowed. Architect, Owner and Hardware Consultant have selected one (1) specified and two (2) equals listed in the Hardware Schedule. These three (3) equal products to be used for competitive pricing. If any specified product is listed as a "No Substitution" product, this product to be supplied as specified, with no alteration or request of substitution. Parts and supplies are inventoried for these specific products for ease and standardization of repair and replacement.
 - 8.7.2 Supplier Qualification: Qualifications of supplier listed to meet or exceed those standards and be documented, in writing, upon the request of the Architect.
 - 8.7.3 Hardware supplier to be engaged regularly in furnishing, delivering and servicing contract builder's hardware and to be experienced and knowledgeable in all phases of estimating, detailing, scheduling, master keying, shipping and installation practices.
 - 8.7.4 An Architectural Hardware Consultant (AHC) or equivalent to be on staff at hardware supplier's place of business to assist Architect and General Contractor throughout project.
 - 8.7.5 Installer Training: Before hardware installation, general contractor to coordinate a hardware installation seminar with a one-week notice to all parties involved. The seminar is to be conducted on the installation of all door hardware; locksets, closers, exit devices, continuous hinges, overhead stops, and access control hardware. Manufacturer's representative of the above products to present seminar. Seminar to be held at the job site and attended by installers of hardware (including low voltage hardware) for aluminum, hollow metal and wood doors. Training to include use of installation manuals, hardware schedules, templates and physical product samples.
- 8.8 Maintenance:
- 8.8.1 Maintenance Service: If there are any products listed that require a maintenance or service contract, provide the Owner/Architect with details and costs of contract.
 - 8.8.2 Maintenance Manuals: All material suppliers provide maintenance manuals and parts lists for the respective items at the conclusion of the project.

08 71 53 Integrated Access Control Hardware Devices

1. General: Support the installation of access control hardware by Dallas ISD-IT-CSS contracted vendor(s). Refer to Responsibility Matrix in Division 01 for division of scope.
2. Keypads - Locations:
 - 2.1 Coordinate locations with Dallas ISD-IT-CSS and Dallas ISD-EM.
 - 2.2 Typical locations include but are not limited to:
 - 2.2.1 Main entrance door.
 - 2.2.2 Main staff entry/exit.
 - 2.2.3 Administration area.
 - 2.2.4 Food services receiving area.
 - 2.3 Middle Schools and High Schools: Special use areas such as:
 - 2.3.1 Gymnasiums.
 - 2.3.2 Libraries with outside access.
 - 2.3.3 ROTC rooms.
 - 2.3.4 Band halls.

- 2.4 Review requirements for stand-alone systems in youth and family centers (Y&FC) with Dallas ISD designated representative.

08 80 00 Glazing

1. Glazing to be evaluated in each building space for conformance to Dallas ISD's CHPS goals. The following are general guidelines:
 - 1.1 Design team to apply glazing parameters based on code requirements.
 - 1.2 Any glazing adjacent or within areas subject to human impact and where required by code to be tempered.
 - 1.3 All glazed openings are to be kept at or under 4' in any direction.
 - 1.4 Insulated Glazing: 1 inch (1/2 inch airspace w/ two 1/4 inch lites). Tempered where required by code. Gas filled not preferred, coatings are acceptable if budget allows.
 - 1.5 Interior Glazing: Clear 1/4 inch tempered.
 - 1.6 Stops for glass lites, louvers, etc. should use vandal proof fasteners and be capable of being removed and reinstalled.
 - 1.7 Clear anodized or factory finish paint system.
 - 1.8 Renovations: Replacement glazing in existing frames to match existing conditions.
2. Exterior Doors/Entrances: Tempered.
3. Interior Doors/Entrances:
 - 3.1 Instructional Spaces (sprinklered): 4 inch x 30 inch tempered vision panel. If sidelights are used, vision panel to be omitted.
 - 3.2 Offices: Solid doors with adjacent sidelights with horizontal louver blinds.

END OF DIVISION 08



Division 09 – Finishes

09 05 00 General Requirements

1. Applied material (sound panels, etc.) used in gymnasiums to be impact resistant. Use of applied materials below ten feet A.F.F. in gymnasiums is not allowed.
2. Exterior soffits to be prefinished metal panels with concealed fasteners.
3. Dallas ISD-Fine Arts, with input from Theatre Consultant (if approved), to approve all finishes selected for performance venues as part of design process.

09 20 00 Plaster and Gypsum Board

1. Contract Documents to clearly indicate gypsum board type and ASTM application system to be used in rooms/spaces listed as follows:
2. Use maximum lengths available to minimize end to end joints.
3. Type by Location:
 - 3.1 Classrooms, Administration, Book Storage Rooms: Standard 5/8 inch thick, ASTM C840.
 - 3.2 Stages: Impact resistant, 5/8 inch thick, ASTM C36/C36M, tapered edge, fire rated type X.
 - 3.3 Restrooms: Sag-resistant 5/8 inch thick hard ceilings.
 - 3.4 Kiln Room, Custodial, Library Office Work Room, All Wet Areas: Cementitious backer board/units 1/2 inch (12mm). At areas subject to or adjacent to contact with water, provide backer board coverage for entire wall surface.
 - 3.5 Exterior: 5/8 inch thick, exterior water resistant board for metal framing systems with book tongue and grooved edges. Dens Glass Gold Exterior Guard or approved equal.
 - 3.6 Corridors: 5/8 inch thick, impact resistant except where CMU is required (ex: gymnasiums or storm shelters adjacent to corridors).
 - 3.7 Use of standard metal stud/gypsum construction in corridors is not allowed except behind lockers.
 - 3.8 Renovations: For walls where patching is required, entire wall surface to be skimmed for a consistent finished texture.

09 30 13 Ceramic or Porcelain Tile

1. Tile:
 - 1.1 Size: 6 inch x 6 inch, minimum.
 - 1.2 Exposed cut edges are not allowed.
 - 1.3 Tile 'wainscot' in applicable wet areas to be a minimum of 6 feet high.
 - 1.4 Provide coved based at all floor to wall transitions.
 - 1.5 Trim pieces to be manufactured beads, or coves, bases, bull noses. If not available, finish transitions to be detailed by Architect.

2. Grout:
 - 2.1 Follow grout manufacturer's standard recommendations.
 - 2.2 All non-epoxy grout to be sealed.
 - 2.3 Provide epoxy grout at all restroom floors and boys' and men's restroom walls.
 - 2.4 All other grout locations to be non-sanded.
 - 2.5 Use darker shades for grout color.
 - 2.6 Renovations: If grout cleaning is included in scope, all grout to be resealed after cleaning.
 - 2.7 Architect is to include the following requirements at a minimum in the Contract Documents: Grout lines to be uniformly 1/8 inch; use spacers during installation.
3. Tiling Accessories: Provide manufactured transition accessories where appropriate tile trim pieces are not available.

09 50 00 Ceilings

1. All new ceilings to be white, 2 feet x 2 feet x 5/8 inch mineral fiber, square lay-in tile (except as noted below for specific areas).
 - 1.1 Auditorium Control Booth: Pre-fab integrally colored black tile.
 - 1.2 Kitchen: To meet applicable governing authority and Health Department requirements.
 - 1.3 Gymnasiums: Typically, acoustic structural deck. Ceiling selection to be integrated into overall acoustic performance of gymnasium. Consult Acoustician (if approved) for performance criteria.
2. Ceiling Heights:

2.1	Classrooms, Library, Corridors & Restrooms	9'-0" minimum
2.2	Gymnasiums	25'-0" clear
2.3	Band/Orchestra & Dance (*)	20'-0" minimum
2.4	Choir (*)	15'-0" minimum
2.5	Other Fine Arts (*)	12'-0" minimum
2.6	(*) Verify all ceiling heights for Fine Arts spaces with Acoustician (if approved).	
3. Ceiling grid to be independently supported from structure.
4. Vestibule ceilings to be clipped to grid.
5. Use spray-on fireproofing for rated ceiling assembly in lieu of rated lay-in ceiling where possible.
6. Some fine arts rooms (ex. black box and scene shop) to be left open to structure. Refer to Educational Specifications for locations. Acoustic spray insulation or pin-fixed insulation may be required at these locations. Consult Acoustician (if approved) for performance criteria.
7. Renovations: Avoid lowering existing ceilings.
8. Acceptable Manufacturers:
 - 8.1 Armstrong fine fissured with exposed tee configuration.
 - 8.2 Certainteed fine fissured with exposed tee configuration.
 - 8.3 USG Radar ClimaPlus with exposed tee configuration.

09 60 00 Flooring

1. Floor Finish Schedule:

Space	Floor Finish
General Classroom	VCT
Early Childhood Classroom	2/3 carpet and 1/3 VCT
Labs, Science, Storage	VCT
Art	Sealed concrete
Cafeteria	VCT, polished & stained concrete, terrazzo
Band/Choir/Ensemble	Carpet or VCT
Lounges	VCT
Corridors	VCT or terrazzo
Under Drinking Fountains	Ceramic tile
Restrooms	Porcelain or terrazzo
Under Kilns	Sealed concrete
Entryways, Public Area at Reception	VCT, ceramic tile, quarry tile or terrazzo
Kitchen/Culinary Arts	Quarry tile or sealed polished concrete
Media Center/Library	Carpet
Dance Studio/Classroom	Vinyl performance surface
Administrative/Support Offices	Carpet
Computer Labs	Carpet
Gymnasium (Elementary)	Poured synthetic flooring Architect to confirm inter local agreements that may impact play surface or marking at elementary schools.
Gymnasium (Middle Schools and High Schools)	Hardwood: Maple
Activity Room	Poured synthetic flooring Architect to confirm local agreements that may impact play surface or marking at elementary schools.
Locker Rooms	Sealed concrete – Non-slip finish

Space	Floor Finish
Mechanical Rooms	Concrete w/ Pedestrian traffic coating
Custodial Closets	Sealed concrete
MDF/IDF	Sealed concrete
Weight Rooms	Resilient rubber athletic flooring
Wrestling Spaces	Professional grade rubber athletic flooring
Vocational Tech Spaces	Sealed, stain/sealed concrete
Fine Arts - Auditoriums/Stages - Elementary Schools	
New Multi-Purpose Stage/Platform	VCT or carpet tile
Existing Stage (Renovations only)	Resilient stage floor assembly or black VCT.
Existing Seating Area (Renovations only)	Epoxy coating at seating areas, carpet in aisles and circulation areas.
Fine Arts - Auditoriums/Stages – Middle Schools and High Schools	
Stage	Resilient stage floor assembly
Dance	Temporary vinyl performance surface
Seating and Circulation Areas	Epoxy coating at seating areas, carpet in aisles and circulation areas.

- 1.1 Extent of stage floor finish to be approved by Dallas ISD-Fine Arts during design.
- 1.2 Stage design to be coordinated with Theatre Consultant.
- 1.3 New Construction and Complete Renovations: Where VCT is listed as floor finish, linoleum, rubber flooring and LVT are also acceptable.

2. Wall Base Schedule:

Flooring Material	Base
Carpet	4" rubber cove (rolled goods) or carpet base (when not on masonry)
VCT	4" rubber/vinyl cove (rolled goods)
Wood Flooring	4" ventilated base
Sports Flooring	None
Resilient Athletic Flooring	4" rubber/vinyl cove (rolled goods)

Flooring Material	Base
Dance and Stage Flooring	Verify wall base requirements with Dallas ISD-Fine Arts.
Terrazzo	Integral monolithic (poured in place)
Ceramic / Porcelain Tile	Ceramic/porcelain tile
Quarry Tile	Quarry tile
Sealed Concrete	4" rubber/vinyl cove (rolled goods), porcelain tile
<p>Architect to exercise professional judgement in determining if covered glazed CMU or ceramic/porcelain tile is a better base specification than those listed above where any flooring is adjacent to a resilient wall finish (ex: cafeteria, corridors, etc.).</p>	

3. Transitions:

- 3.1 Provide guidelines, materials and detailing for flooring transitions for each project.
- 3.2 Provide transitions at the following locations:
 - 3.2.1 Doorways where tile terminates.
 - 3.2.2 Open edges of tile where adjacent finish is a different height or material.
 - 3.2.3 Any flooring transition where materials are of different types or thicknesses.
- 3.3 Material color and finish to match or complement adjacent surfaces.
- 3.4 Restrooms: Marble, white or gray, honed finish: 2 inch wide by full width of wall or frame opening. 1/2 inch thick: beveled on long edge with radius corners on top side: without holes, cracks, or open seams.

4. VCT Flooring at Masonry Walls: Provide rake joint at mortar bed at base of walls to extend VCT install under walls.

5. Recessed entrance mats are not allowed.

09 61 00 Flooring Treatment

1. Sealed/Stained Concrete:

- 1.1 System to be a reactive acid stain that cures with the concrete to produce a variegated or translucent permanent color.
- 1.2 System to have a compatible water based clear sealer with documented compliance with current slip resistance codes.
- 1.3 All components of system to be VOC compliant.

09 64 00 Wood Flooring

1. Gymnasiums:
 - 1.1 Elementary Schools: Wood floors are not allowed.
 - 1.2 Middle Schools and High Schools:
 - 1.2.1 Material: Hardwood - Maple.
 - 1.2.2 Graphics:
 - 1.2.2.1 Include school name at each side.
 - 1.2.2.2 Include school mascot/logo at center court.
 - 1.2.2.3 Design to be reviewed/approved by Dallas ISD designated representative and Dallas ISD-Athletics during Contract Documents phase.
 - 1.2.3 Provide holes for three (3) floor mounted volleyball systems. Refer to Division 11 for locations and additional requirements.
2. System Requirements:
 - 2.1 Flooring: Maple strip 2-1/4 inch width and a minimum of 7/32 inch wear surface above the nail groove, continuous strip or MFMA random length.
 - 2.1.1 Tongue and groove, EM.
 - 2.1.2 Grade: Second and better.
 - 2.1.3 Species: KD Northern Maple.
 - 2.2 7/16 inch EPDM Bio-Pad (or equivalent).
 - 2.3 Fasteners: 1-1/2 inch @ 6-8 inches O.C.
 - 2.4 Subfloor:
 - 2.4.1 Two layers of 15/32" thick, 2 feet x 8 feet APA rated sheathing, exposure 1 (CD-X), fir or pine plywood.
 - 2.4.2 Fasteners: 1 inch length, 7/16 inch crown, coated staples or equivalent.
 - 2.5 Construction Adhesive: PL400 or equivalent.
 - 2.6 Perimeter Base: 3 inch x 4 inch ventilating type, color black.
 - 2.7 Finishing Materials: MFMA approved oil modified polyurethane sealer and finish.
 - 2.8 Gameline paint to be recommended by the finishing materials manufacturer and compatible with the finish. Paint to under the polyurethane. Minimum three (3) coats of polyurethane unless selected system has more stringent finishing techniques.
 - 2.9 All systems to be certified with 3rd party laboratory test results presented with submittal documents with continuous subfloor construction and homogenous pads.
3. Architect is to include the following performance requirements at a minimum in the Contract Documents:
 - 3.1 System to meet or exceed the six (6) criteria of DIN 18032 Part II (2001).
 - 3.2 Ball Rebound: 97% ± 1.5 %.
 - 3.3 Force Reduction: 56.1% ± 0.88 %.
 - 3.4 Vertical Deflection: 2.73mm ± 0.30mm (0.012 inch).
 - 3.5 Area Indentation: 13% ± 2 %.
 - 3.6 Rolling Load: Must pass.

- 3.7 Surface Friction: Must pass.

09 65 00 Resilient Flooring

1. VCT:
 - 1.1 Size: 12 inches x 12 inches x 1/8 inch.
 - 1.2 Floor pattern to be reviewed/approved by Dallas ISD designated representative. Use random patterns for ease of maintenance repair.
 - 1.3 Acceptable Manufacturers/Products:
 - 1.3.1 Armstrong Excelon.
 - 1.3.2 Mannington Essentials.
2. Sports Flooring:
 - 2.1 Professional Grade Rubber Athletic Flooring (wrestling room):
 - 2.1.1 Rolled goods or interlocking tiles made from 100% recycled rubber.
 - 2.1.2 Minimum: 8mm (0.32 inch) thick.
 - 2.2 Resilient Rubber Athletic Flooring (weight room):
 - 2.2.1 Prefabricated interlocking rubber athletic flooring, dual-layer vulcanized rubber.
 - 2.2.2 Material: Rubber.
 - 2.2.3 Nominal Thickness: 10 mm (0.39 inch).
 - 2.2.4 Provide with custom logos/school colors.
 - 2.2.5 Texture: Sealskin or matte.
 - 2.2.6 Static Load Limit (250 lbs): Meet ASTM F970-06.
 - 2.2.7 Hardness (Shore A): Meet ASTM D2240-05.
 - 2.2.8 Fungal Resistance: Meet ASTM G21-96 - No growth.
 - 2.2.9 Acceptable Manufacturers/System:
 - 2.2.9.1 Duraflex Plus Promaxima (10mm) (0.39 inch)
 - 2.2.9.2 Mondo Sport Impact (10mm) (0.39 inch).
 - 2.2.9.3 Northwest Rubber Sportfloor ReAction (10mm) (0.39 inch).
3. Resilient Stage Floor Assembly:
 - 3.1 Neoprene pads supporting 2x4 sleepers topped with two (2) layers of 3/4 inch plywood with offset seams.
 - 3.2 Top layer to be 1/4 inch tempered hardboard with 1/16 inch gaps between sheets and screwed down every square foot with countersunk drywall screws.
 - 3.3 Painted flat black with a satin finish water-based polyurethane top layer.
 - 3.4 Extent of stage floor finish to be approved by Dallas ISD-Fine Arts during design. Stage design to be coordinated with Theatre Consultant.
 - 3.5 Acceptable Manufacturers:
 - 3.5.1 Primer + Sealant: Rosco Tough Prime (black) or Dallas ISD approved equal.
 - 3.5.2 Top Layer: Minwax Polycrylic or Dallas ISD approved equal.

4. Vinyl Performance Surface:
 - 4.1 Modular Sprung Floor Assembly: Acceptable Manufacturer/System: Harlequin Liberty Latchloc or Dallas ISD approved equal.
 - 4.2 Vinyl System:
 - 4.2.1 Welded joints to provide continuous surface.
 - 4.2.2 Acceptable Manufacturer: Harlequin Standfast or Dallas ISD approved equal.
5. Architect is to include Dallas ISD's preference for wax (number of coats and wax type) in the Contract Documents. This requirement is subject to change and is to be obtained from the Dallas ISD designated representative on a project specific basis.

09 66 00 Terrazzo Flooring

1. Terrazzo type to be 3/8 inch epoxy resin matrix thin-set terrazzo, color mixes to be NTMA color plate or custom matrix.
 - 1.1 Dividers: Zinc strips, 1/8 inch thickness.
 - 1.2 Cleaner, sealer and moisture transmission barrier to be supplied by epoxy resin manufacturer.
2. Seamless baseboard and any grouting to be 'non-absorbent'.
3. Flooring to be graded to drains throughout space to meet accessibility and code requirements.
4. Mild, non-skid grit to be added to finish coat for added slip-resistance.
5. Material Make-up:
 - 5.1 Epoxy Resin: Epoxy matrix, 100% solids, zero (0) - VOC epoxy resin.
 - 5.2 Primer: Resin manufacturer's 100% solids epoxy primer.
 - 5.3 Flexible Membrane: Resin manufacturer's 100% solid epoxy crack suppression membrane.
 - 5.4 Marble Chips: Standard color marble or glass chips as defined by NTMA.
 - 5.4.1 Maximum size #2 per NTMA gradation standards.
 - 5.4.2 NTMA Associate Member suppliers.
6. Acceptable Manufacturers:
 - 6.1 General Polymers.
 - 6.2 Crossfield Products.
 - 6.3 T&M Terroxy Resin Systems.
 - 6.4 Key Resin West.

09 67 00 Fluid Applied Flooring

1. Poured Synthetic Flooring System:
 - 1.1 EN 14904 Standard - Category P1.
 - 1.2 Nominal Thickness: 11 mm.
 - 1.3 Character Point: Elastic.
 - 1.4 Ball Bounce: 97%.
 - 1.5 Shock Absorption: 32%.
 - 1.6 Vertical Deformation: 2.3 mm.

- 1.7 Acceptable Manufacturers/Products:
 - 1.7.1 Robbins Pulastic Classic 110.
 - 1.7.2 Horner CushionCourt GPSII.
 - 1.7.3 Conner ElastiPlus High Strength.

09 68 00 Carpet

- 1. General Requirements:
 - 1.1 Flammability Requirements:
 - 1.1.1 The product, when tested with its attached cushion backing, to meet or exceed all flammability requirements for floorcoverings as established by the following codes:
 - 1.1.1.1 NFPA 101 Life Safety Code for Safety to Life in Buildings and Structures.
 - 1.1.1.2 Standard Building Code (SBC) Uniform Fire Code (UBC).
 - 1.2 Face Fiber Characteristics:
 - 1.2.1 Continuous filament 6 or 6.6 solution dyed nylon fiber, with permanent static control.
 - 1.2.2 Fiber type: Certified DuPont SDN, BASF Zeftron 500 with static control and stain resistance.
 - 1.3 Stain Inhibiting and Resistance Properties:
 - 1.3.1 Permanent sintered stain inhibitor and soil inhibitor applied to the product, through heat and force activated cohesion creating mechanical polymeric entrapment, during manufacture, to resist fiber staining.
 - 1.4 Backing Characteristics:
 - 1.4.1 Synthetic polymer cellular cushion.
 - 1.4.2 The cellular cushion backing composite and polymer to have been sold commercially for at least three (3) years in exactly this formulation. No deviation allowed.
 - 1.4.3 Backing system to provide a barrier to moisture penetration. No penetration after 10,000 impacts based on dynamic crush testing @ 10.0 psi.
 - 1.4.4 Product to be professionally seam sealed or chemical welded per manufacturer installation instructions.
 - 1.5 Adhesive System Characteristics:
 - 1.5.1 Carpet product to be securely attached to the floor in compliance with Americans with Disabilities Act (ADA), Section 4.5.3.
 - 1.5.2 Product to be installed according to manufacturer's recommendations.
 - 1.5.3 Product to be supplied with a pressure sensitive adhesive (peel and stick) applied to 100% of the backing at the time of manufacture.
 - 1.6 Environmental Impact Characteristics:
 - 1.6.1 All products to pass the University of Pittsburgh Smoke Toxicity Protocol being "no more toxic than wood" when burned under the same conditions. This data to be supplied by style from a certified independent testing laboratory, or included in the Carpet and Rug Institute testing protocol placed on file with the E.P.A.
 - 1.6.2 Green Label Plus Certification.

- 1.6.3 The carpet, as suggested by the October 1993, Maryland State Dept. of Education Technical Bulletin, to pass the Carpet & Rug Institute, Green Label Testing Program, as a minimum acceptable threshold or for carpet product selection. "Carpet not meeting the CRI test programs are not allowed for use in schools."
- 2. Renovations: Existing carpet in good condition with life span present is to remain. Worn, damaged, mismatched or faded carpet to be replaced as indicated in approved scope.
- 3. Acceptable Manufacturers:
 - 3.1 Shaw Contract Group:
 - 3.1.1 Synthetic with the Ecoworx Secondary Backing and including the Shaw Soil Protection.
 - 3.1.2 2 foot x 2 foot Is only acceptable size.
 - 3.1.3 Acceptable Products:
 - 3.1.3.1 Collection: Worklife, Pattern: Connect Tile – 59342.
 - 3.1.3.2 Collection: No Rules, Pattern: Disperse Tile, 59576.
 - 3.1.3.3 Collection: No Rules, Pattern: Diffuse Tile, 59575.
 - 3.2 Tandus Flooring:
 - 3.2.1 Synthetic with ER3.
 - 3.2.2 Ensure Soil Protection.
 - 3.2.3 2 foot x 2 foot is only acceptable size.
 - 3.2.4 Acceptable Products:
 - 3.2.4.1 Crayon Palette, Colors: Blizzard Blue, Outside the Lines, Precious Metal, Tidal Wave.
 - 3.2.4.2 Construct Palette, Blue Horizon, Longboard.
 - 3.2.4.3 City Walk Palette, Bike Path, Chinatown, Rooftop, Blue Line.
 - 3.3 Mohawk Group (Bigelow):
 - 3.3.1 Synthetic with Ecoflex NXT backing including the Sentry Plus protective treatment.
 - 3.3.2 2 foot x 2 foot Is only acceptable size.
 - 3.3.3 Acceptable Products:
 - 3.3.3.1 Caliber: NXT Platinum.
 - 3.3.3.2 Datum: NTX Platinum.
 - 3.3.3.3 Sector: NTX Platinum.
- 4. Accessories:
 - 4.1 Floor Primer, Seam Sealer and Seam Cleaner: Type recommended by carpet manufacturer.
 - 4.2 Edge Strips:
 - 4.2.1 Type: Tapered vinyl.
 - 4.2.2 Color: To be coordinated with selected carpet tile.
 - 4.2.3 Acceptable Manufacturer: Mercer or approved equal.

5. Architect to include the following requirements at a minimum in the Contract Documents:
 - 5.1 Submittals:
 - 5.1.1 Submit manufacturer's product specifications, product testing reports and other required documents referenced within this text. All product test reports must have been conducted by a Certified Independent Testing Laboratory.
 - 5.1.2 Submit at least three (3) references of installations that have been in use for two (2) years or more, using a cellular backing technology as described within this text. Include contact names and telephone numbers.
 - 5.1.3 Submit two (2) 15 inch x 20 inch finished samples of the exact type of carpet proposed including quality, backing, pattern and color.
 - 5.1.4 Submit seaming diagrams for review prior to installation.
 - 5.1.5 Submit manufacturer's installation and maintenance instructions prior to installation.
 - 5.2 Certified Testing:
 - 5.2.1 Certified test reports to be submitted for all performance assurance specifications listed below.
 - 5.2.2 Requirements listed below to be met by all products.
 - 5.2.3 All submitted test numbers to represent average results for production goods. Dallas ISD reserves the right to send samples of carpet for testing. If the carpet meets or exceeds test minimums, Dallas ISD will pay for the testing. If the material doesn't pass, the manufacturer/vendor will pay for the cost of the test and the replacement of carpet (installed and not installed).
 - 5.2.4 Required Test Reports:
 - 5.2.4.1 Pill Test (Federal Flame Standard): DOC-FF-1-70, Passing result.
 - 5.2.4.2 Flooring Radiant Panel Test: ASTM E-648, Class 1.
 - 5.2.4.3 Optical Smoke Density Test: NFPA 258 NBS Smoke Chamber, Less than 450, flaming mode.
 - 5.2.4.4 Backing Identification Test: Cushion thickness ASTM-D-3676-78, Cushion density ASTM-D-3676-78.
 - 5.2.4.5 Backing Cellular Make-Up Test: After 50,000 Phillips Chair Cycles, Microscopic cellular construction.
 - 5.2.4.6 CRI VOC Chamber Test.
 - 5.2.4.7 Indoor Air Quality Test: CRI-IAG Green Label Test.
 - 5.2.4.8 Moisture Barrier (Moisture Penetration Testing): Dynamic Crush Test @ 10.0 psi. No penetration after 10,000 impacts, Antimicrobial Efficacy AATCC 174: Passing results.
 - 5.2.4.9 Stain Inhibitor: Stain Test: Professional Testing Laboratory Inc, Minimum rating – 4.
 - 5.2.4.9.1 Colorfastness to Wet or Dry (Crocking): AATCC-165. Minimum rating – 4.
 - 5.2.4.9.2 Colorfastness to Water: AATCC – 107, Minimum rating – 4.
 - 5.2.4.9.3 Accelerated Soiling: AATCC 123, Minimum rating – 4.
 - 5.2.4.10 Backing Lamination Test: ASTM-D-3936.

- 5.3 Pre-Inspection and Preparation:
- 5.3.1 All floors to be inspected and approved by the installation contractor prior to installation of carpet. Beginning of installation means acceptance of existing substrate and site conditions.
 - 5.3.2 Ensure floors are level with maximum surface variation of 1/4 inch in ten (10) feet noncumulative. Inspect substrate for cracks, holes, abrasions, rough spots, ridges, scaling or other conditions which will adversely affect execution and quality of work.
 - 5.3.3 Installation contractor to test substrate for moisture evacuation and alkalinity. Results not to exceed those limits established by the carpet manufacturer.
- 5.4 Job Conditions:
- 5.4.1 Do not begin carpet installation until painting and finishing work is complete and ceilings and overhead work is tested, approved and completed.
 - 5.4.2 Renovations: Sub-floor preparation to include, the removal and repair of the existing floor surface. Flooring be inspected prior to the Bid.
- 5.5 Quality Assurance:
- 5.5.1 Flooring contractor to be specialty contractor normally engaged in this type of work and to have three (3) years minimum documented experience in the installation of these materials.
 - 5.5.2 Flooring contractor to be approved by the manufacturer.
 - 5.5.3 Flooring contractor to be responsible for the proper product installation, including floor preparation and moisture / alkalinity testing, in the areas indicated in the Drawings.
 - 5.5.4 Manufacturer to provide field service experts to assist in project start-up as required by the job. Manufacturer will notify Owner, Architect, General Contractor or another designated contact if any installation instructions are not followed.
- 5.6 Extra Materials: Provide minimum one percent (1%) or 1 carton (48 sq.ft.) of carpeting of each color and type specified.
- 5.7 Warranty:
- 5.7.1 Provide a standard, printed warranty from the manufacturer agreeing to repair or replace unsatisfactory work caused by defective materials. All warranty items to be full term, not prorated for the indicated period. If the product fails to perform as warranted when properly installed and maintained according to procedures, the affected area to be repaired or replaced at the expense of the manufacturer.
 - 5.7.1.1 Limited lifetime commercial per the manufacturers of each type listed herein.
 - 5.7.1.2 Fifteen (15) years against excessive surface wear. Excessive wear means more than 10% loss of pile fiber weight measured before and after use.
 - 5.7.1.3 Fifteen (15) years against edge ravel.
 - 5.7.1.4 Fifteen (15) years against backing delamination. Backing delamination is defined as separation of the secondary backing from the primary backing. ASTM-D 3936.
 - 5.7.1.5 Fifteen (15) years against loss of resiliency, per ASTM-D-3574.
 - 5.7.1.6 Lifetime warranty against excessive static electricity. Lifetime static protection means built in protection below 3.0 kilovolts at 20% relative humidity and room temperature of 70 degrees F. or tested under AATCC-134.
 - 5.7.2 Stairs included in all warranty statements.
 - 5.7.3 Chair pads are not required for warranty coverage.

- 5.7.4 All warranties to be sole source responsibility of the carpet manufacturer. Second source warranties or warranties that involve parties other than the carpet manufacturer are not allowed.
- 5.7.5 All warranties to be official documents and be signed and notarized by an authorized representative of the manufacturer.

09 70 00 Wall Finishes

1. Wall Finish Schedule (Reference 09 20 00 for types of gypsum at specific locations):

Space	Wall Finish
Classroom /Teaching Spaces/ Lounges / Workroom / Clinic / Laboratories / Art Studio / Stage	Painted gypsum board, painted CMU
Auditorium / Band / Choir / Music / Ensemble & Practice Spaces	Painted gypsum board, painted CMU (Reference #4 for acoustic/instrument storage considerations)
Library	Painted gypsum board (Reference #4 for acoustic considerations)
Office / Administration	Painted gypsum board
Corridors/Stairwells	Painted, glazed or burnished CMU, brick/masonry veneer system, ceramic tile
Lobbies & Entries	Painted, glazed or burnished CMU, brick/masonry veneer system, ceramic tile, (Other materials to be considered above 8' A.F.F.)
Kitchen	Ceramic tile, painted CMU
Cafeteria, Activity Rooms	Painted or glazed CMU
Concession Areas, Culinary Arts	Ceramic tile, painted or glazed CMU
Gymnasium, Dance Studio	Epoxy painted CMU to 10' AFF, acoustical CMU or sound absorbing masonry units above
Group Restrooms	Full height ceramic tile
Dressing Rooms, Showers, Locker Room	Painted CMU, full height ceramic tile
Weight Rooms	Painted CMU with custom logos, Mirrors
Faculty/Administration Restrooms	Wainscot ceramic tile, painted gypsum board above
Shops, Rifle Range, Custodial Closets, Storage Closets, Electrical	Painted CMU
Mechanical	Un-painted CMU, sealed

2. When CMU is listed as an approved finish, it is to be block filled and painted (excluding burnished).
3. Kitchen Walls:
 - 3.1 Ceramic tile or fiberglass reinforced plastic (FRP) on 1/2 inch cementitious board on all walls at and adjacent to wet and food prep area walls. Material/joints to be light in color.
 - 3.2 Wall surface behind cooking line to be 14 gauge, 304 stainless steel on 1/2 inch cementitious board installed with stainless steel mounting strips.
 - 3.3 Dry storage to have impact resistant gypsum with fiberglass reinforced plastic (FRP).
4. Acoustic Wall and Ceiling Treatments (baffles and panels):
 - 4.1 Design to be supervised by and coordinated with Acoustician (if approved).
 - 4.2 Key Spaces for Acoustic Design Consulting (included but not limited to the following):
 - 4.2.1 Choir, Music, Band, Ensemble and Practice Spaces, Cafeteria, Auditorium and Library.
 - 4.2.2 Use of angled walls as a means of acoustical treatment is not allowed.
 - 4.2.3 Additional consideration to be given to sound sensitive spaces for assembly, education, and administration.
 - 4.3 Provide acoustical wall panels in gymnasiums. Verify minimum elevation AFF with Dallas ISD designated representative.
 - 4.4 Design teams to approach space by reviewing the overall desired acoustic environment.
 - 4.5 Fabrics, paints, shapes selections to be designed and located to be easily maintained and repairable as necessary.
 - 4.6 Mounting and final finish treatment of all materials shall follow manufacturer's recommendations.
 - 4.7 Acceptable Acoustic Products Manufacturers:
 - 4.7.1 Kinetics Noise Control.
 - 4.7.2 ConwedWall Technology.
 - 4.7.3 FabricMate.
 - 4.7.4 Wenger.
5. Murals and graphics are allowed with approval.
6. Vinyl wall coverings are not allowed.
7. Plastic shower enclosures are not allowed.

09 90 00 Paintings and Coatings

1. General Requirements:
 - 1.1 Low-VOC as defined by current CHPS design criteria.
 - 1.2 Standard wall field color for all project/building types is Kelly Moore "Soft Sesame" or color matched equivalent. Refer to Paint Brand Reference Chart.
 - 1.3 Accent colors are acceptable, Color palette and scheduled locations require approval from Dallas ISD designated representative.
 - 1.4 Architect to determine if existing painted surface is able to properly receive the scheduled primers and paints. Specifications to require contractor to confirm during submittal phase.

- 1.5 Architect to evaluate existing condition of lockers including: locks, number plates and handles for function and prior potential overspray. Recommendations with respect to masking, removal, replacement and/or cleaning for each of the aforementioned components to be discussed with Dallas ISD designated representative and specific direction included in the Construction Documents.
 - 1.6 Darker colors to be considered for spaces with sports activities to handle high abuse, scuff marks, etc. (Examples are weight rooms/ wrestling rooms).
 - 1.7 Dallas ISD-Fine Arts and Theatre Consultant (if approved) to approve all paint colors chosen for performance venues.
 - 1.8 Provide fireproof paint/coating at elevator doors.
 - 1.9 Renovations: DISD Light Brown to be used to match existing conditions. Refer to Paint Brand Reference Chart.
2. Interior Paint Schedule:
- 2.1 Concrete Surfaces & Unglazed Brick:
 - 2.1.1 Semi-gloss finish three coat latex system.
 - 2.1.2 Semi-gloss finish two coat epoxy system (water/wet areas).
 - 2.2 Concrete Masonry:
 - 2.2.1 Semi-gloss finish three coat latex system.
 - 2.2.2 Semi-gloss finish three coat epoxy system (water/wet areas).
 - 2.3 Masonite, Insulation or Metal at Ceilings: Eggshell finish two coat dryfall waterborne system.
 - 2.4 Metal (miscellaneous & ornamental iron): Semi-gloss finish three coat enamel system.
 - 2.5 Metal (structural): Semi-gloss finish three coat industrial enamel system.
 - 2.6 Metal (ceiling & ductwork): Eggshell finish two coat dryfall waterborne system.
 - 2.7 Metal (lockers):
 - 2.7.1 Electrostatic coating with satin finish.
 - 2.7.2 Faces/doors (both sides), trim, door returns, edges and filler panels of metal lockers to be included.
 - 2.8 Wood (walls, ceilings, doors, trim): Gloss or satin finish four coat stain and varnish system.
 - 2.9 Wood (where stain and varnish system are not possible): Semi-gloss finish three coat enamel system.
 - 2.10 Drywall (walls, ceiling, etc.):
 - 2.10.1 Semi-gloss finish three coat enamel system w/light sand texture.
 - 2.10.2 Semi-gloss finish three coat enamel system w/epoxy primer and light sand texture (all wet areas surfaces).
3. Exterior Paint Schedule:
- 3.1 Concrete & Masonry (excluding flatwork): Clear finish weather/water repellent seal.
 - 3.2 Metal (aluminum, galvanized): Industrial clear gloss finish three coat latex system.
 - 3.3 Metal (doors, handrails, metal steps): Gloss finish three coat alkyd industrial enamel system with alkyd universal primer.
 - 3.4 Wood (existing trim or hardboard):
 - 3.4.1 Gloss finish three coat latex system.

3.4.2 Semi-gloss finish three coat latex system.

3.5 Architectural PVC, Plastic, Fiberglass: Semi-gloss finish three coat acrylic latex system.

3.6 Drywall (existing soffits, gypsum board, or exterior drywall): Semi-gloss finish three coat acrylic latex system.

4. Paint Brand Reference Chart for Standard Wall Field and Renovation Trim Colors:

Paint Brand	DISD Off White	DISD Light Brown
Glidden	DISD Off White - Semi Gloss	DISD Light Brown - Gloss
Kelly Moore	Soft Sesame OW227 - Semi Gloss	Color Match - Gloss
	AX O Y 2.0000	B O Y 12.5000
	L O Y 16.0000	C O Y 26.00000
		I O Y 27.000
		L O Y 11.5000
Sherwin Williams	Color Match - Semi Gloss	Color Match - Gloss
	CCE* Colorant OZ 32 64 128	BAC Colorant OZ 32 64 128
	G2-New Green - - 1 -	B1 Black - 9 - -
	R4 New Red - 1 - 1	R2 Maroon - 4 1 1
	Y3 Deep Gold - - 1 1	Y3 Deep Gold - 54 - 1

END OF DIVISION 09



Division 10 – Specialties

10 05 00 General Requirements

1. Renovations: Architect is to verify the existing building conditions to assure proper installation is achievable. Specifications to require the General Contractor to also confirm the field conditions and report any concerns to the Architect and Owner's designated representative.
2. Refer to Educational Specifications for additional information related to specialty items including but not limited to quantities and locations.

10 10 00 Information Specialties

1. Chalkboards: Refer to Educational Specifications and approved project specific scope for appropriate replacement scope/material.
2. Marker Board (White Board):
 - 2.1 Marker boards to be installed after wall finishes have been completed. Provide clips or similar methods of installation to allow removal of the board without significant damage to walls.
 - 2.2 White three-coat porcelain enamel process writing surface with 7/16 inch MDF core and T5 tempered factory 6303 alloy grade aluminum trim, 201-R1 satin anodized finish.
 - 2.3 Magnetic marker boards (white boards) to be included if approved by Dallas ISD on a project by specific basis.
 - 2.4 Accessories:
 - 2.4.1 Map Rail: Provide continuous 1 inch rail with cork insert on each marker board and one (1) hook for every 2 feet of rail.
 - 2.4.2 Flag Holder: Two (2) per classroom located on the marker board map rail.
 - 2.4.3 Marker Tray: Provide continuous solid blade-type aluminum tray with ribbed sections.
 - 2.5 Art Rooms: Provide two (2), 16 linear feet.
3. Tack Boards:
 - 3.1 Fabric covered 1/4 inch self-healing cork laminated to 1/4 inch hardboard backing with T5 tempered factory 6303 alloy grade aluminum trim, 201-R1 satin anodized finish.
 - 3.2 Art Rooms: Provide 8 linear feet.
4. Display Cases:
 - 4.1 Size: 18 inches deep (minimum) x 48 inches tall (minimum), length based on available space.
 - 4.2 Access: Recessed with sliding glass or rear entry unit with non-operable glass.
 - 4.3 Glass: Tempered.
 - 4.4 Shelving: Three (3) adjustable shelves, minimum.
 - 4.5 Lighting: Internal recessed or reflected lighting.
 - 4.6 Security: All cases to be lockable.
 - 4.7 Back Panel: Fabric-wrapped tackable panel on all non-glass sides.

- 4.8 Finish:
 - 4.8.1 General: Opening viewable from within Library to match Library wood finishes.
 - 4.8.2 Interior Opening: Finished wood veneer or low pressured wood laminate at top, bottom and ends.
 - 4.8.3 Exterior Opening: Aluminum fronts with satin anodized finish.
- 5. Exterior Dimensional Letter Signage:
 - 5.1 General:
 - 5.1.1 Building name and address to be on building exterior and illuminated.
 - 5.1.2 Verify size and location with Dallas ISD designated representative. Confirm compliance with appropriate agencies (Fire Marshal/Fire Department).
 - 5.2 Material: 1/2 inch thick aluminum plate.
 - 5.3 Attachment: Detailed by Architect based on mounting surface material.
- 6. Room Identification Signage:
 - 6.1 Numbering Requirements: Refer to Division 01 for requirements.
 - 6.2 Comply with ADA/TAS.
 - 6.3 Material: Melamine plastic laminate or engineered plastic, thermoplastic alloy with raised text and character coloring and stipple or matte texture.
 - 6.4 Name Insert Window:
 - 6.4.1 Lens: Flat non-glare.
 - 6.4.2 Elementary Schools:
 - 6.4.2.1 Two (2) faced 3M type tape is acceptable.
 - 6.4.2.2 Provide back plates when signage is installed on glass.
 - 6.4.3 Middle Schools and High Schools:
 - 6.4.3.1 Vandal resistant mounting countersunk mounting holes, holes at each corner with stainless steel screws.
 - 6.4.3.2 Two (2) faced 3M type tape acceptable when mounted to glass.
 - 6.4.3.3 Provide back plates when signage is installed on glass.

10 20 00 Interior Specialties

- 1. Toilet Partitions and Urinal Screens:
 - 1.1 General:
 - 1.1.1 Consider 'line of sight' issues at openings when designing or renovating.
 - 1.1.2 Material: 1 inch solid plastic.
 - 1.1.3 Color/Finish: Black dimpled finish.

- 1.2 Toilet Partitions:
 - 1.2.1 Head rails are required under high ceiling conditions where pilasters extend greater than 36 inches above the top of panel.
 - 1.2.2 Panels to be wall mounted and/or supported by a pilaster.
 - 1.2.3 Ceiling suspended partitions or pilasters are not allowed.
 - 1.2.4 New Construction/Additions: Pilasters to be secured to both floor and ceiling.
 - 1.2.5 Renovations: Pilasters secured to both floor and ceiling are preferred.
- 1.3 Urinal Screens:
 - 1.3.1 Location:
 - 1.3.1.1 Elementary Schools: Between urinals and at end of bank.
 - 1.3.1.2 Middle Schools and High Schools: Not used. Wall to be constructed for separation as required by code.
 - 1.3.2 Continuously secured for the full panel height.
- 1.4 Hardware:
 - 1.4.1 All hardware to be heavy duty/vandal proof and resistant.
 - 1.4.2 Pilasters: Stainless steel angle/sleeve with stainless steel tamper resistant torx head screws.
 - 1.4.3 Wall Brackets: Continuous full height, heavy duty, T5 tempered aluminum anodized finish with stainless steel tamper resistant torx head sex bolts (U-shaped bolts are not approved).
 - 1.4.4 Floors and Ceiling: Stainless steel angle.
 - 1.4.5 Continuous Helix (self-closing) Hinges, Keeper, Strike, Latch and Housing: Heavy duty T5 tempered aluminum, anodized finish with through-bolted stainless steel bolts.
 - 1.4.6 Accessories: Coat hook and wall stops for each stall.

2. Restroom Accessories:

2.1 General:

2.1.1 Restroom Accessories Schedule:

Restroom Accessories Schedule	
Toilet Tissue Holders Group Student Restrooms (Twin Jumbo)	Provided by Dallas ISD, installed by contractor.
Toilet Tissue Holders In-Classroom Restrooms and Adult (Single Jumbo)	Provided by Dallas ISD, installed by contractor.
Paper Towel Dispensers	Provided by Dallas ISD, installed by contractor
Soap Dispensers	Provided by Dallas ISD, installed by contractor.
Sanitary Napkin Disposals	GAMCO ND1 or approved equal
Sanitary Napkin Dispenser	GAMCO NV-2-4FS or approved equal
Grab Bars	GAMCO Min. 150 Series or approved equal
Mirrors	GAMCO 'A' Series- 1/4" Tempered or approved equal
Robe Hook	Bobrick B-2116 or approved equal
Shower Curtain Rod/w Vinyl Curtain	Bobrick B207 (Sized for opening) or approved equal

2.1.2 Architect to confirm brand and type during Design Development phase.

2.1.3 Architect to include schedule and a responsibility matrix in Contract Documents.

2.1.4 Architect to coordinate backing requirements for installation and ensure proper support is identified and detailed in Contract Documents.

2.1.5 Provide vandal resistant and concealed components where possible/applicable.

2.2 Sanitary Napkin Dispensers:

2.2.1 Location:

2.2.1.1 Elementary Schools: All unisex or female faculty toilet rooms.

2.2.1.2 Middle Schools and High Schools: All unisex or female faculty toilet rooms and all girls/women student restrooms.

2.2.2 Operation: Free at all student and faculty restrooms.

2.3 Hand Dryers:

2.3.1 Location: Group restrooms.

2.3.2 Quantity: One (1) for every two (2) lavatories but no more than three (3) total.

- 2.3.3 Type: 4 inch deep, surface mounted, stainless steel slim series.
- 2.3.4 Model: Saniflow M06ACS-UL Speedflow or approved equal.
- 2.4 Group Restrooms:
 - 2.4.1 Where possible, center soap dispenser between two sinks (ex: one (1) dispenser to accommodate two (2) sinks). Otherwise dispensers to be placed in the space occupied by previous dispenser to avoid damaged tile and previous mounting hardware being visible.
 - 2.4.2 Toilet tissue holders to be through-bolted back to back between toilet compartments if possible. Use carriage bolts at single stalls.
 - 2.4.3 One (1) mirror to be installed near restroom exit in accordance with ADA. (Confirm reflectance scenarios and accessibility to space prior to locating.)
- 3. Corner Guards:
 - 3.1 Locations: Exposed gypsum corners at all locations and outside corners within kitchen.
 - 3.2 Flush mount stainless steel corner guards:
 - 3.2.1 16 gauge, type 430 stainless steel, #4 satin finish.
 - 3.2.2 Minimum 4 feet in height typical, angle 1-1/2 inch to 3-1/2 inch based on condition.
 - 3.2.3 Minimum 6 feet height in kitchens, angle 1-1/2 inch to 3-1/2 inch based on condition.
 - 3.3 Installation:
 - 3.3.1 New Construction/Additions: Pre-drilled beveled holes or field applied heavy duty adhesive.
 - 3.3.2 Renovations: At existing ceramic corridors showing damage, verify inclusion of corner guards in project scope with the Dallas ISD designated representative.

10 40 00 Safety Specialties

- 1. Defibrillator Cabinets:
 - 1.1 Automated external defibrillator (AED) cabinet to be included in Contract Documents and provided/installed by General Contractor. AED provided by Dallas ISD-Health Services.
 - 1.2 Location and Quantity: To be coordinated with Dallas ISD-Health Services during Design Development phase.
 - 1.3 Acceptable Manufacturer/Product: Zoll AED Plus standard size cabinet with audible alarm, recess mount or Dallas ISD approved equal.
- 2. Fire Extinguishers and Cabinets:
 - 2.1 Location: Throughout facilities as required by code and governing authority.
 - 2.2 Mount:
 - 2.2.1 New Construction/Additions: Fully recessed.
 - 2.2.2 Renovations: Support existing conditions, fully recessed preferred.
 - 2.2.3 Kiln Room: Bracket mounted.
 - 2.2.4 Kitchen: Bracket mounted.

10 50 00 Storage Specialties

1. Lockers:

1.1 General:

1.1.1 Base: 4 inch concrete base, except for varsity football lockers.

1.1.2 Accessories:

1.1.2.1 Four-digit metal number plate.

1.1.2.2 Two (2) double prong hooks and shelf.

1.1.3 Latching Device: Heavy duty mechanism with tamper proof automatic three point latch.

1.2 Athletic Lockers:

1.2.1 Ventilation: Perforated/louvered, all welded.

1.2.2 Locks: Padlocks provided by Dallas ISD.

1.2.3 Material: Steel with welded joints.

1.2.3.1 Frame/Door: 14 gauge.

1.2.3.2 Sides, Top, Bottom, and Shelves: 16 gauge.

1.2.3.3 Backs: 18 gauge.

1.2.3.4 Ends/Filler Panels: 20 gauge.

1.2.4 Sizes:

1.2.4.1 Varsity Sports (Except Football): 18 inch x 18 inch x 72 inch.

1.2.4.2 Subvarsity Sports (Except Football): 18 inch x 18 inch x 36 inch.

1.2.4.3 Football, All: 24 inch x 24 inch x 72 inch.

1.2.4.4 Middle School Team Lockers: Two (2) tier, 12 inch x 15 inch x 36 inch.

1.2.4.5 Coaches: 12 inch x 12 inch x 72 inch.

1.2.5 Quantity: To be confirmed with Dallas ISD-Athletics during the Design Development phase.

1.3 Kitchen Lockers:

1.3.1 Ventilation: Standard louver.

1.3.2 Lock: Padlocks provided by Dallas ISD.

1.3.3 Material:

1.3.3.1 Steel with welded joints.

1.3.3.1.1 Frame/Door: 16 gauge.

1.3.3.1.2 Sides, Top, Slope, and Back: 24 gauge.

1.3.3.1.3 Ends/Filler Panels: 20 gauge.

1.3.3.2 High Density Polyethylene (HDPE).

1.3.4 Size: Two (2) tier, 12 inches x 15 inches x 36 inches.

1.3.5 Quantity: To be confirmed with Dallas ISD-Food and Child Nutrition Services during the Design Development phase.

2. Mobile Storage Shelving (New Construction/Additions):

2.1 Refer to Educational Specification for quantities, locations, and sizes not stated in the Technical Design Guide.

2.2 Manual with mechanical assist mobile storage shelving with dual flange guidance.

2.3 Operator handle to be 3-spoke ergonomic design for constant push/pull, up/down operation with effort less than 5 lbs.

2.4 System to meet or exceed the Spacesaver system.

3. Art Room Storage: Dallas ISD provided FF&E scope.

3.1 Flat Files:

3.1.1 Middle Schools and High Schools: Flat Files (stacked): 36 inches deep x 36 inches wide x 2 inches high. The base for this item to be 36 inches deep x 36 inches wide x 2 inches high, movable on locking casters.

3.1.2 Elementary Schools: Flat Files (stacked): 24 inches deeps x 36 inches wide x 2 inches high. The base for this item to be 24 inches deep x 36 inches wide x 2 inches high, moveable on locking casters.

3.2 Tall Storage Cabinet (Art Rooms): Provide two (2) – 6 linear feet, movable on locking casters.

3.3 Tall Teacher Cabinet: 3 linear feet with doors, coat hook and two (2) file drawers.

3.4 Metal Storage Rack (Art Rooms): Provide four (4) heavy-duty wire shelves. 36 inches wide x 24 inches deep x 74 inches high.

10 70 00 Exterior Specialties

1. Flag Pole:

1.1 Three (3) total, one each at the following locations:

1.1.1 Near main entrance.

1.1.2 Baseball /Softball Fields: Behind center field.

1.2 Furnish with one (1) polypropylene internal halyard and two (2) sets of swivel type clips. (Manual operation is preferred).

1.3 Finial ball to match pole butt diameter.

1.4 35 feet exposed height with a minimum of 5 feet buried below ground surface.

1.5 Cone tapered, ground set, seamless aluminum.

1.6 Preferred detail is a ground-set concrete base with sleeve. Schedule 40 PVC foundation tube not to be used unless approved by Dallas ISD.

2. United States Flags:
 - 2.1 Five (5) total, one each at the following locations:
 - 2.1.1 Main Entrance.
 - 2.1.2 Baseball /Softball Fields: Standard size.
 - 2.1.3 Competition/Auxiliary Gymnasiums: Size proportional to gym size.
 - 2.2 Size: American flag dimensions should be between one-quarter and one-third the height of the flagpole with a 3:5 ratio (ex: 35 foot pole = 6 foot x 10 foot flag).
3. Marquee Sign:
 - 3.1 General: Comply with jurisdictional requirements.
 - 3.2 Materials: Match facility.
 - 3.3 Sign Cabinet:
 - 3.3.1 Overall Dimensions: 120 inches wide x 60 inches high x 20 inches deep.

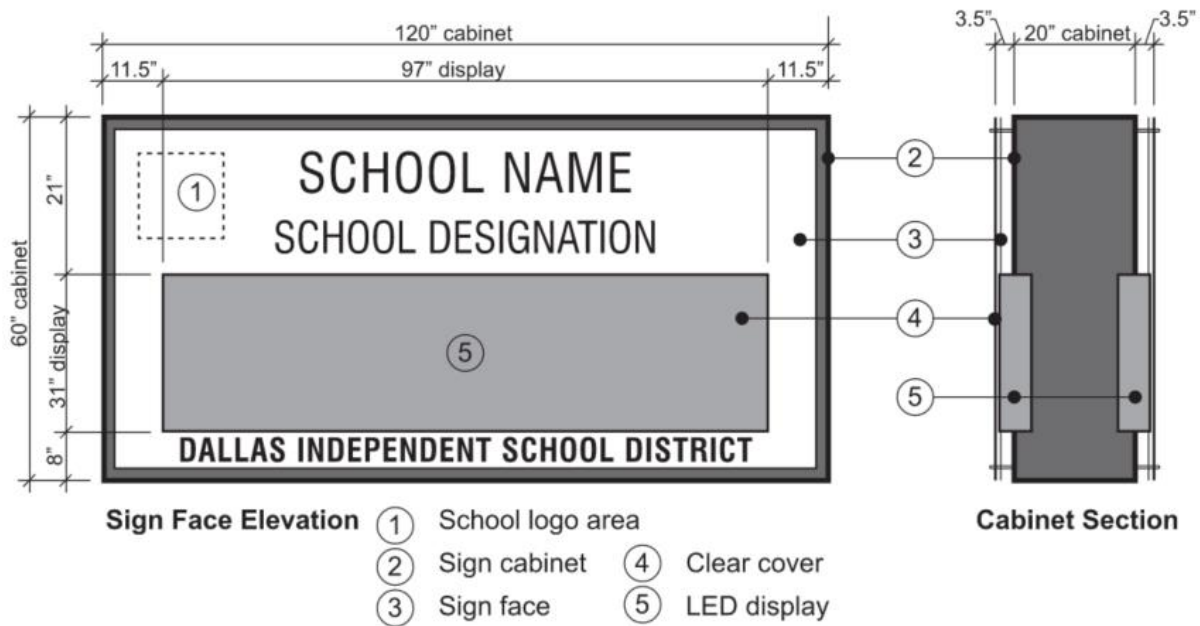


Figure 10 70 00-01: Sign Cabinet

- 3.3.2 Material: Aluminum, painted to coordinate with school exterior.
- 3.3.3 Provide 1/4 inch thick translucent white polycarbonate sign face with cut-out for LED display panel.
- 3.3.4 Provide 1/2 inch thick clear polycarbonate cover panel over entire face of sign and LED display panel.
- 3.3.5 Face and cover panels to be attached using stainless steel stand-offs to maintain required open area for LED panel cooling.

3.3.6 Text and Graphics:

3.3.6.1 Material: Vinyl film, opaque unless noted otherwise.

3.3.6.2 School Logo: 12 inch x 12 inch, refer to Figure 10 70 00.01 for location.

3.3.6.3 Font: TradeGothic Condensed.

3.3.6.4 Approximate Sizes and Colors:

3.3.6.4.1 School Name: 6 inches, black.

3.3.6.4.2 School Designation (ex: Elementary School): 5 inches, black.

3.3.6.4.3 Dallas ISD wordmark: 4 inches, Pantone 274-Primary Blue, translucent.

3.3.6.5 All text to be centered horizontally within overall sign width.

3.3.6.6 Dallas ISD wordmark to be centered vertically between the bottom of the LED display and the bottom of the sign face panel.

3.4 Structure:

3.4.1 Base structure to match building exterior in color and finish material.

3.4.2 Provide two (2) conduits, one (1) for power and one (1) for fiber optic cable.

3.4.3 Monument Sign: Refer to Figure 10 70 00-02.

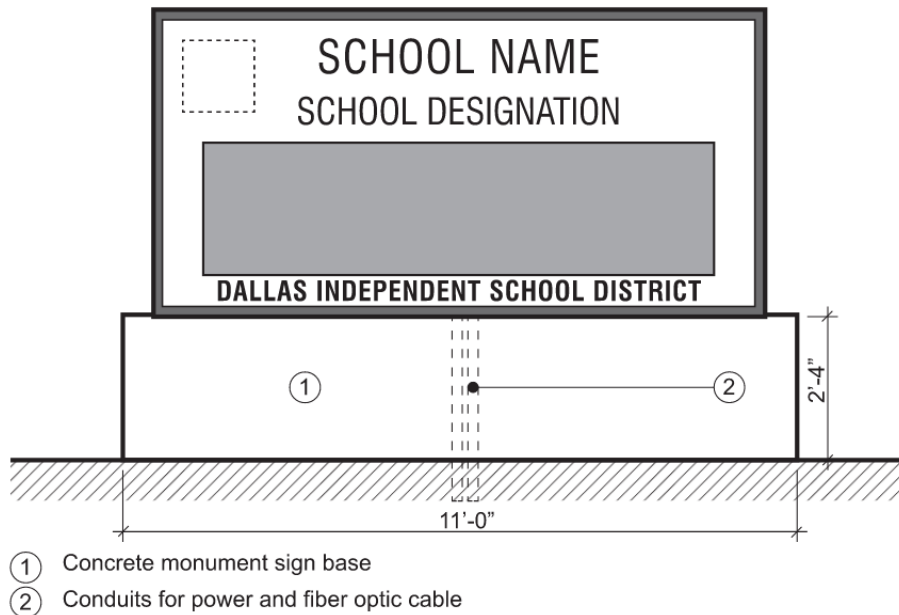


Figure 10 70 00- 02: Schematic Elevation of Ground Monument Signs

3.4.4 Pylon Sign: 12 feet minimum to bottom of sign. Refer to Figure 10 70 00-03.

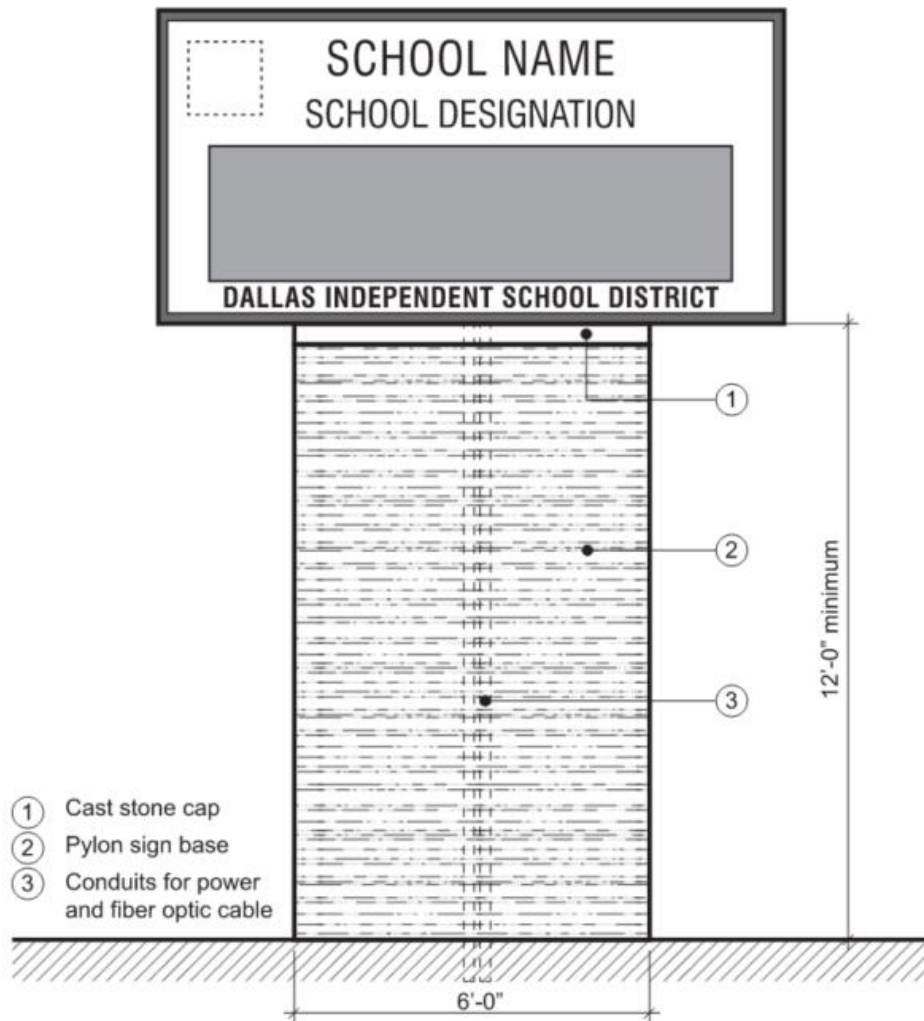


Figure 10 70 00-03: Schematic Elevation of Pylon Signs

3.5 LED Display:

- 3.5.1 Approximate Size: 31 inches x 97 inches (may vary slightly based on resolution/pixel pitch selections). Maintain minimum 4 inch offset between edge of sign face and LED display.
- 3.5.2 Approximate Active Area: 16.3 square feet.
- 3.5.3 Sides: Two (2) sides.
- 3.5.4 Colors: RGB: One (1) red, one (1) green, one (1) blue.
- 3.5.5 Communications: Ethernet bridge radio.
- 3.5.6 Resolution and pixel pitch to be confirmed based on viewing distance/angle.
- 3.5.7 Acceptable Manufacturer/Product: Daktronics GALAXY GS6 or Dallas ISD approved equal.

3.5.8 Warranty:

3.5.8.1 Five (5) year warranty on parts.

3.5.8.2 One (1) year labor and material on non-LED components.

END OF DIVISION 10



Division 11 – Equipment

11 05 00 General Requirements

1. Specify equipment and include installation and demonstration in the Contract Documents.
2. All electrical equipment to have an “energy star” rating.
3. All products to be ADA/TAS compliant and installed to meet code requirements.
4. Refer to Educational Specifications for locations and quantities of equipment.

11 10 00 Vehicle and Pedestrian Equipment

1. Rubber Dock Bumpers:
 - 1.1 Fabric reinforced rubber pads, ozone resistant, laminated, and compressed with connection hardware.
 - 1.1.1 Projection from Wall: 6 inches.
 - 1.1.2 Vertical Height: 10 inches.
 - 1.1.3 Length: 24 inches.
 - 1.2 Attachment Hardware: 3/4 inch diameter galvanized bolts and expansion shields; "L" shaped anchor rods for casting into concrete.

11 20 00 Commercial Equipment

1. Washer/ Dryer, Commercial:
 - 1.1 Locations: Food service and student dining, custodial/laundry, physical education laundry room, culinary labs, career and technical education (CTE), dry cleaning labs, auto shops, and cosmetology.
 - 1.2 Specify commercial-grade equipment.
 - 1.3 Washer: Capacity 50 lb. electric 208 /240 volt.
 - 1.4 Dryer: Capacity 75 lb. gas 150,000 BTU.
 - 1.5 Provide path for installation and removal of equipment from laundry to exterior of building.
 - 1.6 Confirm selected machine is serviceable through 42 inch door width or if double doors will be required.
 - 1.7 Acceptable Manufacturers:
 - 1.7.1 Speed Queen.
 - 1.7.2 Whirlpool.
 - 1.7.3 Maytag.
2. Custodial Equipment:
 - 2.1 Storage:
 - 2.1.1 Provide shelving to allow for tissue and lamp storage.
 - 2.1.2 Allow space for a storage cart 36 inches (W) x 18 inches (D) x 30 inches (H). Dallas ISD provided FF&E scope.

- 2.1.3 Do not locate power transformer in storage room.
 - 2.1.4 Allow space for battery powered equipment. Space to be set up for charging with code compliant ventilation and fireproofing. Space to accommodate up four pieces of equipment, (ex: battery burnishers, auto scrubbers, vacuums).
 - 2.1.5 Review and confirm custodial requirements with Dallas ISD-M&O as requirements may vary.
 - 2.2 Equipment Hooks / Mop Racks:
 - 2.2.1 Wall mounted.
 - 2.2.2 Fabricated heavy duty stainless steel type.
 - 2.2.3 4 spring activated rubber holders per closet.
 - 2.3 Wall Hung Chemical Dispenser: Dallas ISD provided FF&E scope.
 - 2.3.1 Provide space for a 30 inches x 12 inches chemical dispenser.
 - 2.3.2 Coordinate dispenser with Dallas ISD-M&O.
 - 2.4 Mop Sinks: Refer to Division 22 for requirements.
 - 2.5 In buildings that have large, open areas of hard surface flooring such as terrazzo, LVT, or VCT, etc., provide an indoor area, for wet cell battery charging. Battery charging area to have code compliant ventilation, electrical service for 110 and 220 volt charging stations and required fire rating. The size of the charging area to be determined at design review based on building size/design and amount of equipment.
3. Safes: Confirm model and space requirements with Dallas ISD designated representative.

11 30 00 Residential Equipment

- 1. Washer / Dryer, Residential:
 - 1.1 Locations: Special education (SPED), choral uniform storage, dance storage, costume shop, career and technology laundry, career and technology observation room/laundry storage for child development center, family and consumer science labs, culinary labs, automotive shops, cosmetology labs, and fashion design.
 - 1.1.1 Washer, Residential: Minimum 3.0 cubic foot front-load washer with front controls. Finish to be white with a minimum of three wash cycle types.
 - 1.1.2 Dryer, Residential: Minimum 7.0 cubic foot front-load dryer with front controls. Finish to be white.
- 2. Dishwasher, Residential: Minimum five-cycle quiet motor under counter accessible dishwasher.
- 3. Garbage Disposal: 1/2 horse power disposer with stainless steel swivel impellers.
- 4. Microwave, Residential:
 - 4.1 Minimum 1000 watt microwave with finish to be white.
 - 4.2 Provide 20 amp dedicated circuit.
- 5. Cooktop, Residential Electric: 30 inch electric with frontal controls.
- 6. Cooktop, Residential Gas: 30 inch gas with frontal controls.
- 7. Range/Oven: Drop-in 30 inch electric range with minimum 3.7 cubic foot oven and frontal controls.
- 8. Fume Ventilation (Range Hood):
 - 8.1 36 inch hood with variable speed fan control.
 - 8.2 Vented to outside.

- 8.3 Install fire suppression systems if required by the authority having jurisdiction (AHJ).
- 9. Refrigerator/Freezer, Residential:
 - 9.1 Compact: 6 cubic foot refrigerator.
 - 9.2 Standard: Minimum 18 cubic foot top-freezer refrigerator with ice maker.
 - 9.3 Provide lockable refrigerator and ice maker in clinics.
- 10. Acceptable Manufacturers:
 - 10.1 General Electric.
 - 10.2 Hotpoint.
 - 10.3 Maytag.
 - 10.4 LG Electronics.
 - 10.5 Sharp.
 - 10.6 Whirlpool.
 - 10.7 Samsung.

11 40 00 Food Service Equipment

- 1. Dallas ISD designated representative to provide Dallas ISD-Food and Child Nutrition Services (food service) contact for kitchen & dining design and scope.
- 2. Kitchen design consultant/specialist with K-12 experience is to be included in defining scope and developing solutions. Facility to be reviewed for functionality and service for deliveries.
- 3. Architect to review existing conditions and conduct an on-site meeting with Dallas ISD-Food and Child Nutrition Services during the Schematic Design phase to determine scope of work in kitchen area. Design to be reviewed with the local health inspector prior to Construction Document Phase.
- 4. Verify all food service specifications, equipment and sample floor plan requirements with Dallas ISD-Food and Child Nutrition Services.
- 5. Similar equipment to be used in all culinary labs.
- 6. Kitchen Infrastructure:
 - 6.1 Mechanical, Electrical, and Plumbing: Refer to Divisions 22, 23 and 26 for additional requirements.
 - 6.1.1 Architect and Engineers to coordinate both in-contract and owner furnished equipment.
 - 6.1.2 New electrical panels to be located in accessible areas and clearly labeled.
 - 6.1.3 Gas piping for kitchen area to only be exposed below, or behind, equipment and not contained within walls.
 - 6.1.4 Grease Trap:
 - 6.1.4.1 Minimum 1,000 gallon capacity.
 - 6.1.4.2 Exact size to accommodate school population and kitchen capacity.
 - 6.1.4.3 To be chemically treated.
 - 6.1.4.4 Adjacent to service drive accommodating a 60 foot truck.
 - 6.1.4.5 Wheel load for pavement design to be the more stringent of 16,900 pounds or that required by code or the authority having jurisdiction.
 - 6.1.5 Toilet and Hand Sinks:
 - 6.1.5.1 Provide a conveniently located toilet facility with hand washing sink for food service employees.

- 6.1.5.2 Hot and cold water to be provided through a mixing valve or combination faucet to the sinks, except where prohibited by code.
 - 6.1.5.3 Lavatory and hand washing sinks to be equipped to provide water at a temperature of at least 43 degrees Celsius/110 Fahrenheit.
 - 6.1.5.4 Provide ventilation at toilet room.
 - 6.1.5.5 Hand sinks to be provided outside of toilet room and throughout kitchen per health department requirements.
 - 6.1.5.6 Hand sink plumbing to drain to a floor sink. Pipe from sink to not be connected to plumbing lines and to have an air gap per health department requirements.
- 6.2 Miscellaneous Equipment:
- 6.2.1 Vent Hoods:
 - 6.2.1.1 Provide fire dampers in the exhaust duct per code requirements.
 - 6.2.1.2 Provide furr-out around fire rated exhaust duct. Furr-out to extend to underside of floor/roof deck above.
 - 6.2.1.3 Provide for removable filters.
 - 6.2.1.4 Provide for make-up air for hood. Refer to Division 23 for additional requirements.
 - 6.2.2 Ice Machines:
 - 6.2.2.1 Half dice only.
 - 6.2.2.2 Provide full dice, under counter commercial ice machine (70lbs/day) at dance storage area and drill team locker room in middle and high schools in addition to all locations indicated by food service consultant/vendor.
 - 6.2.2.3 Acceptable Manufacturer: Manitowoc or Dallas ISD approved equal.
 - 6.2.2.3.1 Elementary Schools: SY-0454A with B-400 bin, 450lbs/day.
 - 6.2.2.3.2 Middle Schools: SY-0504A with B-570 bin, 450lbs/day.
 - 6.2.2.3.3 High Schools: SY-0604A with B-570 bin, 450lbs/day.
 - 6.2.3 Trash Compactors:
 - 6.2.3.1 Self-contained compactor.
 - 6.2.3.2 Acceptable Manufacturer: Marathon Equipment Company Signature Series RJ-250SC-ET with doghouse option or Dallas ISD approved equal.
 - 6.2.4 Walk-in Freezers and Coolers:
 - 6.2.4.1 Minimum outside dimensions for any walk-in freezer or cooler is 15'-0" x 8'-0" (120 square feet.).
 - 6.2.4.2 Exterior walk-in freezers and coolers to be specified with exterior color(s) to match campus exterior.
 - 6.2.4.3 Freezers and coolers to each have their own entrance.
 - 6.2.4.4 Provide diamond plate stainless steel for the floor of freezers when it is not recessed.
 - 6.2.4.5 Floor area of walk-in freezer to be insulated to meet or exceed the manufactures recommendations. Refer to Division 03 for additional requirements.

7. Serving Lines:
 - 7.1 Provide single line queuing for each serving area whenever possible.
 - 7.2 Provide roll-down security grilles between serving lines and dining.
 - 7.3 Serving lines to be visible from the kitchen staff office.
 - 7.4 Coordinate number of serving lines with the number of students at each lunch period as indicated by food services.
 - 7.5 For new serving counters, locate junction boxes in the floor of the kitchen serving area.
 - 7.6 Coordinate necessary conduit for data lines to new point of sales at serving lines with technology under floor to avoid power pole installation.
 - 7.7 Drainage from hot food counter serving line to be tied under the equipment and routed to adjacent floor drains.
 - 7.8 All service counters to be on 6 inch stainless steel legs, casters are prohibited.

11 50 00 Educational and Scientific Equipment

1. Science Lab Requirements:
 - 1.1 Elementary School Lab:
 - 1.1.1 Google cabinet/sanitizer.
 - 1.1.2 Fire blanket.
 - 1.1.3 Safety showers and eyewashes.
 - 1.1.4 Electrical and Data Outlets: Outlets posted along the wall above the perimeter sink countertops.
 - 1.1.5 Safety solenoid valves.
 - 1.1.6 Fire extinguisher.
 - 1.1.7 One (1) perimeter sink at K-2.
 - 1.1.8 Four (4) perimeter sinks at 3-5.
 - 1.2 Middle School Lab:
 - 1.2.1 Goggle cabinet / sanitizer.
 - 1.2.2 Fire blanket.
 - 1.2.3 Location for mobile fume hood station (8th grade lab only).
 - 1.2.4 Safety showers and eyewashes.
 - 1.2.5 Electrical and Data Outlets: Outlets along the wall above the perimeter sink countertops and six (6) drop down outlets near the perimeter.
 - 1.2.6 Safety solenoid valves.
 - 1.2.7 Fire extinguisher.
 - 1.2.8 Six (6) perimeter sinks.

- 1.3 Middle School Lab Prep Room:
 - 1.3.1 Residential dishwasher.
 - 1.3.2 Two (2) chemical cabinets: Dallas ISD provided FF&E scope.
 - 1.3.2.1 One (1) for corrosives.
 - 1.3.2.2 One (1) for flammable.
 - 1.3.3 Glass drying rack.
 - 1.3.4 Electrical and Data Outlets: Outlets along the wall above the perimeter sink countertops and six (6) drop down outlets near the perimeter.
 - 1.3.5 Residential refrigerator.
 - 1.3.6 Eyewash station.
 - 1.3.7 Sink.
- 1.4 High School Biology/Life Science Lab:
 - 1.4.1 Goggle cabinet / sanitizer.
 - 1.4.2 Safety showers and eyewashes.
 - 1.4.3 Electrical and Data Outlets: Outlets along the wall above the perimeter sink countertops and six (6) drop down outlets near perimeter.
 - 1.4.4 Fire extinguisher.
 - 1.4.5 Fire blanket.
 - 1.4.6 Location for mobile fume hood station.
 - 1.4.7 Six (6) perimeter sinks
- 1.5 High School Biology Lab Prep Room:
 - 1.5.1 Electrical and Data Outlets: Outlets along the wall above the perimeter sink countertops and six (6) drop down outlets near the perimeter.
 - 1.5.2 Glass drying rack.
 - 1.5.3 Sink.
 - 1.5.4 Residential refrigerator.
 - 1.5.5 Residential dishwasher.
 - 1.5.6 Eyewash station.
- 1.6 High School Chemistry/Physical Science Lab:
 - 1.6.1 Goggle cabinet / sanitizer.
 - 1.6.2 Fire blanket.
 - 1.6.3 Built-in fume hoods.
 - 1.6.4 Safety showers and eyewashes.
 - 1.6.5 Electrical and Data Outlets: Outlets along the wall above the perimeter sink countertops and six (6) drop outlets neat the perimeter.
 - 1.6.6 Safety solenoid valves.
 - 1.6.7 Countertops to be a corrosive resistant material.
 - 1.6.8 Six (6) perimeter sinks.

- 1.7 High School Chemistry / Physical Lab Prep Room:
 - 1.7.1 Residential dishwasher.
 - 1.7.2 Two (2) chemical cabinets. Dallas ISD provided FF&E scope.
 - 1.7.2.1 One (1) for corrosives.
 - 1.7.2.2 One (1) for flammable.
 - 1.7.3 Built-in fume hood (one fume hood that opens to both prep room and chemistry classroom/lab is acceptable).
 - 1.7.4 Glass drying rack.
 - 1.7.5 Electrical and Data Outlets: Outlets along the wall above the perimeter sink countertops and six (6) drop down outlets near the perimeter.
 - 1.7.6 Residential refrigerator.
 - 1.7.7 Eyewash station.
 - 1.7.8 Sink.
- 2. Science Equipment:
 - 2.1 Dishwasher (Glassware Washer):
 - 2.1.1 White finish.
 - 2.1.2 Acceptable Manufacturer: Whirlpool WDF510 PAYS or Dallas ISD equal.
 - 2.2 Fume Hood:
 - 2.2.1 High Schools: Built-in required for chemistry labs only. All others can be mobile.
 - 2.2.1.1 Variable-air-volume (VAV) control.
 - 2.2.1.2 Fume hood equipped with an electronic control unit that monitors face velocity and maintains a constant face velocity by controlling air volume.
 - 2.2.1.3 Damper to work with building HVAC system.
 - 2.2.2 Middle Schools:
 - 2.2.2.1 Mobile fume hood station: Diversified Wood Craft Systems model 1800k or Dallas ISD approved equal.
 - 2.2.2.2 Provide space and electrical connections for use and storage in classrooms.
 - 2.3 Goggle Cabinet:
 - 2.3.1 To hold 36 pairs of goggles.
 - 2.3.2 All cabinets to be keyed alike.
 - 2.3.3 To have ultra-violet light.
 - 2.3.4 To have outlet for power.
 - 2.3.5 Acceptable Manufacturer: EISCO Goggle Sanitizing Cabinet- 35 Capacity- Part # GGSN10HB or Dallas ISD approved equal.
 - 2.4 Provide fire blanket cabinet and fire blankets.
 - 2.5 Acid/Chemical Cabinets: Dallas ISD provided FF&E scope.
 - 2.5.1 Provide stackable or base type cabinets based on the programmatic requirements of the labs.

- 2.5.2 Cabinets are to be color coded and labeled “Flammable” or “Corrosive” as required by program.
- 2.6 Glass Drying Rack:
 - 2.6.1 To be wall mounted.
 - 2.6.2 To have 50 black pegs.
 - 2.6.3 Acceptable Manufacturer: Fisher Scientific S-47855 or Dallas ISD approved equal.
- 2.7 Refer to Divisions 22 and 26 for safety solenoid valves, electrical and data outlets, safety showers and eyewashes.
- 3. Robotics/Makers Lab:
 - 3.1 Middle School and High School Lab:
 - 3.1.1 Closet containing two (2) 24 inch deep lockable cabinets. Dallas ISD provided FF&E scope.
 - 3.1.2 Electrical and data outlets – multiple outlets along the perimeter.
 - 3.1.3 Two (2) plastic bin rack shelving with wheels. Dallas ISD provided FF&E scope.
 - 3.1.4 Moveable desk/tables with lockable casters. Dallas ISD provided FF&E scope.
 - 3.1.5 Adjustable height rolling chairs. Dallas ISD provided FF&E scope.
 - 3.1.6 Area for robotics field (14 feet x 14 feet).
 - 3.1.7 Designated charging area with table and access to multiple power outlets.

11 52 00 Audio Visual Equipment

- 1. Projection Screens:
 - 1.1 Design, size & specify a screen that coordinates with size and lighting of room.
 - 1.2 Coordinate projector and screen mounting locations. Projector axis square with screen surface and centered.
 - 1.3 Projection screens to be factory assembled.
 - 1.4 Screen ratio to be 16:9 and sized based on the room or area on which they are installed with a minimum width of 10'-0”.
 - 1.5 Masking Borders: Black, four (4) sides.
 - 1.6 Extra Drops: Provide extra drop at top of screen as required to center viewing area with projector.
 - 1.7 Exposed Screen Cases:
 - 1.7.1 Material: Steel.
 - 1.7.2 Type: Integral roller brackets.
 - 1.7.3 Finish: Baked enamel.
 - 1.7.4 Color: Black in auditorium, white in libraries.
 - 1.7.5 Mounting: Ceiling.
 - 1.8 Scope of work to include installation of the following components:
 - 1.8.1 Mounting brackets, wall or ceiling.
 - 1.8.2 Cage for all wall mounted projectors.
 - 1.8.3 Power for projection screen.

- 1.8.4 Media outlets and media cabling at projector, podium and stage left or right.
 - 1.8.5 Controls wiring.
 - 1.8.6 Sound system wiring and integration with sound system.
 - 1.8.7 Refer to Divisions 26 and 27 for additional requirements.
2. Electrically-Operated Screens:
- 2.1 Horizontal and Vertical Tensioning:
 - 2.1.1 Tab-guided cable system.
 - 2.1.2 Screen fabric weighted at bottom with steel bar with plastic end caps.
 - 2.1.3 Provide mounting hardware, brackets, supports, fasteners, and other mounting accessories required for a complete installation.
 - 2.2 Electrical Components:
 - 2.2.1 Electrical Components: Listed and classified by UL.
 - 2.2.2 Motors: Direct drive, 120 V, 60 Hz.
 - 2.2.3 Screen Motor: Mounted inside roller; three wire with ground; quick reverse type; equipped with thermal overload cut-off.
 - 2.3 Controls: Low voltage switch include with screen and integrated into overall AV control system.
3. Front Projection Screens:
- 3.1 Matte Light Diffusing Fabric: Light diffusing screen fabric; washable, flame retardant and mildew resistant.
 - 3.2 Material: Matte white vinyl on fiberglass backing, with nominal gain of 1.0 over viewing angle not less than 70 degrees from axis, horizontally and vertically.
4. Rear Projection Screens:
- 4.1 Translucent Light Diffusing Vinyl: Light diffusing screen; washable, flame retardant and mildew resistant.
 - 4.2 Material: Neutral Grey vinyl, with nominal gain of 1.0 over viewing angle not less than 40 degrees from axis, horizontally and vertically.
5. Acceptable Manufacturers:
- 5.1 Draper, Inc.
 - 5.2 Da-lite.
6. Projection Screen Setups:
- 6.1 Auditorium (Stage Areas):
 - 6.1.1 Presentation Projection Setup Type:
 - 6.1.1.1 Preference is a large-format long throw front projector mounted on the rear wall of house.
 - 6.1.1.2 Secondary preference is a rear projection system.
 - 6.1.1.3 Screen to mount to the house/downstage side of the proscenium wall above the first ceiling cloud with clear sight-lines from seating.
 - 6.1.1.4 Alternatively, screen may mount to the upstage side of the proscenium opening in facilities that do not require a fire curtain.
 - 6.1.1.5 Screen to be controlled from FOH control booth and back wall of stage right or left.

- 6.1.1.6 Screen control to be integrated into AV control system. Refer to Division 27 for additional requirements.
- 6.1.2 Production Projection Setup Type:
 - 6.1.2.1 Provide projection system suitable for projecting on backdrops, scenery, or architecture in Auditorium.
 - 6.1.2.2 Projection system to include the following at a minimum:
 - 6.1.2.2.1 Two (2) laser projectors (15,000 lumen).
 - 6.1.2.2.2 Temporary projector mounting frames.
 - 6.1.2.2.3 Load rated projector mounting couplers and hardware to attach to over-stage battens.
 - 6.1.2.2.4 Scenery bumpers for rigging battens.
 - 6.1.2.2.5 Controls and image blending head-end via software (ex: Q-lab) or Hardware (ex: TripleHead2Go).
 - 6.1.2.2.6 Cabling and active adapters to translate video signal through HDMI over category cable.
- 6.2 Libraries/Media Centers & Multipurpose Room (Instruction/Seating Area):
 - 6.2.1 Projection Setup Type:
 - 6.2.1.1 Preference is an interactive screen. Dallas ISD provided IT scope.
 - 6.2.1.1.1 Rolling/movable or wall mounted depending on the available space, book shelf arrangement, seating, and workflow.
 - 6.2.1.1.2 Acceptable Manufacturers: Newline Tru Touch, Promethean ActivePanel.
 - 6.2.1.2 Second preference is a front projector ceiling mounted below 12'-0" AFF over an unobstructed, and flat, area to the screen.
 - 6.2.1.3 Third preference is a cart mounted projector Dallas ISD provided IT scope.
 - 6.2.1.4 Coordinate the location of the screen with design of instructional seating area.
 - 6.2.1.5 Install controls for screen and projector near location of screen.

11 60 00 Fine Arts Equipment

- 1. Theatre Equipment:
 - 1.1 Design team to include Acoustician and Theatre Consultant (if approved) in the design process for new facilities and renovations. All equipment to be coordinated and approved by Acoustician and Theatre Consultant (if approved).
 - 1.2 Stage Equipment:
 - 1.2.1 Stage Equipment at Elementary and Middle Schools (Stage Auditorium):
 - 1.2.1.1 Projection Screen(s): Refer to Section 11 52 13.
 - 1.2.1.2 Stage Drapery: Refer to Section 11 61 43.
 - 1.2.1.3 Integrated sound system designed based on the shape and finishes of the room. Provide with alarm signal override. Refer to Division 27.
 - 1.2.1.4 DMX-Controlled Power and Lighting: Refer to Division 26.

- 1.2.2 Middle and High School (Full Production Auditorium):
 - 1.2.2.1 Auditorium Design Considerations: Shape of the space, acoustic material type and location, and sound equipment location to be considered to provide the desired acoustical environment.
 - 1.2.2.2 Projection screen(s). Refer to Section 11 52 13.
 - 1.2.2.3 Stage Drapery: Refer to Section 11 61 43.
 - 1.2.2.4 Stage Rigging. Refer to Section 11 61 33.
 - 1.2.2.5 Install catwalks with sturdy walkway configuration and operationally appropriate handrails above ceiling in auditorium for aiming.
 - 1.2.2.5.1 This applies to stage and house lighting fixtures.
 - 1.2.2.5.2 Provide cutout or gaps in ceiling clouds for theatrical fixtures to light stage.
 - 1.2.2.6 Provide front of house (FOH) control room / position for production systems.
 - 1.2.2.6.1 Allow for proper air flow at lighting and sound system controls.
 - 1.2.2.6.2 Security enclosure to be provided for equipment.
 - 1.2.2.6.3 Provide override of sound system for alarm signal.
 - 1.2.2.6.4 Lighting and sound control boards to have the option of connecting and operating at full capacity from stage rights, stage left, mid-house and control booth.
 - 1.2.2.7 DMX-Controlled Power and Lighting: Refer to Division 26.
- 1.2.3 Middle School and High School (Black Box):
 - 1.2.3.1 Stage Drapery: Refer to Section 11 61 43.
 - 1.2.3.2 DMX-Controlled Power and Lighting: Refer to Division 26.
 - 1.2.3.3 LED profile and wash fixtures for stage illumination (pipe-mounted). Refer to Division 26.
- 1.2.4 Fixed Auditorium Seating: Refer to Division 12.
- 1.3 Scenic Studio Equipment (Middle and High Schools):
 - 1.3.1 Large-format dust collector with ducting and disposal system. Provide acoustic isolation from studio.
 - 1.3.2 Large-format air compressor (Ingersoll Rand minimum 60gal). Provide acoustic isolation from studio. Dallas ISD provided FF&E scope.
 - 1.3.3 Installed Tools (basis of design models indicated): Dallas ISD provided FF&E scope.
 - 1.3.3.1 Industrial cabinet table saw with integrated blade safety system: Saw Stop 52”.
 - 1.3.3.2 Panel saw: Milwaukee 6480-20.
 - 1.3.3.3 Drill press (8 amp, 16 speed): Delta 8-900L.
 - 1.3.3.4 Two (2) double bevel sliding compound miter saws: Dewalt DWS780.
 - 1.3.3.5 Two (2) compound miter stands: Dewalt DWX726.
 - 1.3.3.6 Band saw (14 inch): Delta 28-400, dimensions: 27 inch X 19 inch X 65 1/2 inch.
 - 1.3.3.7 Belt / disc sander: Porter-Cable PCB420SA.

- 1.3.4 Storage and Shelving: Dallas ISD provided FF&E scope.
 - 1.3.4.1 Four (4) pallet racks with wire shelving, 8 foot x 4 foot x 8 foot.
 - 1.3.4.2 Three (3) cantilever racks, 8 foot x 3 foot x 8 foot.
- 1.4 Theatre Costume Studio Equipment (Middle and High Schools): Dallas ISD provided FF&E scope.
 - 1.4.1 Four (4) industrial sewing machines: All metal construction and components.
 - 1.4.2 20 residential sewing machines.
 - 1.4.3 Four (4) industrial sergers.
 - 1.4.4 Ten (10) mannequin dress forms: Various sizes or adjustable, locking casters.
 - 1.4.5 Ten (10) adjustable work tables:
 - 1.4.5.1 Locking casters.
 - 1.4.5.2 Adjustable height legs.
 - 1.4.5.3 Stools (24 students, minimum).
 - 1.4.6 Large Cutting Table: Locking casters.
 - 1.4.7 Rolling Storage Racks: Wenger Rack n' Roll Garment Racks or Dallas ISD approved equal to work in tandem with the metal shelving design.
 - 1.4.8 Industrial, Metal Shelving: Wenger GearBoss shelving or Dallas ISD approved equal measured and designed to fit the square footage of the space.
 - 1.4.9 Adjustable, padded student chairs with backs and locking casters.
- 1.5 Theatre Classroom (Elementary and Middle School Classrooms, and High School Black Box): Dallas ISD provided FF&E scope.
 - 1.5.1 UIL One Act Play Set:
 - 1.5.1.1 High Schools: 32 piece canvas set painted UIL medium gray: Palco Specialties.
 - 1.5.1.2 Middle Schools: 30 piece canvas set painted UIL medium gray: UIL Unit Sets Unlimited.
 - 1.5.1.2.1 Set to include: Six (6) 4x4 platforms, four (4) 1X1 platforms, two (2) 2' steps, two (2) 4' steps, two (2) ramps, two (2) 6' pylons, two (2) 4' pylons, six (6) cubes, two (2) double cubes, and two (2) benches.
 - 1.5.1.3 Elementary School: Wenger black flip forms or Dallas ISD approved equal.
 - 1.5.2 High School Portable UIL Sound Package:
 - 1.5.2.1 System to be centered around a high-performance digital mixing system with remote digital IO. Console to have dedicated touring grade road case, capable of supporting the console while in use.
 - 1.5.2.2 Input sources to include digital wireless microphone system (minimum 6) and an assortment of dynamic and condenser microphones. Wireless system to be mounted in a dedicated touring grade road case. Additional sources include a media player mounted in rack and a peripheral computer.
 - 1.5.2.3 Additional road case to be provided to house cabling and hardware.
 - 1.5.2.4 System to include portable loudspeakers (minimum 2) with collapsible mounts powered by a dedicated amplifier and processor rack. Loudspeakers (minimum 2) will also be provided for on-stage monitoring.

- 1.5.3 High School Portable UIL Lighting Package:
 - 1.5.3.1 LED lighting Instruments: Six (6) each ETC Colorsource Spot Jr and ETC Colorsource Par.
 - 1.5.3.2 Portable light board: ETC ColorSource AV 20.
 - 1.5.3.3 Portable telescoping trees.
- 1.5.4 Black Box Risers and Seating:
 - 1.5.4.1 High Density Portable Audience Chairs: Wenger, or Dallas ISD approved equal, color: black, refer to Division 12 - Furnishings.
 - 1.5.4.2 Portable Risers: Wenger StageTEK or Dallas approved equal audience seating.
- 1.6 Theater Costume Storage Equipment (All Schools): Dallas ISD provided FF&E scope.
 - 1.6.1 Clothing Storage (basis of design models indicated):
 - 1.6.1.1 Two tier dry cleaning racks with control.
 - 1.6.1.2 Industrial, adjustable, multi-tiered, metal shelving with rolling rack inserts: Wenger GearBoss Shelving or Dallas ISD approved equal measured and designed to the square footage of the space with the appropriate amount of Wenger Rack n Roll Garment Racks or Dallas ISD approved equal.
 - 1.6.2 Shoe Storage (basis of design models indicated): Industrial, adjustable, multi-tiered, metal shelving integrated with other storage: Wenger GearBoss Shelving or Dallas ISD approved equal.
- 2. Dance Equipment:
 - 2.1 Barres are floor mounted and will require attachment to the structural floor.
 - 2.2 Coordinate attachment detail with flooring assembly.
 - 2.3 Dance Storage Equipment (All Schools):
 - 2.3.1 Costume Storage: Industrial, adjustable, metal shelving with rolling rack inserts: Wenger GearBoss Shelving or Dallas ISD approved equal measured and designed to the square footage of the space with the appropriate amount of Wenger Rack n Roll Garment Racks or Dallas ISD approved equal. Dallas ISD provided FF&E scope.
 - 2.3.2 Shoe Storage: Industrial, adjustable, multi-tiered, metal shelving integrated with other storage: Wenger GearBoss Shelving or Dallas ISD approved equal. Dallas ISD provided FF&E scope.
 - 2.3.3 Washer and Dryer.
 - 2.3.4 Commercial Ice Machine: Refer to 11 40 00 for requirements.
- 3. Drill Team Locker Room Equipment (Middle and High Schools):
 - 3.1 Locking Storage Cabinets: Wenger UltraStor Storage Cabinets or Dallas ISD approved equal in wood with two (2) adjustable shelves for uniforms. Dallas ISD provided FF&E scope.
 - 3.2 Lockers: Wenger Day-Use Lockers or Dallas ISD approved equal in wood. Dallas ISD provided FF&E scope.
 - 3.3 Washer and dryer.
 - 3.4 Commercial Ice Machine: Refer to 11 40 00 for requirements.
 - 3.5 Large white marker board.

4. Band Room Equipment:
 - 4.1 Instrument Storage Units:
 - 4.1.1 Storage units to be acoustically rated with unique options to fit different instruments contained within the desired program.
 - 4.1.2 3/4 inch composite wood construction.
 - 4.1.3 Cabinet Doors: Acoustically treated cage style doors through-bolted to cabinet wall with heavy duty, five knuckle hinge institutional, ANSI/BHMA A 156.9, Grade 1.
 - 4.1.4 Acoustical Performance: One-third octave band center frequency, Hz for four 27 1/2 inch w x 21 3/4 inch d x 85 5/8 inch h (699x533x2175mm).
 - 4.2 Practice Rooms:
 - 4.2.1 Doors: Full glass door required.
 - 4.2.2 Windows: Dual-pane safety glass insulated by 3 inch sealed air space.
 - 4.2.3 Provide appropriate acoustic properties for multiple students practicing. Minimum 63 NIC rating.
 - 4.2.4 Acceptable Manufacturers: Wenger Corp. or Dallas ISD approved equal.
 - 4.2.5 Warranty: Ten years.
 - 4.3 Instrumental Rehearsal Rooms:
 - 4.3.1 Absorber panels as recommended by Acoustician (if approved).
 - 4.3.2 Convex panels as recommended by Acoustician (if approved).
 - 4.3.3 Quadratic Panels: Effective diffusion of 750Hz to 3300Hz.
 - 4.3.4 Acceptable Manufacturers: Wegner Corp, Melhardt or Dallas ISD approved equal.
 - 4.4 Uniform Storage: Dallas ISD provided FF&E scope.
 - 4.4.1.1 Portable uniform storage capable of securing marching uniform and hat.
 - 4.4.1.2 Acceptable Manufacturers: Wenger Corp GearBoss or Dallas ISD approved equal.
 - 4.5 Instrument Chairs: Dallas ISD provided FF&E scope.
 - 4.5.1 Rated for musical performance.
 - 4.5.2 Music posture design, with seat pan rise of 4-1/4 inch forward of pelvic area that create as though to backrest angle of 97 degrees, 18-1/2 inch height.
 - 4.5.3 Stackable to 18 high with corresponding rack.
 - 4.5.4 Color: Black.
 - 4.5.5 Acceptable Manufacturers: Wenger Corp or Dallas ISD approved equal.
 - 4.6 Instrument Stands: Dallas ISD provided FF&E scope.
 - 4.6.1 Adjustable height (desk lip to floor) from 25 inch to 49 inch (635 to 1245mm).
 - 4.6.2 Polycarbonate desk and base.
 - 4.6.3 Stackable to 20 high with corresponding rack.
 - 4.6.4 Acceptable Manufacturers: Wenger Student Music Stand or Dallas ISD approved equal.

- 4.7 Portable Sound System: Dallas ISD provided FF&E scope.
 - 4.7.1 High School: Minimum 800 watts of power. Five (5) speaker system including minimum 12 inch subwoofer.
 - 4.7.2 Middle School: Minimum 500 watts of power. Two (2) speaker system.
- 4.8 Director Equipment: Dallas ISD provided FF&E scope.
 - 4.8.1 Conductor podium system including specialized music stand for directors to read over-sized scores.
 - 4.8.2 Acceptable Manufacturers: Wenger Corp or Dallas ISD approved equal.
- 4.9 Marching Band Practice Tower (HS Band only):
 - 4.9.1 Height: 12 feet minimum.
 - 4.9.2 Platform size: 10 feet x 5 feet with enclosed basket.
 - 4.9.3 Permanent Installation:
 - 4.9.3.1 Provide engineered foundation & tower design (PE stamped).
 - 4.9.3.2 Tower to be welded to concrete foundation. Bolted connection is not allowed.
 - 4.9.3.3 Specify galvanized or painted finish.
 - 4.9.4 Movable: Dallas ISD provided FF&E scope.
 - 4.9.4.1 Aluminum construction.
 - 4.9.4.2 Transportation wheels.
- 5. Elementary School Music Classroom Equipment: Dallas ISD provided FF&E scope.
 - 5.1 Elementary Music Package: Piano, audio/visual package from Romeo Music or Dallas ISD approved equal.
 - 5.2 Elementary Music Flip Form Risers: Wenger or Dallas ISD approved equal.
 - 5.3 Elementary Music Materials Package: Dallas ISD-Visual and Performing Arts (V&PA) to provide comprehensive list.
- 6. Choir Room Equipment: Dallas ISD provided FF&E scope.
 - 6.1 Seated choral risers (StageTek, 3-tier).
 - 6.2 Standing choral risers for performances.
 - 6.3 Choral riser storage (Deck, Rail Cart).
 - 6.4 Choral music binder folio system.
 - 6.5 Choral music library system.
 - 6.6 Conductor podium system.
 - 6.7 Uniform Storage: Full length units for dresses/robes/tuxedos.
 - 6.8 Acceptable Manufacturers: Wenger Corporation or Dallas ISD approved equal.
 - 6.9 Dallas ISD choral room audio package to include rehearsal piano and practice room pianos: Romeo Music Dallas ISD Package.

7. Art Kiln:
 - 7.1.1 Acceptable Kiln Manufacturers:
 - 7.1.1.1 Elementary and Middle Schools: Dragon 24, by Paragon Industries. No substitution allowed.
 - 7.1.1.2 High Schools: Super Dragon, by Paragon Industries. No substitution allowed.
 - 7.1.1.3 Architect to include following requirement at a minimum in the Contract Documents: Refer to RFP awarded kiln equipment vendors list for approved vendor.
 - 7.1.2 Kiln to be located near exterior wall for venting with minimum distance from wall of 18 inches.
 - 7.1.3 Include support stand without casters, instruction manual, etc.
 - 7.1.4 Provide positive pressure venting mechanism (Orton Vent Master) that mounts to Dragon 24 and Super Dragon cabinet.
 - 7.1.5 Confirm venting system meets kiln manufacturer requirements.
 - 7.1.6 Refer to Division 26 for disconnect requirements.
8. Art Room Equipment: Dallas ISD provided FF&E scope.
 - 8.1 Drying Racks:
 - 8.1.1 Elementary Schools: Provide two (2) table top models.
 - 8.1.2 Middle Schools and High Schools: Provide one (1) table top model and one (1) floor model.
 - 8.2 Slab Rollers:
 - 8.2.1 Middle Schools: Provide one (1) table top model.
 - 8.2.2 High Schools: Provide one (1) floor model.
 - 8.3 Pottery Wheels and Seats:
 - 8.3.1 Provide three (3) at middle and high school ceramic labs.
 - 8.3.2 Acceptable Manufacturers: Laguna or Dallas ISD approved equal.
 - 8.4 Clay Extruder: Wall mount and die kit, for high school ceramic labs only.
 - 8.5 Stainless Steel Pug Mill:
 - 8.5.1 Provide at high school ceramic lab only.
 - 8.5.2 Acceptable Manufacturers: Shimpo or Dallas ISD approved equal.
 - 8.6 Ceramic Drying Cabinet:
 - 8.6.1 Material: Steel mesh.
 - 8.6.2 Size: 36 inches wide x 84 inches high.
 - 8.6.3 Provide two (2) for high school and one (1) for elementary and middle schools.
 - 8.6.4 Acceptable Manufacturers: Debcor or Dallas ISD approved equal.
 - 8.7 Ceramic Damp Proof Cabinet:
 - 8.7.1 Material: Steel double-walled, sealed doors to keep clay moist.
 - 8.7.2 Provide one (1) large 36 inch wide x 84 inch high for all schools.
 - 8.7.3 Acceptable Manufacturers: Debcor or Dallas ISD approved equal.

- 8.8 Ware Cart:
 - 8.8.1 Provide with wooden shelves and casters and optional plastic cover.
 - 8.8.2 Provide one (1) 72 3/4 inch high, 35 inch wide and 24 inch deep for all schools.
 - 8.8.3 Acceptable Manufacturers: Brent EX or Dallas ISD approved equal.
- 8.9 Paper Cutter: Dallas ISD provided FF&E scope.
 - 8.9.1 Wooden with steel blade, finger guard and latch locks.
 - 8.9.2 Elementary Schools: Provide one (1) 24 inch cutter for each art room.
 - 8.9.3 Middle Schools and High Schools: Provide one (1) 30 inch cutter for each art room.
 - 8.9.4 Acceptable manufacturers: X-ACTO or Dallas ISD approved equal.
- 8.10 Mat Cutter:
 - 8.10.1 Board-mounted, bevel-cut edge and trimmer.
 - 8.10.2 Size:
 - 8.10.2.1 Elementary Schools: 32 inches.
 - 8.10.2.2 Middle Schools and High Schools: 40 inches.
 - 8.10.3 Provide one (1) at all schools.
 - 8.10.4 Acceptable Manufacturers:
 - 8.10.4.1 Elementary Schools: Logan Elite 350-1 Compact or Dallas ISD approved equal
 - 8.10.4.2 Middle Schools and High Schools: Logan Simplex Elite 750-1 or Dallas ISD approved equal.
- 8.11 Table top Easels:
 - 8.11.1 Size: 17 inch high × 17½ inch wide × 13 inch deep.
 - 8.11.2 Provide 16 for each school.
 - 8.11.3 Color: Black.
- 8.12 Portable Display Panels:
 - 8.12.1 Material: Tackable fabric finish.
 - 8.12.2 Size: 6'-5" high.
 - 8.12.3 Provide 12 panels.
 - 8.12.4 Color: Charcoal or black.
 - 8.12.5 Acceptable Manufacturers: Screenflex Display Tower, ProPanels or Dallas ISD approved equal.
- 8.13 Printing Press (High Schools Only):
 - 8.13.1 Provide one (1).
 - 8.13.2 Acceptable Manufacturer: Jack Richeson Medium or Dallas ISD approved equal.

11 61 33 Rigging Systems and Control

1. Architect shall engage the services of an ASTC theatrical consultant.
2. Hoist Systems:
 - 2.1 All hoist and control system to provide load profiling, slack line detection and overload protection.
 - 2.1.1 Load Profiling: System can learn weight of static and dynamic loads.
 - 2.1.2 Slack Line Detection: if a batten should get hung up going up or down, system will stop, allowing user to clear obstruction.
 - 2.1.3 Overload Protection: if weight capacity of hoist is exceeded, hoist will stop and not allow movement until excess weight is removed.
 - 2.2 Hoist systems, unless specifically called out, not to impose any lateral loads on the building structure.
 - 2.3 Hoists systems, unless specifically called out, to have the ability to isolate the lift lines to the pipe batten separate from the rigging support steel.
 - 2.4 Hoist systems to be fed either 480V or 208V from a single three phase breaker. Hoist systems that require remote starter panel enclosures are not allowed.
 - 2.4.1 All controls to maintain a log of all operations of the hoist. It monitors all safety features and provides a printed record for safety and maintenance purposes.
 - 2.5 Rigging Equipment for Cafetorium Stage in Elementary and Middle Schools:
 - 2.5.1 Provide hoisted linesets to support theatrical lighting equipment located in front of stage.
 - 2.5.2 Provide hoist control with remote to allow operator line-of-sight of linesets in motion.
 - 2.6 All hoists to be tested full loading before leaving factory. Verification of testing prior to shipment to be available upon request.
3. Linesets (minimum load criteria):
 - 3.1 Utility and Drapery Hoists: 1000 lb. minimum capacity; variable speed hoists.
 - 3.2 Stage Electrics and Shell Ceilings: 2000 lb. minimum capacity; fixed speed hoists.
4. Controls:
 - 4.1 Provide full-color touchscreen with joy-stick and push-button controls suitable for controlling variable and fixed-speed motors.
 - 4.2 Controller to control a maximum of four (4) motors at any time.
 - 4.3 Controller to be able to record and reproduce presets and cues for speed and position to within 1/4 inch.
 - 4.4 Acceptable Manufacturer/Product: ETC Foundation or Dallas ISD approved equal with remote e-stops and pendant.
5. Miscellaneous Rigging Equipment:
 - 5.1 Provide hardware rated by the manufacturer for the intended purpose to serve all linesets, dead-hung rigging, and overhead equipment.
 - 5.2 Provide all necessary supplemental strut or steel for supporting rigging loads, equipment, and accessories.
6. Cable management system to be UL listed.

7. Basis of design manufacturer is Electronic Theatre Controls (ETC).
 - 7.1 Any manufacturer to meet the following minimum criteria to be considered as a substitute:
 - 7.1.1 Provide phone support free of charge 365 days a year, 24 hours a day
 - 7.1.2 Continue to support and repair products after discontinued from manufacturing. When possible, provide loaner equipment if repair is needed.
 - 7.1.3 Provide service technicians factory-trained and authorized in the state of Texas.
 - 7.1.4 Manufacture all products in the USA. Quality control to be on site and lead time of standard products to be minimal.
 - 7.1.5 Three (3) year limited warranty on parts and workmanship on condition of annual inspection by manufacturers' certified personnel.
 - 7.1.6 One day of rigging controller training by an authorized factory engineer.

11 61 43 Stage Drapery

1. New Construction:
 - 1.1 Include the following drapery types:
 - 1.1.1 Elementary Schools (platform layout):
 - 1.1.1.1 Main Drape: Traveler (bi-parting).
 - 1.1.1.2 Valance: Color matched to main drape.
 - 1.1.1.3 Borders: As needed to mask stage electronics and rigging hardware.
 - 1.1.1.4 Masking Legs: Mounted to walk-along tracks.
 - 1.1.1.5 Mid-stage traveler.
 - 1.1.1.6 Upstage traveler.
 - 1.1.1.7 Rear Cyclorama: Mounted on walk-along track with tensioning.
 - 1.1.1.8 Side Masking Tab Curtains: Mounted on walk-along tracks.
 - 1.1.1.9 Both side cycloramas.
 - 1.1.2 Middle Schools and High Schools (auditorium layout):
 - 1.1.2.1 Main Drape Traveler: Color as selected by Dallas ISD-Fine Arts.
 - 1.1.2.2 Valance: Color matched to main drape.
 - 1.1.2.3 Borders: As needed to mask stage electronics and rigging hardware.
 - 1.1.2.4 Masking Legs: Mounted to walk-along tracks.
 - 1.1.2.5 Mid-stage traveler.
 - 1.1.2.6 Upstage traveler.
 - 1.1.2.7 Rear cyclorama.
 - 1.1.2.8 Side Masking Tab Curtains: Mounted on walk-along tracks.
 - 1.1.2.9 Both side cycloramas.
 - 1.2 Sizes to be based on actual site/design condition.
 - 1.3 Middle School and High Schools (black box): Masking legs set 3'-0" off from each perimeter wall.
2. Architect to assess stage curtains during STB process. Establish scope for protection, removal and storage, cleaning or replacement.

3. Provide inherently flame retardant, synthetic velour with minimum 50% added fullness, and minimum 25oz weight (21oz weight allowed at side masking tab curtains only). Sew tag listing fabric material used, size, location and all local, state, and federal flame resistant codes.
4. Fabrication Standards:
 - 4.1 Sewn fabrics with box pleats to 3-1/2 inch w heavy-duty upholstery jute webbing.
 - 4.2 Pleats spaced at 12 inches on center.
 - 4.3 Thread used in pleat panel work to be color matched to cloth.
 - 4.4 Curtains for Traveler Track: Equip each pleat with 2 inch plated harness snap-hook.
 - 4.5 Curtains for Pipe Batton: Equip each pleat with 30 inch long #4 braided nylon tie-line through number two or larger grommet. Each to be spaced at 12 inches on center, located in the box pleats at the wedding.
 - 4.6 Bottom Hems: 5 inch hems with separate canvas pocket at 1-1/2 inch minimum above bottom of hem. Canvas pocket to be loaded with number six galvanized pump chain, secured to prevent bunching and shifting within pocket.
 - 4.7 Minimum fullness in 150%.
5. Provide support hardware and tracks as required in specific masking layout or as described above.
6. Structure to be designed to support all rigging hardware and drapes.
7. Architect to indicate the following at a minimum in the contract documents:
 - 7.1 Installation and service of all aspects of stage equipment are to be provided by a single vendor/supplier/installer.
 - 7.1.1 This requirement includes but is not limited to the following:
 - 7.1.1.1 Rigging.
 - 7.1.1.2 Curtains.
 - 7.1.1.3 Tracks.
 - 7.1.1.4 Motors and controls.
 - 7.1.1.5 Stage lighting fixtures.
 - 7.1.1.6 Miscellaneous equipment.
 - 7.2 Potential Suppliers/Installers:
 - 7.2.1 Texas Scenic Co.
 - 7.2.2 J.R. Clancy.
 - 7.2.3 H & H Specialty.

11 61 53 Tension Wire Grid System

1. System to be provided in middle and high school black box theatres.
2. Design and provide a system of tension grid panels manufactured from structural steel shapes and 1/8 inch diameter wire rope.
3. Tension wire grid shall extend rom wall to wall.
4. System to be accessible by stairs or ladder from floor level.
5. Panels to provide walkable access for personnel above the stage and be transparent to theatrical lighting effects projected through.

6. Panels to be suspended from overhead structure on suitable hangers as located on the drawings with all associated hardware necessary to support the system.
7. Provide a pipe railing system to be installed above the tension grid to protect unguarded openings and to support wiring devices and portable lighting fixtures.
8. All lighting battens to be constructed of 1-1/4 inch piping supported from structure above and to be diagonally braced. Provide portable pipe battens to suspend stage lighting fixtures.
 - 8.1 All pipe battens to be constructed of 1-1/2 inch Schedule 40 steel pipe supported from structures above.
 - 8.2 Pipe batten vertical supports spacing not to exceed 10'-0" on center.

11 65 00 Athletic and Recreational Equipment

1. Gymnasium Equipment and Requirements:
 - 1.1 Provide equipment room & storage with adequate space for volleyball, girls'/boys' basketball equipment.
 - 1.2 Provide impact protection for all devices and fixtures in the gymnasium, including clocks, lights, and sprinkler heads.
 - 1.3 Wall mats to be coordinated with bleacher and gymnasium layout.
 - 1.4 Gym Seating (Middle Schools and High Schools): Refer to Division 12.
 - 1.5 Sound System in Gymnasiums: Refer to Division 27.
 - 1.6 Gymnasium Equipment:
 - 1.6.1 Gymnasium Equipment (Elementary Schools):
 - 1.6.1.1 Basketball Equipment:
 - 1.6.1.1.1 Provide a set of safety glass backboards with adjustable height feature - for full court play, with non-retractable overhead supports.
 - 1.6.1.1.2 Provide two additional sets of fiberglass backboards for half court play - equip these backboards with manual operative lifting ratchet, with stationary wall mounted supports.
 - 1.6.1.1.3 Install 16 linear feet of wall pads behind goals at each end of gym for full court play.
 - 1.6.1.2 Four Square Courts:
 - 1.6.1.2.1 Provide four (4) total, one (1) on each corner of the court.
 - 1.6.1.2.2 Dimensions: Large square (10 feet x 10 feet) divided into four (4) smaller squares (5 feet x 5 feet).
 - 1.6.1.3 Bowling Lanes:
 - 1.6.1.3.1 Provide eight (8) total, four (4) on each side of gymnasium.
 - 1.6.1.3.2 Markings for pins to be located on both sides of each basketball goal.
 - 1.6.2 Gymnasium Equipment (Middle Schools and High Schools – Auxiliary Gym):
 - 1.6.2.1 Basketball Equipment:
 - 1.6.2.1.1 Provide a set of safety glass backboards with adjustable height feature - for full court play, with non-retractable overhead supports.

- 1.6.2.1.2 Provide two additional sets of fiberglass backboards for half court play - equip these backboards with manual operative lifting ratchet, with stationary wall mounted supports.
- 1.6.2.1.3 Provide free standing 12 foot length scorers tables. Dallas ISD provided FF&E scope.
 - 1.6.2.1.3.1 Acceptable Manufacturers/Products: BSN Sports #1297717 or Dallas ISD approved equal.
 - 1.6.2.1.3.2 Provide with optional padded possession indicator with bonus, BSN Sports #1397720 or Dallas ISD approved equal.
- 1.6.2.1.4 Provide floor connections to meet electrical requirements of equipment.
- 1.6.2.1.5 Install 16 linear feet of wall pads behind goals at each end of gym for full court play.
- 1.6.2.2 Volleyball Equipment: Provide one (1) to three (3) sets of volleyball standards, pads, nets, anchors, antennae, official's stand and safety pads.
- 1.6.2.3 Scoreboards:
 - 1.6.2.3.1 Provide two (2) wall-mounted scoreboards (6 feet x 10 feet x 6 inches), to include operator's board.
 - 1.6.2.3.2 Acceptable Manufacturers/Products: Daktronics BB-2107 or Dallas ISD approved equal.
- 1.6.3 Gymnasium Equipment (Middle Schools and High Schools – Competition Gym):
 - 1.6.3.1 Basketball Equipment:
 - 1.6.3.1.1 Three sets (one primary set and 2 practice sets) of safety glass backboards with adjustable height feature - for full court play, with retractable overhead supports.
 - 1.6.3.1.2 Two Scoreboards, to include All Sport Pro software and operator's board.
 - 1.6.3.1.3 One gym divider.
 - 1.6.3.1.4 Two sets of floor connections for scoreboards.
 - 1.6.3.2 Volleyball Equipment: Provide two (2) to five (5) sets of volleyball standards, pads, nets, anchors, antennae, official's stand and safety pads.
- 1.7 All equipment to comply with NFHS: The National Federation of State High School Associations (NFHS) requirements and standards.
- 2. Basketball Equipment:
 - 2.1 Basketball Systems:
 - 2.1.1 Basketball System: Ceiling suspended retractable.
 - 2.1.1.1 Capable of mounting both rectangular and fan shaped backboards, with safety pads.
 - 2.1.1.2 Framing: Center strut; backward folding framing.
 - 2.1.1.3 Folding Control System: Electric hoist; folds backstop with 115 volt actuator; integral limit switches provide automatic shut-off in both positions; provide safety catch with automatic reset.
 - 2.1.1.4 Key operated, group in gang plate where possible.
 - 2.1.1.5 Framing Color: Manufacturer's standard.

- 2.1.2 Basketball System: Ceiling suspended stationary.
 - 2.1.2.1 Capable of mounting both rectangular and fan shaped backboards, with safety pads.
 - 2.1.2.2 Framing: Center strut; stationary supported form roof structure.
 - 2.1.2.3 Framing Color: Manufacturer's standard.
- 2.1.3 Basketball System: Wall supported backstop assemblies.
 - 2.1.3.1 Capable of mounting both rectangular and fan shaped backboards, with safety pads.
 - 2.1.3.2 Framing: Wall mounted stationary struts / frame.
 - 2.1.3.3 Provide 2x8 wood blocking attached to the wall at each connection point to spread out load to a minimum of three anchors for each connection points.
 - 2.1.3.4 Install two safety cables to point high on the wall or to the structure above.
 - 2.1.3.5 Framing Color: Manufacturer's standard.
- 2.2 Backboards:
 - 2.2.1 Ceiling-retractable backboards are preferred.
 - 2.2.2 Structural support and safety straps for backboards are required.
 - 2.2.3 Provide support bar and mats on walls adjacent to basketball backboards.
 - 2.2.4 Interior Backboards: Tempered glass, rectangular shaped.
 - 2.2.4.1.1 Frame: Unitized steel frame.
 - 2.2.4.1.2 Dimensions: 42 inches x 66 inches
 - 2.2.4.1.3 Thickness: 2-5/16 inches.
 - 2.2.4.1.4 Markings: Painted.
 - 2.2.4.1.5 Height Control System: Electric hoist; folds backstop with 115 volt actuator; integral limit switches provide automatic shut-off in both positions. Hoist to extend to position close to horizontal. Coordinate with stands and HVAC infrastructure.
 - 2.2.4.1.6 Provide bolt on safety padding for bottom edge and sides of backboard.
 - 2.2.4.1.7 Color: Manufacturer's standard.
 - 2.2.4.1.8 Vertical Height Adjuster: To raise/lower assembly by 2 feet to adjust goal height. Use where applicable. Refer above.
 - 2.2.5 Interior Backboards: Fiberglass, fan shaped.
 - 2.2.5.1 Mounting: Steel plate.
 - 2.2.5.2 Dimensions: 39 inches x 54 inches.
 - 2.2.5.3 Markings: Painted.
 - 2.2.5.4 Vertical Height Adjuster: To raise/lower assembly by 2 feet to adjust goal height.
 - 2.2.5.5 Color: Manufacturer's standard.
 - 2.2.6 Exterior Backboards: Aluminum, fan shaped.
 - 2.2.6.1 Mounting: Steel plate.
 - 2.2.6.2 Dimensions: 39 inches x 54 inches.

- 2.2.6.3 Markings: Painted.
- 2.2.6.4 Color: Manufacturer's standard.
- 2.3 Goals:
 - 2.3.1 Interior Goals: Steel rim, mounted to backboard, with attached nylon anti-whip net.
 - 2.3.1.1 Net Attachment Device: Tube-tie.
 - 2.3.1.2 Finish: Powder coat orange.
 - 2.3.1.3 Rims to be movable spring action.
 - 2.3.2 Exterior Goals: Steel rim, mounted to backboard, with attached chain net.
 - 2.3.2.1 Net Attachment Device: Tube-tie.
 - 2.3.2.2 Finish: Powder coat orange.
 - 2.3.2.3 Rims to be movable spring action.
- 2.4 Acceptable Manufacturers: Porter, Draper, AALCO Athletic.
- 3. Volleyball Equipment: Dallas ISD provided FF&E scope.
 - 3.1 Volleyball Systems:
 - 3.1.1 Post Standards:
 - 3.1.1.1 Removable, paired volleyball post, adjustable, telescoping height.
 - 3.1.1.2 Extruded-aluminum pipe, with non-marking plastic end cap or floor bumper.
 - 3.1.1.3 Finished with manufacturer's standard factory applied, baked powder-coating.
 - 3.1.1.4 Net height adjuster: sliding collar and lock.
 - 3.1.1.5 Nominal pipe or tubing diameter: 3-1/2-inch (89-mm) O.D. at base.
 - 3.1.1.6 Permanently placed floor insert supports.
 - 3.1.2 Net:
 - 3.1.2.1 32 feet long.
 - 3.1.2.2 36 inches wide with 4-1/2 inch square mesh made of black polyester string.
 - 3.1.2.3 Hem Band Edges: White.
 - 3.1.2.4 Dowels: Not less than 1/2 inch diameter fiberglass. Provide two dowels per net threaded at side edges.
 - 3.1.2.5 Net Antennas: According to competition rules, provide two antennas per net.
 - 3.1.2.6 Boundary Tape Markers: provide two tape markers per net for marking court boundaries.
 - 3.1.3 Net Tensioning System: Fully enclosed, nonslip manufacturer's standard-type.
 - 3.1.4 Bottom net lock tightener.
 - 3.1.5 Acceptable Manufacturers: Senoh System or Dallas ISD approved equal.
 - 3.2 Judges' Stands:
 - 3.2.1 Provide manufacturer's standard units designed to be freestanding.
 - 3.2.2 Folding for storage with wheels for transporting. Fabricate units of welded steel tubing with finish and color to match post standards.

- 3.3 Safety Pads:
 - 3.3.1 Comply with NCAA and NFHS requirements.
 - 3.3.2 Provide pads that are at least 1-inch thick, multiple-impact-resistant foam filler covered by puncture and tear-resistant fabric cover.
 - 3.3.3 Provide pads with hook-and-loop closure or attachments for the following components:
 - 3.3.3.1 Post Standards to a height of not less than 66 inches.
 - 3.3.3.2 Net Lines: Four (4) per net.
 - 3.3.3.3 Judges' stands: designed to totally enclose each unit.
- 3.4 Accessories:
 - 3.4.1 Post Standard Transporter: Manufacturer's standard wheeled unit.
 - 3.4.2 Storage Cart: Manufacturer's standard wheeled unit designed for transporting and storing volleyball equipment.
 - 3.4.3 Latch Cover: Brass, round; swivel hinge; tamper resistant lock with key.
- 3.5 Floor Anchors:
 - 3.5.1 Volleyball post anchors to be embedded into concrete slab beneath gym floor. Install during slab pour. Avoid drilling.
 - 3.5.2 Provide three (3) sets of anchors, one (1) at main court and two (2) at side courts.
 - 3.5.3 Floor Sleeves for Posts: Metal sleeve, with latch cover, cast into concrete subfloor to hold poles for nets and goals: Install flush with finish floor surface.
 - 3.5.4 Floor Anchors for Portable Gymnasium Equipment: Steel plate bolted into wood flooring, with center screw-down button for securing tensioned elements. Install flush with finish floor surface.
- 3.6 Acceptable manufacturers:
 - 3.6.1 Porter.
 - 3.6.2 Draper.
 - 3.6.3 AALCO Athletic.
 - 3.6.4 Senoh.
 - 3.6.5 BSN.
 - 3.6.6 Daktronics.
 - 3.6.7 Promaxima.
- 4. Wrestling: Dallas ISD provided FF&E scope.
 - 4.1.1 Avoid the use of mat hoists. Provide adequate space in storage for minimum of two three piece competition wrestling mats.
 - 4.1.2 Competition Mat with Custom Logo:
 - 4.1.2.1 7-piece Velcro with flex connection.
 - 4.1.2.2 42 feet x 42 feet x 1 5/8 inch thick.
 - 4.1.2.3 10 foot and 30 foot circle with start marks.
 - 4.1.2.4 Logo in center and school name on side.

- 4.1.3 Practice Mat for Wrestling Room:
 - 4.1.3.1 Purchase to fit wrestling room (room sizes vary).
 - 4.1.3.2 Recommended Size: 36 feet x 36 feet with 4 foot-6 foot center circle.
- 4.1.4 Roller carts for storage.
- 4.1.5 Storage bags for set of seven (7) mats.
- 4.1.6 Red/green carpet set for corner.
- 5. Football:
 - 5.1.1 Goal Posts: 8 foot gooseneck floor mounted goal post with 6 5/8" diameter support post installed in ground based on manufacturer's recommendation.
 - 5.1.2 Pads: 6 feet tall 5 inches thick vinyl covered pads on each post.
 - 5.1.3 Pylons: Provide set of weighted pylons.
- 6. Soccer:
 - 6.1.1 Goals: Portable, aluminum 8 feet x 24 feet competition size goal and nets. Goals to fit under gooseneck football goals.
 - 6.1.2 Flags (Dallas ISD provided FF&E scope) & Inserts: Provide a set of soccer flags and in-ground insert sleeves. Sleeves to be anchored in concrete below grade.
- 7. Baseball / Softball:
 - 7.1.1 Foul Poles: 30 foot ground mounted foul poles.
 - 7.1.2 Fencing: Fencing to conform to NFHS standards and install 4 inch diameter corrugated fence toppers on all fencing around the perimeter of the field.
 - 7.1.3 Provide and install anchoring systems for bases, home and pitcher plates.
 - 7.1.4 Brick/concrete back stop with safety netting.
 - 7.1.5 Windscreen for first and third base fencing.
 - 7.1.6 Metal outfield wall with distance markers.
- 8. Gymnasium Scoreboards:
 - 8.1.1 Interior, multi-purpose basketball/volleyball/wrestling electronic scoreboard with dual integral horns, LED displays for time, scores, period, bonus, double bonus, and next possession arrows.
 - 8.1.2 Auxiliary Gymnasium: Two (2) wall-mounted scoreboards (6 feet x 10 feet x 6 inches), to include operators board.
 - 8.1.3 Competition Gymnasium: Two (2) scoreboards, to include software and operator's board).

Operator Board Requirement	
Line/Column Spacing:	0.234" (5.9 mm)
Pixel Configuration:	RGB 3-in-1 SMD
Module Configuration:	42 x 42 pixels
Module Dimensions (HxW):	9.84" x 9.84" (250 mm x 250 mm)

Operator Board Requirement

Display Power:	Varies by display size (see chart on page 2)
Display Weight:	Varies by display size (see chart on page 2)
Processing:	22 bit distributed
Color Capacity:	16 bit (281 trillion colors)
Dimming:	256 levels
Calibration:	Full depth, LED to LED
LED Refresh Rate:	3840 Hz
LED Lifetime:	100,000 hours
Brightness:	1400 nits (cd/m2)
Viewing Angles:	140° horizontal, +60°/-80° vertical
Service Access:	Front
Cabinet Depth:	6.0625" (154 mm)
Cabinet Construction:	Aluminum and Steel
Temperature Rating:	-40° to 95° Fahrenheit (-40° to 35° Celsius)
Communication:	Fiber Optic (50/125 µm multi-mode)

8.1.4 Power requirement: 126 Watts, MAX, 100-240 Volts AC; two sets of electrical/floor connections in each gymnasium.

8.1.5 Mounting height depends on height of gymnasium, however bottom of scoreboard should be installed at 10'-0".

8.1.6 Acceptable Manufacturers:

8.1.6.1 Daktronics BB 2107 (preferred).

8.1.6.2 BSN.

8.1.6.3 Nevco, Model 2700.

8.1.6.4 Electro-Mech.

8.1.6.5 Fair Play.

9. Dividing Curtain:

9.1.1 Electrically operated.

9.1.2 Upper Curtain, Mesh: Woven fabric of 100 percent polyester yarn coated with PVC.

9.1.3 Lower Curtain, Solid: Woven polyester coated with PVC.

9.1.4 Curtain Fabrication:

- 9.1.4.1 Fused seams.
- 9.1.4.2 Top Hem: Reinforced with double thickness mesh for continuous pipe batten.
- 9.1.4.3 Bottom Hem for Roll-up Curtains: Floor-length curtains with hems above finished floor and with standard 4-inch roll-up tube and lifting tape.
- 9.1.5 Divider Curtain Operator: Roll-up drive tube.
- 9.1.6 Divider Curtain Electric Operator: Provide operating machine of size and capacity recommended by manufacturer.
 - 9.1.6.1 Remote-Control Station: Key operated.
- 10. Cushion Wall Pads:
 - 10.1 2 foot x 6 foot, 2 inch thick vinyl clad polyurethane foam wall safety pads including corner pads.
 - 10.2 Provide with custom school logo.
 - 10.3 Acceptable Manufacturers: Bison or Dallas ISD approved equal.
- 11. Equipment Storage:
 - 11.1 Storage Room: Provide modular steel storage shelving in 50% of the room for storage of smaller items. Leave the remainder of room for wrestling mats and volleyball equipment carts.
 - 11.2 Outdoor Storage:
 - 11.2.1 Larger equipment (baseball, softball, football, soccer, track & field).
 - 11.2.2 Maintenance equipment, medical cart and equipment.
 - 11.3 Specialized education equipment.

11 68 00 Play Field Equipment and Structures

- 1. Play Structure: Provide at Elementary Schools and facilities with child care as directed by Dallas ISD designated representative. Design: GameTime and PlayWorld.
 - 1.1 Architect to meet with the school principal to select the following during the Design Development phase:
 - 1.1.1 Colors: Each school to select from the three color combinations below:
 - 1.1.1.1 Tan post, blue deck, green plastic.
 - 1.1.1.2 Black post, blue deck, blue plastic with white accents.
 - 1.1.1.3 Blue post, blue deck, yellow plastic with green accents.
 - 1.1.2 Type: Each school to select from the equipment types for the age group (s) identified in the project scope.
 - 1.1.2.1 Two-Five Year Old Play Areas:
 - 1.1.2.1.1 Include border and pre-engineered wood fiber.
 - 1.1.2.1.2 Option 1 (GameTime):

Two-Five Year Old Play Area Option 1 (GameTime)			
No.	Part No.	Description	Quantity
1	4854	Accessible Playcurb	1
2	4860	12"Playcurb Package	23
3	7099	Soft Step	2
4	12023	3 1/2" Upright Assembly Alum 8'	3
5	12024	3 1/2" Upright Assembly Alum 9'	1
6	12025	3 1/2" Upright Assembly Alum 10'	6
7	12201	Chin Bar 1 Place	1
8	12671	Interactive Panel (shapes)	1
9	13547	Horiz Loop Ladder, 36" Dk	1
10	18200	36" Sq Punched Deck P/T 1.3125	2
11	19004	Transfer System w/Barrier (1' Rise)	1
12	19028	Rung Access Ladder (3' & 4')	1
13	19035	Optional Access Step (3' & 5')	1
14	19107	Clover Leaf Climber (4' & 4'-6")	1
15	19123	Straight Zip Slide (4')	1
16	19232	Loop Ladder (3'-6" & 4')	1
17	19285	Transfer Platform w/ Guardrail 3'	1
18	G12023	3 1/2" Upright Assembly Galv 8'	1
19	G12024	3 1/2" Upright Assembly 9'	1

1.1.2.1.3 Option 2 (PlayWorld):

Two-Five Year Old Play Area Option 2 (Play World)			
No.	Part No.	Description	Quantity
Posts			
1	ZZCH0018	3.5in OD x 124in Steel Post W/Riveted Cap	4
2	ZZCH0028	3.5in OD x 136in Steel Post W/Riveted Cap	8

Two-Five Year Old Play Area Option 2 (Play World)			
No.	Part No.	Description	Quantity
Decks & Kick Plates			
3	ZZCH0616	Square Coated Deck Assembly	2
ADA Items			
4	ZZCH2006	Transfer Station (36in Deck)	1
5	ZZUN2019	Approach Step For Transfer Station	1
Slides			
6	ZZCH3126	Glide Slide (48in Deck)	1
Activity Panels			
7	ZZCH4440	Shape-Color Activity Wall	1
Climbers			
8	ZZCH7410	Deep Rung Arch Climber (48in Deck)	1
9	ZZCH7949	Silo Climber (36in DECK)	1
10	ZZCH8110	Beanstalk Climber (48in Deck)	1
Overhead Events			
11	ZZCH5736	Chinning - Turning Bar	1
12	ZZCH5780	6ft Horizontal Loop Ladder	1
13	ZZCH5950	Overhead Event Access Ladder (12in Deck)	2
Stairs and Ladders			
14	ZZCH9168	12in Access Stepped Platform (Deck to Deck)	1
Additional Tool & Maintenance Kits			
15	ZZCHGUID	Challenger Guidelines	1
16	ZZUN9910	Surfacing Warning Label Kit	1
17	ZZUN9930	Pipe Systems Maintenance Kit W/ A/Erosol	1
18	ZZUN9990	Tool And Additional Parts Kit W/A/Erosol	1

1.1.2.2 Five-Twelve Year Old Play Areas:

1.1.2.2.1 Include border and pre-engineered wood fiber.

1.1.2.2.2 Option 1 (GameTime):

Five-Twelve Year Old Play Option 1 (GameTime)			
No.	Part No.	Description	Quantity
1	4854	Accessible Playcurb	1
2	4860	12"Playcurb Pkg	21
3	12024	3 1/2" Uprt Ass'Y Alum 9'	2
4	12025	3 1/2" Uprt Ass'Y Alum 10'	5
5	12027	3 1/2" Uprt Ass'Y Alum 12'	8
6	12207	2'-6"/3'Overhead Tree Clb	1
7	12215	Crunch Bar Prime Time	1
8	18200	36" Sq Punched Deck P/T 1.3125	3
9	18238	6'-0" Funnel Bdg W/Barrier	1
10	18372	Incline Cosmix Climber, 45 1/2" Dk	1
11	18682	High Whistle	1
12	19001	Entry Way	1
13	19007	Transfer system w/Barrier (3' Rise)	1
14	19035	Optional Access Step (3' & 5')	1
15	19056	Twister Climber (6')	1
16	19058	Giant Wave Climber	1
17	19073	Tic-Tac-Toe Panel	1
18	19117	DNA Climber (6')	1
19	19234	Loop Ladder (6')	1
20	19285	Transfer Platform w/ Guardrail 3'	1
21	19056	Single Entrance WilderSlide II	1
22	19387	Right Curve Section WilderSlide II	2
23	19388	Exit Section WilderSlide II	1
24	19391	Support WilderSlide II	1

1.1.2.2.3 Option2 (PlayWorld):

Five-Twelve Year Old Play Option 2 (PlayWorld)			
No.	Part No.	Description	Quantity
Posts			
1	ZZCH0018	3.5in OD X 124in Steel Post W/Riveted Cap	2
2	ZZCH0028	3.5in OD X 136in Steel Post W/Riveted Cap	4
3	ZZCH0038gz	3.5in OD X 148in Ground Zero Post	1
4	ZZCH0048	3.5in OD x 160in Steel Post W/ Riveted Cap	8
Decks & Kick Plates			
5	ZZCH0616	Square Coated Deck Assembly	3
ADA Items			
6	ZZCH2006	Transfer Station (36in Deck)	1
7	ZZUN2019	Approach Step For Transfer Station	1
Slides			
8	ZZCH2889	72in Banister Glide	1
9	ZZCH3136	Slither Slide Entry/Exit	1
10	ZZUN3157	Slither Slide (Right Section)	4
11	ZZUN3169	Slither Slide Support Leg 3ft-6in	1
Activity Panels			
12	ZZCH4350	Tic-Tac-Toe Activity Wall	1
Climbers			
13	ZZCH7160	6ft Twisted Climber	1
14	ZZCH7168	6ft Tower Climber	1
15	ZZCH7430	Deep Rung Arch Climber (72in Deck)	1
Ground Zero Climbers			
16	ZZCH8398	The Helix	1
Overhead Events			
17	ZZCH5770	Leg Lift	1
18	ZZCH5806	6ft Wave Ladder	1
19	ZZCH5970	Overhead Event Access Ladder (36in Deck)	1
Bridges			
20	ZZCH7085	6ft Catwalk	1
Audible Activities			

Five-Twelve Year Old Play Option 2 (PlayWorld)			
No.	Part No.	Description	Quantity
21	ZZCH4556	7in Bell (Post Mount)	1
Stairs and Ladders			
22	ZZCH9177	36in Access Stepped Platform (Deck to Deck)	1
Additional Tool & Maintenance Kits			
23	ZZCHGUID	Challenger Guidelines	1
24	ZZUN9910	Surfacing Warning Label Kit	1
25	ZZUN9930	Pipe Systems Maintenance Kit W/ A/Erosol	1
26	ZZUN9990	Tool And Additional Parts Kit W/A/Erosol	1

- 1.2 Where both a 2-5 year old group and a 5-12 year old group, play area are included in the project scope design to include separation of the areas as recommended by Dallas ISD designated representative.
- 1.3 Swing sets are not allowed.
- 1.4 Wood structural components are not allowed.
- 1.5 All aluminum structural components to be powder coated.
- 1.6 Basis of Design: Game Time and PlayWorld.
 - 1.6.1 For equipment manufacturers/installers other than Game Time and PlayWorld, the design of a proposed structure is to work with the same set of motor skills as the basis of design structures.
 - 1.6.2 Playground equipment components to be certified by IPEMA's third-party product certification service.
- 1.7 Acceptable Manufacturers:
 - 1.7.1 GameTime.
 - 1.7.2 Playworld.
 - 1.7.3 Grounds for Play.
 - 1.7.4 Play & Park Structures.
 - 1.7.5 Playwell Group.
 - 1.7.6 Hunter Knepsheild of Texas.
2. Shades: Include a shade cover for all play structures.
 - 2.1 Acceptable Manufactures:
 - 2.1.1 Cover for 2-5 Unit: Ultrashade – Hip Rectangular 24’ x 38’ Shade. 12’ Eave Height, P/C Structure P/N PHP2438S-12-FB or Dallas ISD approved equal.
 - 2.1.2 Cover for 5-12 Unit: Ultrashade – Hip Rectangular 40’ x 40’ Shade. 14’ Eave Height, P/C Structure P/N PSQ40S-14-FB or Dallas ISD approved equal.

3. Warranty Requirements:
 - 3.1 Covered playground to have five (5) year non-prorated warranty.
 - 3.2 Manufacturer and installer to provide a special warranty based on:
 - 3.2.1 Lifetime limited warranty on support post (uprights).
 - 3.2.2 15 year limited warranty on punched steel decks, pipes, rails, loops and rungs.
 - 3.2.3 15 year limited warranty on rotomolded polyethylene components.
 - 3.2.4 15 year limited warranty on engineered wood fiber playground surfacing.
 - 3.2.5 10 year limited warranty on playground border and ramps.
 - 3.2.6 Lifetime limited warranty on hardware.
 - 3.3 Authorized Vendor / Manufacturer Representative to provide local service for warranty and non-warranty part replacement. A dedicated warranty / parts replacement staff contact is preferred in addition to local sales representative.
4. Architect is to include the following requirements at a minimum in the Contract Documents:
 - 4.1 Manufacturer/Installer Qualifications:
 - 4.1.1 Installer to be certified by the manufacturer.
 - 4.1.2 Installer to have a NPSI certified crew leader or other staff.
 - 4.1.3 Manufacturer and installer to be in business for 10 years.
 - 4.1.4 Local office to be within 60 miles of Dallas Independent Schools District Grounds Maintenance Department, 3701 S. Lamar St. Dallas, TX 75215.
 - 4.1.5 Installation company to provide all appropriate insurance certificates naming contractor as additional insured.
 - 4.1.6 Verification of State of Texas worker's compensation insurance specifically for playground equipment installation is required.
 - 4.2 Product Installation:
 - 4.2.1 Equipment and surfacing to be installed by manufacturer certified installation contractor.
 - 4.2.2 Verify shipments are correct upon delivery. A delivery checklist to be provided by manufacturer in addition to bill of lading.
 - 4.2.3 Provide maintenance and playground supervisor training at site.
 - 4.2.4 Provide an assortment of manufacturer recommended hardware, tools, and equipment documents (not manufacturer standard maintenance kit) to Dallas ISD-M&O at project completion.
 - 4.2.5 Installer to provide post installation letter of verification that equipment was installed to meet manufacturer's specifications.

END OF DIVISION 11



Division 12 – Furnishings

12 20 00 Window Treatments

1. Horizontal Window Blinds:
 - 1.1 Utilize at all exterior glazed openings in classrooms, offices, media centers and cafeterias. Excluded from stairwells, gymnasiums and auditoriums.
 - 1.2 Louver Slats: Six gauge, 1 inch wide, pre-finished spring tempered aluminum horizontal slates with radiused or eased corners.
 - 1.3 Cord: Braided nylon or polypropylene, continuous loop.
 - 1.4 Wand: Clear, hollow extruded plastic, tamper resistant.
 - 1.5 Finish:
 - 1.5.1 Slats, Headrails, Brackets: Baked enamel.
 - 1.5.2 Ladders/Cords: Dyed to match slates.
 - 1.6 Color:
 - 1.6.1 New Construction: Select from manufacturer's standard selection.
 - 1.6.2 Renovations: Match existing at campus.
 - 1.7 Operation: Blinds for windows with head heights above 8'-0" AFF to be motorized. Coordinate with Dallas ISD designated representative for operation requirements for windows with head heights below 8'-0".
2. Roller-shades are an acceptable substitution for horizontal window blinds. Use one or the other throughout facility.

12 30 00 Casework

1. General Requirements:
 - 1.1 Casework design to provide clear organized of workspaces where special equipment is being used.
 - 1.2 Casework to be specified as 'Custom Grade', as defined by latest edition of the North American Architectural Woodwork Standards.
2. Science Casework: Acceptable Manufacturers:
 - 2.1 Leonard Peterson & Co, Inc.
 - 2.2 Campbell Rhea Institutional Casework.
 - 2.3 Diversified Woodcrafts.
3. Laboratory/Work Surfaces:
 - 3.1 Labs (except physical science labs): Chemical resistant plastic.
 - 3.2 Physical Science Labs: Epoxy resin work surfaces, sinks and accessories.
 - 3.2.1 Molded epoxy resin with non-asbestos inert fillers.
 - 3.2.2 Thickness: 1 inch.
 - 3.2.3 Edge: 1/8 inch chamfered, exposed corners to be eased for safety.

- 3.2.4 Back/End Splashes: 1 inch wide x 4 inches high.
- 3.2.5 Sinks: Molded epoxy resin to match adjacent work surface.
- 3.3 Acceptable Manufacturers:
 - 3.3.1 Leonard Peterson & Co, Inc.
 - 3.3.2 Campbell Rhea Institutional Casework.
 - 3.3.3 Diversified Woodcrafts.
- 4. Art Room Casework:
 - 4.1 All Schools:
 - 4.1.1 Upper and Lower Cabinets: 24 linear feet.
 - 4.1.2 Storage Room Casework: Provide along three (3) of four (4) perimeter walls.
 - 4.1.3 Art Display Cases: Provide in hallway adjacent to art room, three (3) at elementary schools, six (6) at middle schools and high schools.
 - 4.2 Middle Schools: Portfolio Storage Cabinet: 36" x 30" x 6" - 6 LF.
- 5. Art Room Work Surfaces: Epoxy resin work surfaces, sinks and accessories.
 - 5.1 Middle Schools and High Schools:
 - 5.1.1 Molded epoxy resin with non-asbestos inert fillers.
 - 5.1.2 Thickness: 1 inch.
 - 5.1.3 Edge: 1/8 inch chamfered, exposed corners to be eased for safety.
 - 5.1.4 Back/End Splashes: 1inch wide x 4 inch high epoxy resin..
 - 5.1.5 Sinks: Molded epoxy resin to match adjacent work surfaces.
 - 5.1.6 Art Sinks: Refer to Division 22.
 - 5.2 Elementary Schools:
 - 5.2.1 High pressure laminate countertops with MDF core.
 - 5.2.2 Edge: 1/8 inch chamfered, exposed corners to be eased for safety.
 - 5.2.3 Back/End Splashes: Matching ceramic tile to be approved by Dallas ISD-V&PA.
 - 5.2.4 Art Sinks: Refer to Division 22.

12 50 00 Furniture

- 1. Art Room Furniture:
 - 1.1 All Schools:
 - 1.1.1 Bookcase: Open book nook base cabinet 30 inches wide x 12 inches deep x 72 inches high with four (4) adjustable shelves. Must match the teacher desk.
 - 1.1.2 Filing Cabinet: 15 inches wide x 25 inches deep x 52 inches high. Must match the teacher desk.
 - 1.1.3 Teacher Desk:
 - 1.1.3.1 Tops: 1.25 inch thick high pressure laminate (HPL) with phenolic backer and matching 3mm PVC edge banding.
 - 1.1.3.2 Drawers: Fully doweled, 0.75 inch matching TFL front with 3mm PVC edge banding, 4 inch satin nickel wire pulls and standard full extension side mount steel

ball bearing glides. WB Manufacturing or Dallas ISD approved equal.

- 1.1.4 Guest Chair: Provide two (2) with mesh back and rolling casters, weight capacity 300 lbs., color black. Affordable Interior Systems Inc. or Dallas ISD approved equal.
- 1.1.5 Teacher Chair: Provide one (1) with mesh back and rolling casters, weight capacity 300 lbs., color black. Affordable Interior Systems Inc. or Dallas ISD approved equal.
- 1.1.6 Student Stool: Provide 32 (middle and high schools), 20 (elementary schools) stools with back, adjustable height. National Public Seating (NPS) Elephant 6600 Z or Dallas ISD approved equal.

1.2 Middle Schools and High Schools:

- 1.2.1 Student Table: Provide 16-20 60 inch x 30 inch phenolic top, legs with titanium finish, wheel-barrow locking casters and adjustable height 22-36 inches.

1.3 Elementary Schools Only:

- 1.3.1 Primary Student Stool: Provide 15. Classroom Select NeoRock Active Wobble Stool or Dallas ISD approved equal.
- 1.3.2 Oval rug: 8 foot x 12 foot with color wheel. Childcraft or Dallas ISD approved equal.

2. Library:

2.1 All furniture including but not limited to shelving, computer stations and circulation desk to be constructed of oak plywood meeting the following criteria:

- 2.1.1 Free from any structural imperfections.
- 2.1.2 All plywood to be Engineered Wood Association (APA) rated.
- 2.1.3 Facing material to be oak, minimum 1/18 inch thickness after sanding.
- 2.1.4 Core Material:
 - 2.1.4.1 Particle board core is not allowed in any application.
 - 2.1.4.2 Lumber core required at table, office furniture, circulation desk, and computer station tops.
- 2.1.5 Plywood at table, office furniture, circulation desk, and computer station tops to be 5/8 inch thickness with a modulus of rupture of 8,600 psi minimum.
- 2.1.6 Bull-nose edging required. No sharp edges are allowed.
- 2.1.7 Legal style metal shelves may be acceptable. Architect to review with Dallas ISD-Library/Media Services on a project specific basis.

2.2 Finishes:

- 2.2.1 Tesco Standard Stains:
 - 2.2.1.1 Medium Stain: Nepal Teak corresponding PLAM 7209-60 Nepal Teak.
 - 2.2.1.2 Darker Stain: Montana Walnut corresponding PLAM 7110-60 Montana Walnut.
 - 2.2.1.3 Darker Stain: Oak Windsor Mahogany to match furniture selections.
- 2.2.2 Finish/stain selection to be communicated to the Dallas ISD designated representative for coordination with Dallas ISD provided FF&E items.

2.3 High pressure plastic laminate for top of circulation desk (Define Tops) to meet N.E.M.A.-LD 3-1985 Specifications.

- 2.3.1 Vertical Surfaces: .030 inches thick.

- 2.3.2 Horizontal Surfaces: .050 inches thick with .030 inches thick phenolic backer sheet applied on reverse side of all horizontal surfaces.
- 2.4 Acceptable Manufacturers:
 - 2.4.1 Tesco.
 - 2.4.2 Worden.
 - 2.4.3 Brodart.
 - 2.4.4 Library Bureau.
- 2.5 Architect to include the following at minimum in the Contract Documents:
 - 2.5.1 Description of each component. Include name, item number and dimensions/sizing.
 - 2.5.2 Provide dimensional sketches for each item.
- 3. JROTC:
 - 3.1 Conference Table:
 - 3.1.1 Confirm sizing requirements with Dallas ISD designated representative.
 - 3.1.2 Refer to Division 27 for table cabling requirements.
- 4. Architect to include the following at minimum in the Contract Documents: Locking or mounting hardware to be free of any sharp edges or projections.

12 60 00 Multiple Seating

- 1. Fixed Audience Seating (Auditorium):
 - 1.1 Layout:
 - 1.1.1 Detailed seating layout to be coordinated with and approved by Theatre Consultant (if approved) and Dallas ISD-Fine Arts.
 - 1.1.2 Integrate seating layout with architecture of room to achieve a cohesive acoustic environment.
 - 1.2 Design/Fabrication and Installation:
 - 1.2.1 Self-lifting, gravity return. Torsion spring return is acceptable with lifetime warranty.
 - 1.2.2 Fully upholstered and suitable for installation in performing arts venues.
 - 1.2.3 Chair upholstery to comply with California Technical Bulletin 117.
 - 1.2.4 Include number and letter plates. Numbering and layout to be approved by Dallas ISD designated representative.
 - 1.2.5 Provide end-standard mounted LED aisle lighting system. Integrate control with theatrical lighting system.
 - 1.2.6 Provide all necessary accessories and equipment to comply with all applicable codes including Americans with Disabilities Act (ADA).
 - 1.2.7 Color: Confirm with Dallas ISD designated representative for each school.
 - 1.3 Acceptable Manufacturers/Products:
 - 1.3.1 Irwin Seating, Millennium.
 - 1.3.2 Irwin Seating, Citation.
 - 1.3.3 Irwin Seating, Patriot (Middle Schools only, if requested by Dallas ISD).
 - 1.3.4 Series Seating.

- 1.3.5 Hussey Seating.
- 2. Loose Audience Seating (Black Box):
 - 2.1 Provide folding loose theatre seats (min. 100).
 - 2.2 Provide with fully upholstered seat and back (black) and hardwood arms.
 - 2.3 Provide with necessary storage carts.
 - 2.4 Acceptable Manufacturers/Products: Wenger High Density Portable Audience Chairs or Dallas ISD approved equal.
- 3. Stadium/ Seating:
 - 3.1 Design/Fabrication and Installation:
 - 3.1.1 Steel structure.
 - 3.1.2 Aluminum decking system.
 - 3.1.3 Concrete foundation.
 - 3.2 Decking/Seating:
 - 3.2.1 Standard Tread Depths: 30 inches.
 - 3.2.2 Standard Riser Heights: 10 inches.
 - 3.2.3 Riser Infill Panel: 9-1/4 inches x 1-3/4 inches (front), 9-1/4 inches x 1-1/2 inches (rear).
 - 3.2.4 Height and number of rows to be based on student capacity.
 - 3.3 Aisles:
 - 3.3.1 Midsteps required for rise above 8 inches.
 - 3.3.2 Solid riser front.
 - 3.4 Approved Local Suppliers:
 - 3.4.1 Sturdisteel Company.
 - 3.4.2 Southern Bleacher Company.
- 4. Campus Athletic Facilities:
 - 4.1 Spectator Seating (Gymnasium – Basketball/Volleyball):
 - 4.1.1 Tip and roll portable aluminum bleachers.
 - 4.1.1.1 Four (4) rows, 56 seats.
 - 4.1.1.2 21 feet long, 30 inches high, 81 inches deep.
 - 4.1.1.3 Acceptable Manufacturers/Products: BSN TRO421P or Dallas ISD approved equal.
 - 4.1.2 Retractable Gymnasium Bleacher:
 - 4.1.2.1 Manual operation.
 - 4.1.2.2 Acceptable Manufacturers/Products: BSN NSPHG or Dallas ISD approved equal.
 - 4.1.3 Retractable Gymnasium Bleacher (Competition Gym): Automatic operation.
 - 4.2 Spectator Seating (Outdoor – Baseball/Softball):
 - 4.2.1 Powder-coated bleachers with vertical picket railing.
 - 4.2.1.1 Five (5) rows, 70 seats.
 - 4.2.1.2 21 feet long, 92 inches high, 109 inches deep.

- 4.2.1.3 Acceptable Manufacturers/Products: BSN NB0521CVP or Dallas ISD approved equal.
- 4.3 Players' Seating:
 - 4.3.1 Basketball and Volleyball:
 - 4.3.1.1 Deluxe sideline cushioned chair with custom logo.
 - 4.3.1.2 Acceptable Manufacturers/Products: BSN 1307252 or Dallas ISD approved equal.
 - 4.3.2 Tennis:
 - 4.3.2.1 Players' aluminum bench with shelf.
 - 4.3.2.2 27 feet long.
 - 4.3.2.3 Acceptable Manufacturers/Products: BSN BEPS27 or Dallas ISD approved equal.
- 5. Telescoping Bleachers for Gymnasiums at Middle Schools and High Schools:
 - 5.1 Automatic operation with manual override.
 - 5.2 Multitiered, closed deck seating rows operating in a telescopic manner. Incorporate the most economical quantity of sections while complying with to be loading requirements.
 - 5.3 First moving row to be secured with mechanical locks. Other rows operable only upon unlocking and cycling first row.
 - 5.4 Each bleacher row to have risers, seat and deck components and a complete set of supportive columns and braces.
 - 5.5 Provide ADA/TAS compliant notch-outs and truncations as required.
 - 5.6 Rise per row: 10-1/4 inches x 11-1/2 inches.
 - 5.6.1 Row to Row Spacing: 22 inches, 24 inches, 26 inches.
 - 5.7 Seating: Sculptured/molded plastic bleacher style.
 - 5.7.1 Operation: Automatic, retractable.
 - 5.7.2 Provide with custom logos/descriptions.
 - 5.8 Timers Table:
 - 5.8.1 Size: 15 inches x 96 inches.
 - 5.8.2 To be able to be used at any location.
 - 5.8.3 Provide with removable legs for on-deck storage.
 - 5.9 Acceptable Manufacturers:
 - 5.9.1 Interkal.
 - 5.9.2 Irwin.

12 90 00 Other Furnishings

- 1. Bicycle Rack: Provide at each campus.
 - 1.1 Capacity: Provide five (5) units accommodating eight (8) bicycles each.
 - 1.2 Racks to be ground mounted on a paved surface accessible to an adjacent sidewalk.
 - 1.3 Location: Within secured/fenced school grounds, visible to a common public interior space to deter theft. Do not locate at or near vehicular drives, or directly in front of main entry.

- 1.4 Acceptable Manufacturers:
 - 1.4.1 Madrax.
 - 1.4.2 Highland Products.
 - 1.4.3 PlayCore/Dero.

END OF DIVISION 12



Division 13 – Special Construction

13 05 00 Special Purpose Rooms

1. Storm Shelter:
 - 1.1 Impact and Wind Resistance:
 - 1.1.1 Ensure compliance with current building codes. Notify Dallas ISD designated representative of any deviations.
 - 1.1.2 Include Dallas ISD-EM in all storm shelter design projects as it directly affects the execution of the Campus Emergency Operations Plan.
 - 1.1.3 Impact Resistance: Building components to meet the following criteria at a minimum.
 - 1.1.3.1 Walls to withstand a 15 pound 2x4 wood stud shot at 100 mph.
 - 1.1.3.2 Roof to withstand a 15 pound 2x4 wood stud shot at 67 mph.
 - 1.1.3.3 All wall and roof openings (windows and skylights) to be protected with components complying with the missile-impact testing requirements listed above.
 - 1.1.3.4 Mechanical penetrations greater than 3-1/2 inches to be covered with impact protection.
 - 1.1.4 Building structure must be designed to withstand code required wind loads.
 - 1.2 Space Requirements:
 - 1.2.1 Shelter Size:
 - 1.2.1.1 5 square feet per occupant, based on number of students to be accommodated.
 - 1.2.1.2 Provide additional 20% for MEP system and toilets.
 - 1.2.2 Provide a minimum of two entries/exits complying with code minimum exiting width.
 - 1.2.3 Provide an access control card reader (installed by access control contractor) at an entrance of the school that provides the shortest distance from portable building(s) to the storm shelter to reduce delay in accessing the storm shelter.
 - 1.2.4 Provide a recessed knox box at or near the door nearest the fire lane.
 - 1.2.5 Provide toilet and hand wash facilities.
 - 1.2.6 Control room to be adequately sized for required equipment and control panel.
 - 1.2.7 Typical Storm Shelter Layout: Refer to Figure 13 05 00-01.

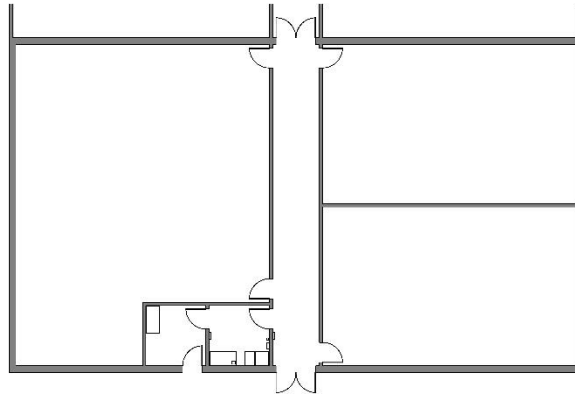


Figure 13 05 00-01

1.3 MEP Requirements:

- 1.3.1 Refer to Divisions 22, 23, 26, 27 and 28 for additional requirements.
- 1.3.2 Provide an independent lighting system and HVAC power supply.
- 1.3.3 Provide a dedicated ventilation system.
- 1.3.4 All critical support systems to remain operational for a minimum of two hours.
 - 1.3.4.1 Emergency lighting system.
 - 1.3.4.2 Water supply for drinking fountain(s) and toilets.
- 1.3.5 Provide UPS or generator to provide power for a minimum of two hours. Coordinate requirements with Dallas ISD-EM on a project specific basis.

1.4 Control Room:

- 1.4.1 Provide an access control card reader (installed by access control contractor) and district master lock on control room door.
- 1.4.2 Contractor to provide the following items within the control room:
 - 1.4.2.1 First aid kit.
 - 1.4.2.2 Ax.
 - 1.4.2.3 Hand-crank weather radio.
 - 1.4.2.4 Laminated set of sequence of events for end user to direct campus how to activate the storm shelter.
- 1.4.3 Typical Control Room Layout: Refer to Figure 13 05 00-02.

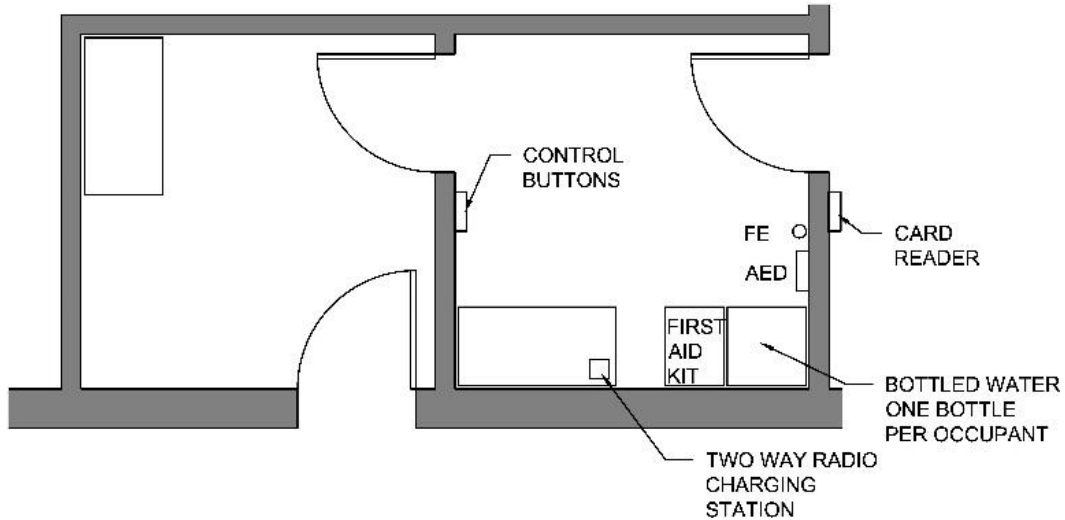


Figure 13 05 00-02

1.5 Controls:

1.5.1 Access Control Button (Button 1):

- 1.5.1.1 Secures all card reader supported shelter doors by engaging electric strikes and closing roll-down doors. Releases any door holds and over-rides all door unlock schedules.
- 1.5.1.2 Electric strikes and Dallas ISD standard master locks at all card reader supported doors (card readers to be installed by access control contractor).
- 1.5.1.3 Only authorized card credentials to be permitted when button 1 is activated.
- 1.5.1.4 LED Indicator Lights: Provide single gang RCI or Panelcraft custom LED status plates with status lights corresponding to each card reader supported door.
- 1.5.1.5 Labeling: Button 1: "Close doors", LED Indicators: Label each LED indicator with door name.

1.5.2 Ventilation Control Button (Button 2):

- 1.5.2.1 Activates the ventilation louver system.
- 1.5.2.2 LED Indicator Lights: Provide single gang RCI or Panelcraft custom LED status plates with status light to denote the current status of the ventilation system.
- 1.5.2.3 Labeling: Button 2 and LED Indicator: "Ventilation".

1.5.3 Gas Control Button (Button 3):

- 1.5.3.1 Controls the gas shut-off.
- 1.5.3.2 LED Indicator Lights: Provide single gang RCI or Panelcraft custom LED status plates with status light to denote the current status of the gas shut-off.
- 1.5.3.3 Labeling: Button 2 and LED Indicator: "Gas shut-off".

1.5.4 Water Control Button (Button 4):

- 1.5.4.1 The activation of this button is to provide pressurization of the shelter's water tank on an as needed basis.
- 1.5.4.2 Button (installed by access control contractor) to be located in a separate enclosure within the control room.

- 1.5.4.3 LED Indicator Lights: Provide single gang RCI or Panelcraft custom LED status plates with status light to denote the current status of the water pressurization.
- 1.5.4.4 Labeling: Button 4: "Water pressure activation-only when needed", LED Indicator: "Water pressure".
- 1.5.5 Contractor to install all wiring associated with the above operations and make final connections for the operation and system logic for each at the control panels (installed by access control contractor). Contractor to coordinate input and output needed for the EACS to monitor the status of each system with the access control contractor.
- 1.5.6 Refer to Figure 13 05 00-03 for EACS operation diagram.

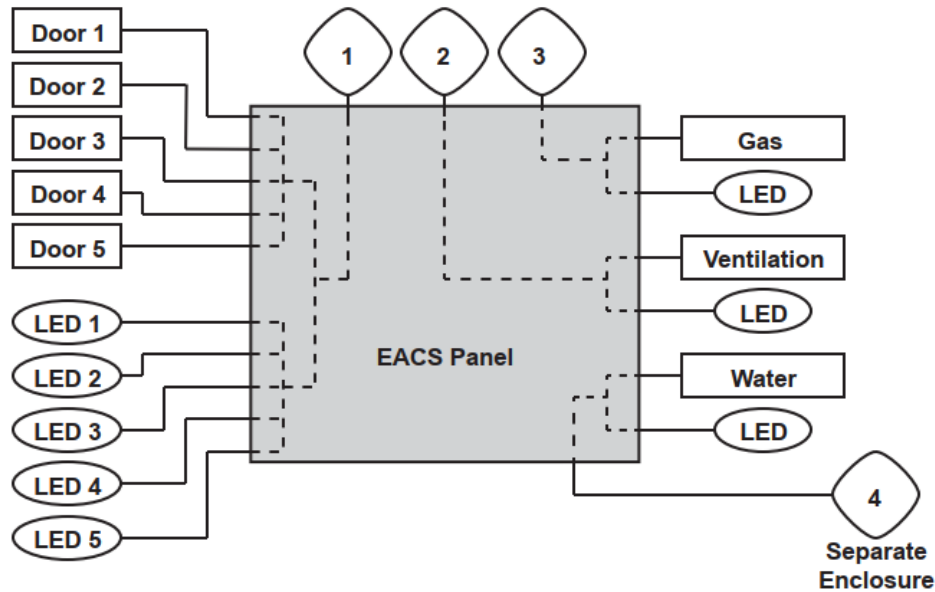
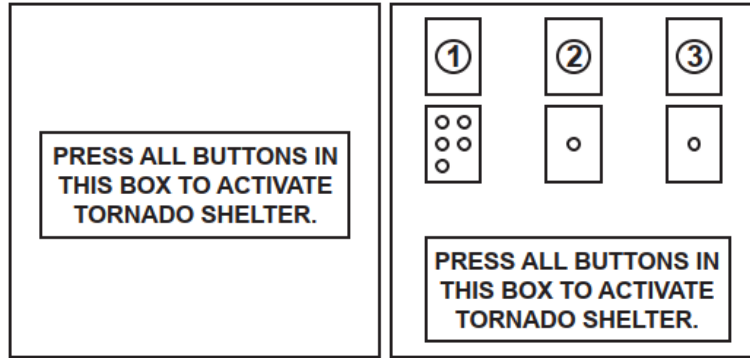


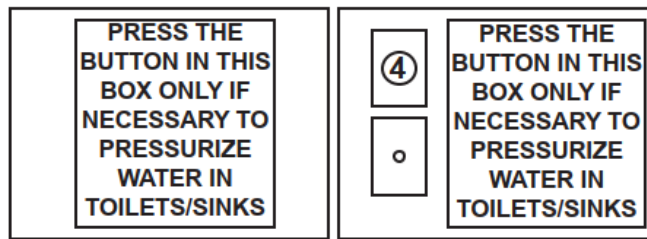
Figure 13 05 00-03

- 1.5.7 Access control contractor to install control buttons, indicator lights and enclosure.
 - 1.5.7.1 Control Button Enclosure: Mount at 44 inches to bottom of enclosure.
 - 1.5.7.2 Control Buttons: Colors for the control buttons have not been specified. Confirm colors with Dallas ISD-EM.
- 1.5.8 Refer to Figure 13 05 00-04 for typical panel layout.



Main Panel Exterior

Main Panel Interior



Water Panel Exterior

Water Panel Interior

Figure 13 05 00-04

END OF DIVISION 13



Division 14 – Conveying Equipment

14 20 00 Elevators

1. Elevators are required in new multilevel facilities.
2. Alterations to the primary function of existing buildings may require the installation of an elevator. Refer to ADA/TAS.
3. Acceptable Elevator Types:
 - 3.1 Machine roomless.
 - 3.2 Electro-hydraulic or hydraulic with telescoping operation.
4. Elevator cars to be of such size and arrangement to accommodate an ambulance stretcher or local code, whichever is greater. Cab size not to be less than 24.83 sq. ft. and comply with TDLR standards for configurations and size.
5. Where instrument transport is necessary, elevator to be minimum 7 feet deep with door opening to be minimum 48 inches wide.
6. Access to elevators to be key controlled.
 - 6.1 Provide for override lockout.
 - 6.2 Required to be integral with the elevator control panel.
7. All elevator hardware and software to be non-proprietary.
 - 7.1 Controllers:
 - 7.1.1 Provide non-proprietary control systems only. Proprietary programmable controllers are not allowed.
 - 7.1.2 Provide software and all diagnostic tools required to troubleshoot, re-program and maintain the equipment. Adjuster level troubleshooting manuals to be provided to Dallas ISD at turnover. All SIM cards, backup thumb drives and other diagnostic systems become property of Dallas ISD upon completion of installation.
8. Cab Finishes:
 - 8.1 Brushed stainless steel walls.
 - 8.2 VCT flooring.
 - 8.3 Parabolic lighting.
 - 8.4 Provide hooks and pads with elevator.
9. Equipment Room: Refer to Division 23 for HVAC requirements.
10. Soils tests to be performed for all new elevators to determine compatibility between the soil and the installation of the cylinder.
11. Provide PVC casing, sealed at the bottom, to prevent ground water from coming into contact with the cylinder of hydraulic elevators.
12. Cathodic protection to be installed to protect the elevator cylinder.
13. Elevators to be powered from a shunt-trip circuit breaker located in the elevator machine room.
14. Elevator Pit Waterproofing: Acceptable Manufacturers: Seal Krete products or approved equal.

15. Renovations: Architect to employ elevator consultant to assess all existing elevator equipment. Provide recommendation for refurbishment or replacement with machine-room less type.
16. Warranty: One-year for the elevator with monthly service inspections, adjustments, routine maintenance and all repairs, excluding vandalism.

14 40 00 Lifts

1. Stage or platform lifts for existing facilities to be considered on a project specific basis.
2. Lift type and installation location to be approved by Dallas ISD-Fine Arts and coordinated with Theatre Consultant (if approved).
3. Basis-of-Design: Ascension Virtuoso, or Dallas ISD approved equal.

END OF DIVISION 14

Division 21 – Fire Suppression

21 05 00 General Requirements

1. All school designs are to include wet pipe systems consisting of pipes, valves and fittings that normally constitute a complete fire suppression system.
2. Renovations:
 - 2.1 If changes are proposed to the floor plan layout, Architect must provide notes in the Construction Documents requiring modification of the existing sprinkler system to be code compliant.
 - 2.2 If renovation involves temporary removal of the existing fire suppression system, Architect must provide notes in the construction documents to provide for a completely reinstalled and code compliant sprinkler system.
3. Special Use Areas:
 - 3.1 MDF and IDF Rooms:
 - 3.1.1 Dry pipe system is required in MDF room in some cases based on value of equipment. Obtain written determination of wet or dry system from Dallas ISD-IT-Infrastructure designated representative during design phase.
 - 3.1.2 When heads are required in distribution room ceilings, they are to be arranged so that they are not directly over the equipment or panels in the room.
 - 3.1.3 Provide blue high-temperature sprinkler heads.
 - 3.1.4 When necessary to avoid conflicts with distribution room equipment in existing building installations, wall-mounted, side discharge sprinkler heads with wire baskets are allowed.
 - 3.2 Kiln Rooms: Provide blue high-temperature sprinkler heads.
4. All necessary water easements for these installations to be obtained by the Architect team prior to completing the construction documents.
5. Architect to confirm street water pressure with the regulatory agency and confirm if a fire pump is required. If required, include fire pump information in the construction documents. Pump is to be electric where allowed by code.
6. Underground entrance and stub up into building to be ductile iron and a minimum of 6 inches in diameter, through oversized steel sleeve.
7. Retarding chamber, Valves, Sprinkler Heads, Alarms: Acceptable Manufacturers:
 - 7.1 Reliable.
 - 7.2 Viking.
 - 7.3 Grinnell.
 - 7.4 Approved equal.
8. Fire suppressions systems to have their own supports directly from the structure above and not from any other building element. Run piping at or near the bottom chord of structural framing to be free of other systems.

- 9. Piping:
 - 9.1 Sprinkler piping to be schedule 40 black steel.
 - 9.1.1 Pipe larger than 2-1/2 inch to be welded or rolled groove.
 - 9.1.2 Pipe smaller than 2-1/2 inch to have malleable iron threaded or rolled groove fittings.
 - 9.2 Specify that all valves be color coded and painted to identify each zone controlled.
 - 9.3 Sprinkler pipes are to be concealed above the ceiling wherever possible.
 - 9.3.1 If pipes must be exposed, then mount min 9'-0" AFF, unless specifically approved by Dallas ISD.
 - 9.3.2 Paint exposed pipes per the Architect's color scheme for the space.
 - 9.4 Do not locate piping where it will inhibit access to serviceable equipment.
 - 9.5 Standpipe cabinets to be located in main circulation paths and be flush mounted in walls adjacent to classrooms.
- 10. Valves:
 - 10.1 Gate valves 2 inches and less to be bronze OS & Y with threaded connections or iron butterfly valve. Gate valves larger than 2 inches to be iron body, OS & Y, bolted bonnet, bronze seats, and flanged ends or iron butterfly valve.
 - 10.2 Supervised valves to have tamper switches. Supervised switches to be double pole, single throw, with cast aluminum housing and tamperproof cover.
- 11. Sprinklers:
 - 11.1 In areas without ceilings, sprinkler heads to be upright type.
 - 11.2 In areas with ceilings, sprinkler heads to be fully concealed similar to Reliable model G1 with chrome cover plate.
 - 11.3 Architect to include the following spare parts requirements in the specification at a minimum: Six (6) extra heads and 12 escutcheons (of each type and color).
 - 11.4 Provide a metal cabinet to store extra heads and head wrenches located near controls.

END OF DIVISION 21

Division 22 – Plumbing

22 05 00 General Requirements

1. Provide backflow prevention as required by code/authority having jurisdiction. Remove and replace all backflow devices older than five (5) years.
2. Provide pressure reducing valves at all facilities where water pressure exceeds 72.5 psi.
3. Piping:
 - 3.1 Crawlspace Piping:
 - 3.1.1 All first-floor plumbing pipes to be in crawl space where possible.
 - 3.1.2 Hang all piping in crawlspaces from the structure at an accessible height.
 - 3.1.3 No piping to be installed below mud slabs where construction requires a mud slab except within 5 feet of where piping enters the crawlspace from subsurface exterior.
 - 3.2 Provide domestic hot and cold water to staff-use spaces, including science lab, teaching stations and storage (prep) room.
 - 3.3 Provide tepid water per code to emergency showers.
 - 3.4 Emergency eye wash stations to have tepid water at 100 degrees or as required by code/authority having jurisdiction mixed through Dallas ISD approved thermostatic mixing valve. If AHJ requirement is different than 100 degrees F, bring to the attention of the Dallas ISD designated representative.
 - 3.5 Piping expansion joints to be accessible for maintenance.
 - 3.6 Show isolation valve locations on the Construction Documents.
 - 3.7 Provide water hammer arrestors on all domestic hot and cold-water lines.
4. Provide 2 foot wide concrete apron around perimeter of exterior area drains or area drains in courtyards.
5. Provide a plumbing chase between the gang student restrooms of sufficient width to allow for observation of piping within the chase and to allow access to these areas by Dallas ISD personnel. Access to be provided through an access panel located in the HC stall on the men's/boys side. Access panel to be minimum 18 inch by 18 inch (24 inch by 24 inch preferred). Coordinate with Architect.
6. In all science labs, provide pre-engineered systems with solenoid valves located behind the teaching station on wall for shut-off of all water and power outlets.
7. Provide stands properly constructed to prevent vibration for washers and dryers (coordinate with Architect) empty drainage into a trough drain. Refer to Section 22 40 00 below for trough requirements.
8. Provide a trench drain across pathway into/exiting the shower.
9. Ice Machines and Refrigerators:
 - 9.1 Provide domestic water piping to all ice machines and refrigerators with ice makers.
 - 9.2 Provide code approved backflow preventer and filter to all commercial grade ice machines.
10. Storm Shelters:
 - 10.1 Written approval from Dallas ISD-EM is required. Refer to Division 13 for additional requirements.
 - 10.2 Provide a Contractor responsibility matrix on the general drawing code sheet and the plumbing drawing sheets.

- 10.3 Plumbing system designer to coordinate with Architect and other Engineers to ensure all storm shelter components are included in the Construction Documents and to assign clear responsibilities relating to the which components are to be provided and installed by the Contractor.
- 11. Additions: Add domestic hot and cold water to all gang restroom faucets.
- 12. Renovations:
 - 12.1 Site Visit: Design professional to perform a site investigation at all existing facilities prior to providing Pre-Design (STB) documents. At a minimum, the following data is to be obtained and clearly documented in Construction Documents.
 - 12.1.1 Gas pressure available at meter and location of meter(s).
 - 12.1.2 Water pressure and location of meter(s).
 - 12.1.3 Flow line of sanitary sewer at potential connection point (POC).
 - 12.1.4 Flow line of storm sewer at potential connection point (POC).
 - 12.2 Code deficiencies identified, in the project impacted work area, are to be corrected. Upgrades may be required for equipment supporting the alteration area but located outside of it.
 - 12.3 Re-use or modify existing equipment if in good condition. Equipment for which replacement parts are no longer available to be evaluated with Dallas ISD-M&O for replacement.
 - 12.4 All abandoned piping to be removed and disposed of off-site. All abandoned piping that cannot be removed to be labeled, purged and capped on both ends. Abandoned piping to be pre-approved by Owner's representative and noted on as-built drawings.
 - 12.5 Design professional to identify existing backflow prevention devices and replace any that are more than five (5) years old.
- 13. Project specifications to include the following Contractor responsibilities:
 - 13.1 Notify Dallas ISD designated representative at completion of all project phases.
 - 13.2 Provide city green tags for every phase of plumbing work completed to Dallas ISD designated representative.
 - 13.3 All equipment to be installed per manufactures specifications. Literature to be submitted to the Dallas ISD designated representative for all installed equipment.
 - 13.4 Upon completion of new equipment installation and startup, contractor to provide training on all installed equipment.

22 08 00 Commissioning (Cx) of Plumbing

- 1. Project specifications to include the Plumbing Contractor (PC) and Plumbing Sub-Contractors requirements below:
 - 1.1 Provide all personnel, tools, materials, and equipment to support the commissioning process.
 - 1.2 Facilitate the coordination of the commissioning work by the CxP.
 - 1.3 Incorporate all commissioning related activities into the project schedule, ensuring that Cx activities do not delay project completion.
 - 1.4 Notify Dallas ISD and the CxP in writing that equipment and systems are ready for functional testing.
 - 1.5 Perform equipment startups using authorized manufacturers' representatives.
 - 1.6 Provide written documentation to the CxP that equipment and systems are fully operational and ready to be functionally performance tested.
 - 1.7 Perform commissioning tests at the direction of the CxP.
 - 1.8 Attend construction phase commissioning coordination meetings.

- 1.9 Provide qualified personnel for participation in commissioning tests.
- 1.10 Provide equipment, materials, and labor to correct deficiencies found during the commissioning process.
- 1.11 Participate in plumbing system, assemblies, equipment, and component maintenance orientations and inspections as directed by the CxP.
- 1.12 Provide information requested by the CxP for commissioning documentation and testing.
- 1.13 Perform all quality control functions to ensure equipment and systems are installed properly. Ensure equipment and systems are brought to a state of readiness and full functionality prior to commencing the commissioning functional performance testing processes.
- 1.14 Provide a representative to attend end of warranty testing.

22 11 16 Domestic Water Piping and Appurtenances

- 1. Summary: This section includes domestic water piping from 5 feet outside of building to fixtures and equipment inside the building.
- 2. Piping Products and Applications: Project specifications to include the following:
 - 2.1 Underground Piping:
 - 2.1.1 All underground piping to be copper or C-900 Brute.
 - 2.1.2 Copper Tubing: All copper to meet ASTM B88 standards.
 - 2.1.2.1 2 inch diameter and smaller: Type "L" soft drawn commercially pure copper.
 - 2.1.2.2 2-1/2 inch diameter or larger: Type "L" hard drawn commercially pure copper.
 - 2.2 Under Slab Piping:
 - 2.2.1 Copper Tubing: All copper to meet ASTM B88 standards.
 - 2.2.1.1 2 inch diameter and smaller: Type "K" soft drawn commercially pure copper.
 - 2.2.1.2 2-1/2 inch diameter and larger: Type "K" hard drawn commercially pure copper.
 - 2.2.1.3 Joints/fittings are not allowed in piping runs beneath concrete slabs. All joints to be in accessible areas above the slab (behind access doors in walls, in mechanical closets, etc.).
 - 2.2.1.4 Copper tubing to be sleeved with code approved sleeving.
 - 2.3 Interior Piping: All copper tubing to be Type "L" hard drawn commercially pure copper and to meet ASTM B88 standards.
 - 2.4 Polyethylene Encasement (PE): PE encasement for underground metal piping to be PE film 0.008-inch (0.20-mm) minimum thickness, tube or sheet and to meet ASTM A 674 or AWWA C105.
 - 2.5 Piping Applications:
 - 2.5.1 Transitions and special fittings with pressure rating at least equal to piping rating may be used in applications below, unless otherwise indicated.
 - 2.5.1.1 Flanges to be used on above-ground piping. All flanges to be accessible.
 - 2.5.1.2 Grooved joints may be used on aboveground grooved-end piping.
 - 2.5.1.3 Fitting Option: Mechanically formed tee-branch outlets and brazed joints may be used on aboveground copper tubing.

- 2.6 Pipe Fittings:
 - 2.6.1 Copper Piping Unions:
 - 2.6.1.1 150 lb. standard.
 - 2.6.1.2 300 lb. water-oil-gas service copper with ground joints.
 - 2.6.1.3 Di-electric unions are required at connections of dissimilar metals.
 - 2.6.2 Only soldered fittings are allowed. Compression fittings and mechanical fastening systems are not allowed in any application for Dallas ISD projects.
- 2.7 Pipe Joints:
 - 2.7.1 All pipe joints to conform to ASTM B813 and ASTM B828.
 - 2.7.2 Use a cast brass adapter when connecting copper pipe to screwed brass pipe.
 - 2.7.3 Copper piping joints to use solder fittings.
 - 2.7.3.1 Solid string, hard solder.
 - 2.7.3.2 Wire, hard solder.
 - 2.7.3.3 Cored solder is not allowed.
 - 2.7.3.4 Solder:
 - 2.7.3.4.1 1-1/2 inch and smaller: 95-1/2% tin, 4% copper and 1/2% silver.
 - 2.7.3.4.2 2 inch and larger: "SILFOS15", 15% silver, 80% copper, 5% phosphorous.
 - 2.7.3.5 Flux to be non-corrosive, lead-free paste.
- 2.8 Piping Installation:
 - 2.8.1 Install sleeve with water stop and mechanical sleeve seal at each service pipe penetration through the foundation wall. Select number of interlocking rubber links required to make installation watertight.
 - 2.8.2 Install aboveground domestic water piping level and plumb.
 - 2.8.3 Set outlet pressure at 80 psig maximum for water pressure regulators, unless otherwise indicated.
 - 2.8.4 Ductile iron water service piping is not allowed.
- 3. Valves:
 - 3.1 Locate accessible isolation valves in the following locations:
 - 3.1.1 Restroom Gang: above lay-in ceilings adjacent to gang restrooms. When hard ceilings are present provide 18"x18" (minimum) ceiling access panel to access valves.
 - 3.1.2 Individual (private) Restrooms: above lay-in ceilings adjacent to restroom. When hard ceilings are present provide 18"x18" (minimum) ceiling access panel to access valve.
 - 3.1.3 Individual Fixtures: above lay-in ceilings adjacent to restroom. When hard ceilings are present provide 18"x18" (minimum) ceiling access panel to access valve.
 - 3.1.4 In corridors to allow isolation of buildings wings, sections, areas.
 - 3.1.5 On main water entry upstream of strainer and backflow preventer (if backflow preventer is inside building).
 - 3.1.6 At each exterior wall hydrant and each roof hydrant.
 - 3.1.7 At all appliances and plumbing fixtures.

- 3.2 Install shut-off valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside building at each domestic water service.
 - 3.3 Isolation valves to be 1/4 turn full port ball valves.
 - 3.4 Provide sectional valves close to water main on each branch and riser serving plumbing fixtures or equipment. Use ball valves for piping NPS 3 and smaller.
 - 3.5 Provide shutoff ball valves on each water supply to equipment and plumbing fixtures without supply stops.
 - 3.6 Provide drain valves for equipment, at base of each water riser, at low points in horizontal piping, and where required to drain water piping.
 - 3.6.1 Install hose-end drain valves at low points in water mains, risers, and branches.
 - 3.6.2 Install stop-and-waste drain valves where indicated.
 - 3.7 Install calibrated balancing valves in each hot-water circulation return branch and discharge side of each pump and circulator.
 - 3.8 Project specifications to require Contractor to set calibrated balancing valves partly open to restrict but not stop flow.
 - 3.9 Project specifications to require di-electric unions at connections of dissimilar metals.
 - 3.10 Project specifications to require Contractor to provide drawings showing all installed isolation valve locations in closeout documents.
 - 3.11 Project specification to require that all water valve installations be labeled, diagrammed, and provide with an access panel.
4. Valve Requirements by Type: Project specifications to include the following:
- 4.1 Check Valves: 125 lb. bronze check valve with "Buna N" disc.
 - 4.2 Ball Valves:
 - 4.2.1 150 psi, bronze 1/4 turn ball valve with full port, stainless steel ball.
 - 4.2.2 300 psi, bronze 1/4 turn ball valve with full port, stainless steel ball. ASTM 61.
 - 4.2.3 125 psi lead free dezincification resistant arsenical brass 1/4 turn ball valve with full port, stainless steel ball C46500 or CW 511L, ASTM 763, or C46750.
 - 4.3 Temperature and pressure relief valves: ASME rated valve.
 - 4.4 Water Main Valves: 150 lb. AWWA valve.
 - 4.5 Pressure Reducing Valves: 300 lb. bronze sealed spring cage, strainer.
 - 4.6 Cast Iron: ASTM A126, Class B.
 - 4.7 Cast Carbon Steel: ASTM A216, Grade WCB.
 - 4.8 Forged Carbon Steel: ASTM A105, Grade II.
 - 4.9 Drain Duty: Hose-end drain valves.
 - 4.10 Gate valves are not allowed on any domestic potable water piping.
5. Water Hammer Arrestors:
- 5.1 Provide on hot and cold-water supply lines. Locate between last two flush/solenoid valves on supply lines or per manufacturer's recommendations.
 - 5.2 Project specifications to require water hammer arrestors to be located within 3 feet of single toilet fixtures or per manufacturer's recommendation.

- 5.3 Project specifications to require Contractor to provide as-built drawings showing all final water hammer arrestor locations with sizes.
- 6. Hanger and Support Requirements: Project specifications to include the following:
 - 6.1 Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 6.2 Base of Vertical Piping: MSS type 52, spring hangers.
 - 6.3 Support Vertical Piping and tubing at base and at each floor.
 - 6.4 Individual, straight, horizontal piping runs: According to the following:
 - 6.4.1 100 feet and less: MSS type 1, adjustable, steel clevis hangers.
 - 6.4.2 Longer than 100 feet: MSS type 43, adjustable roller hangers.
 - 6.4.3 Longer than 100 feet, if indicated: MSS type 49, spring cushion rolls.
 - 6.5 Multiple, straight, horizontal piping runs 100 feet or longer: MSS type 44, pipe rolls.
 - 6.6 Support pipe rolls on trapeze.
 - 6.7 Install vertical hangers for all horizontal piping every 10 feet maximum.
 - 6.8 Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 6.8.1 NPS 3/4 and smaller: 5 feet with 3/8-inch rod.
 - 6.8.2 NPS 1 and NPS 1-1/4: 6 feet with 3/8-inch rod.
 - 6.8.3 NPS 1-1/2 and NPS 2: 8 feet with 3/8-inch rod.
 - 6.8.4 NPS 2-1/2: 9 feet with 1/2-inch rod.
 - 6.8.5 NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
 - 6.8.6 NPS 6: 10 feet with 5/8-inch rod.
 - 6.8.7 NPS 8: 10 feet with 3/4-inch rod.
- 7. Connection Requirements:
 - 7.1 Install piping adjacent to equipment and machines to allow service and maintenance.
 - 7.2 Connect domestic water piping to exterior water service piping with shutoff valve. Use transition fitting to join dissimilar piping materials.
 - 7.3 Extend domestic water piping and connect to the following equipment:
 - 7.3.1 Booster Systems: Cold-water suction and discharge piping.
 - 7.3.1.1 Water Heaters: Cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
 - 7.3.1.2 Plumbing Fixtures: Cold and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code.
 - 7.3.1.3 All Other Equipment: Cold and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.
- 8. Pipe Cleaning Requirements: Project specifications to include the following Contractor responsibilities:
 - 8.1 Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before placing system into service.
 - 8.2 Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in AWWA C651 or AWWA C652.

- 8.3 Prepare and submit reports of purging and disinfecting activities.

22 13 00 Facility Sanitary Sewerage

1. Provide floor drains (round drains with heel proof drain covers) in the following locations and where required by code.
 - 1.1 Each large student restroom (possibly more than one in each restroom).
 - 1.2 Kitchens and dishwashing areas.
 - 1.3 Mechanical rooms.
 - 1.4 Locker rooms.
 - 1.5 Laundry rooms for washer.
 - 1.6 Emergency showers.
2. Provide trap guards and trap seals for all floor drains.
3. Provide lint screen at all laundry room floor drains for washers.
4. Provide plaster traps on all art room sinks.
5. All sanitary sewer piping to be minimum schedule 40 PVC in accordance with ASTM D-2665. Exception: Where piping is routed through a mechanical plenum space.
 - 5.1 All new piping exits to remain schedule 40 PVC until piping enters city domain. Piping material transitions on Dallas ISD property are not allowed.
 - 5.2 Where new connections are to be made to existing piping that is not Schedule 40, existing piping to be replaced with Schedule 40.
6. All underground sanitary sewer lines to accommodate soil movement by means of a pea gravel backfill/embedment or other method deemed appropriate by the Architect. Provide a clear detail on construction drawing sheets.
7. All exposed piping in kitchen areas to be DWV copper, exposed PVC piping is not allowed.
8. Greywater/rainwater harvesting strategies will be reviewed on a case-by-case basis.
9. Acid waste piping is not required at science labs.
10. Provide grease traps for food service kitchens. Refer to 11 40 00 Food Service Equipment for details.
11. Hub drains are not allowed in crawl spaces, suspended ceilings, or concealed walls.
12. Project specifications to require the following:
 - 12.1 All sanitary sewer systems to be smoke tested by a third-party contractor hired by the General Contractor.
 - 12.2 All sanitary sewer lines to be inspected by camera before and after work is completed. Contactor to hire a 3rd party to perform inspection and submit recordings to Dallas ISD designated representative on a flash drive.
13. Clean-out requirements:
 - 13.1 Each gang restroom to have two (2) horizontal and one (1) vertical clean-out.
 - 13.2 Vertical clean-outs to be located in walls and have an access door.
 - 13.3 Standalone lavatories to have a horizontal and vertical clean-out.

22 13 18 Condensate Piping

1. Terminate all condensate piping into a running p-trap (hub drains are not allowed).
2. Piping within the building to be type DWV copper and insulated with closed-cell insulation.
3. Piping on the exterior to be schedule 40 CPVC and painted with UV resistant paint.
4. Terminate piping in an accessible location.

22 14 01 Roof Drainage and Appurtenances

1. Set splash blocks on concrete pads sized at a minimum of 3 feet by 3 feet. Pad is to be secured in-position. Connect pad to structure where possible.
2. Insulate all interior roof drain piping regardless of material to prevent sweating.

22 14 29 Sump Pumps

1. Sump pumps to be provided with quick removal system that allows pump removal or re-installation into the basin without disturbing any valve or pipe connections.
2. Basis System Components:
 - 2.1 Steel base plate with stationary discharge fitting and spool support.
 - 2.2 Two (2) cast iron discharge elbows, one (1) stationary, one (1) moveable.
 - 2.3 Two (2) galvanized guide poles with connecting bars.
 - 2.4 Stainless steel wire rope and complete fittings.
 - 2.5 Rectangular hinged steel cover plate with drop handles and hinges with lockable latch.
3. Sump pumps to be equipped with local audible and visual alarms.
4. Sumps pumps to be monitored by the building controls system. Secondary independent float switch to be provided above the primary float switch. Pump controls to be capable of sending alarm. Refer to Division 23 for additional information.

22 16 01 Natural Gas Piping and Appurtenances

1. Paint all gas piping yellow.
2. Mega press/compression fittings are not allowed.
3. Sleeve all gas piping in crawlspaces.
4. Renovations: When gas service is increased, reset/recalibrate all existing to remain regulators.

22 30 00 Plumbing Equipment (Domestic Hot Water Systems)

1. General Requirements:
 - 1.1 Hot water loops to provide tempered water to all areas via a master mixing valve located in the same room as the water heater. Mixing valves for each fixture are not preferred. Exception provide kitchen hot water from a separate water heater.
 - 1.2 Centrally locate all domestic hot water heaters in a mechanical room with exterior door access when possible.
 - 1.3 Point-of-use hot water heaters or insta-hots are not allowed.
 - 1.4 Provide electric water heaters in all applications up to 50 gallons.
 - 1.5 In areas using larger gas fired water heaters, provide a CO monitoring system with automatic shut-down and external notification.

- 1.6 Where water heaters over 199,000 BTU/h are used, provide a boiler/storage tank configuration in accordance with the manufacturer's recommendations.
 - 1.7 Implement a recirculation system when the piping length from the water heater to the fixtures surpasses 43 feet. Provide a check valve in the main return to prevent reversal of flow. Provide a check valve on cold water feed.
 - 1.8 Provide a check valve on all cold-water feed lines to water heaters of all sizes.
 - 1.9 Hot water temperatures: not less than 140 degrees F.
 - 1.10 Provide a 4 inch thick concrete housekeeping pad and drain pan for all floor mount water heaters.
 - 1.11 Provide and install an expansion tank at each water heater installation per manufacturer's requirements. All expansion tanks to bear ASME seal that serve boilers greater than 200,000 BTUH or 120 gallons of storage.
 - 1.12 Pressure and Temperature Test Plugs: provide two (2) sets of suitable pressure and temperature gauges for use with the plugs.
 - 1.13 Maintain water temperature at not less than 140 degrees F in hot water tanks unless other techniques are used to prevent bacterial growth. Supply a separate water heating system capable of delivering up to 180 degrees F to all kitchen equipment. Heating system to be easily accessible from kitchen.
2. Domestic Water Heaters: Project specifications to include the following acceptable manufacturers:
- 2.1 Small Capacity Electric Water Heaters:
 - 2.1.1 Lochinvar.
 - 2.1.2 A.O. Smith.
 - 2.1.3 RBI.
 - 2.2 Gas Water Heaters (0-199 MBTU):
 - 2.2.1 Lochinvar (Shield).
 - 2.2.2 A.O. Smith (Cyclon).
 - 2.2.3 RBI.
 - 2.3 Commercial Grade Electric Water Boilers:
 - 2.3.1 ASME Code Section IV (more than 58 KW).
 - 2.3.2 Minimum Working Pressure: 160 psi.
 - 2.4 Commercial Grade Gas Water Boilers:
 - 2.4.1 ASME Code Section IV (more than 200,000 BTU input).
 - 2.4.2 AGA Seal of Certification.
 - 2.4.3 Minimum working pressure: 150 psi.
3. Temperature and Relief Valves:
- 3.1 Comply with ANSI Z21.22.
 - 3.2 Discharge line from valve to be same size as valve outlet.
4. Circulation Pumps:
- 4.1 Control pumps locally, not by a central building energy management system. Provide control per current energy code.
 - 4.2 Project specifications to require that pumps are to be 100% bronze construction (lead free).

5. Carbon Monoxide Detection:
 - 5.1 Provide carbon monoxide detector with a manual reset in each boiler room with greater than 200,000 BTUH total capacity of 120 gallons of total storage.
 - 5.2 Interlock the carbon monoxide detector and all heater(s)/boiler(s) in common room to disable the burners when the measured level of CO rises above 50 ppm.
 - 5.3 Carbon monoxide detector to disable the burners upon loss of power to the detector.

22 40 00 Plumbing Fixtures

1. Low voltage censored fixtures are allowed however, manual fixtures are preferred. Battery powered fixtures are not allowed.
2. Refer to Food Service plans and specifications for all kitchen plumbing fixture requirements.
3. Water Closets:
 - 3.1 1.28 gallons/flush.
 - 3.2 Manual flush valve.
 - 3.3 Urethane gasket required.
 - 3.4 Wall-mounted with heavy-duty (or dual) wall carrier.
 - 3.5 If a fixture is replaced, replace the corresponding wall carrier as well.
4. Urinals:
 - 4.1 0.5 gpf maximum.
 - 4.2 Manual flush valve.
 - 4.3 Integral p-trap.
 - 4.4 Waterless urinals are not allowed.
 - 4.5 Ultra low flow fixtures are not allowed.
5. Lavatory Faucets (in student restrooms):
 - 5.1 New Construction and Major Plumbing Renovations For Elementary Schools:
 - 5.1.1 Provide automatic infrared hard-wired with box mounted transformers.
 - 5.1.1.1 Transformers are to be located above ceiling.
 - 5.1.1.1.1 If ceiling is lay-in type, locate transformer above lavatory.
 - 5.1.1.1.2 If location has hard ceiling, locate transformer in an accessible location above ceiling in corridor.
 - 5.1.2 Battery powered faucets are not allowed.
 - 5.2 Partial Restroom Renovations and Single Fixture Replacements:
 - 5.2.1 0.2 gallons/cycle.
 - 5.2.2 Mechanically metered and tamper resistant with 4 inch center set faucet.
 - 5.3 Lavatory Faucet Supplies: 3/8 inch chrome plated copper attached to a 1/2 inch IPS x 3/8 inch flare chrome plated loose-key stop.
 - 5.4 All exposed chrome plated fittings polished.
 - 5.5 New lavatories to have flexible supply line only: Single faucets with rigid supply lines are not allowed.
 - 5.6 Adjustable duration set for 20-30 seconds.

- 5.7 Single hole lavatories are not allowed for durability reasons.
- 5.8 Gooseneck faucets are not allowed.
- 6. Lavatory Sinks:
 - 6.1 All lavatory sinks to be porcelain.
 - 6.2 Wall mounted sinks to be provided with appropriate carrier.
 - 6.3 If a fixture is replaced, replace the corresponding wall carrier as well.
 - 6.4 Wall mounted lavatories to be equipped with concealed arm (floor mounted) carriers.
 - 6.5 Hand wash stations / wash fountains are not allowed.
- 7. Science Laboratory Sinks:
 - 7.1 Under-mount epoxy at physical science labs.
 - 7.2 Commercial grade stainless steel at all other science labs.
- 8. Custodial sinks:
 - 8.1 Floor-basin-type 4 inch curb service sink with hose bib connection.
 - 8.2 Industry standard faucet with supporting bracket.
 - 8.3 Nonporous seamless for ease of cleaning.
 - 8.4 Accommodate four (4) gallon mop buckets.
 - 8.5 Include water resistant surface around mop sink.
- 9. Library Sinks:
 - 9.1 Under-mounted.
 - 9.2 Provide hot and cold water.
- 10. Art Classroom Sinks:
 - 10.1 Commercial grade stainless steel, 8" deep with a clay trap.**
 - 10.2 Provide one (1) ADA depth basin. All others to be deep basin.
- 11. Other Sinks:
 - 11.1 Commercial grade stainless steel.
 - 11.2 Provide wall mounted sinks with appropriate carrier.
- 12. Showers:
 - 12.1 2.0 pgm @80 psi.
 - 12.2 Vandal-resistant, low-flow shower heads.
 - 12.3 Stainless steel for durability.
 - 12.4 All valves to have internal stops with anti-scald shower valve.
- 13. Dual-Height Electric Water Coolers:
 - 13.1 Wall-mounted.
 - 13.2 Stainless steel.
 - 13.3 Local condensing unit.
 - 13.4 Equip with vandal resistant bubbler.

- 13.5 Provide at each large student restroom and at other locations as requested by Dallas ISD or required by codes.
- 13.6 Provide bottle filling station at gymnasium and cafeteria area to meet the below requirements:
 - 13.6.1 Halsey Taylor Hydro Boost bottle filling station. Model HTHBWF-OVLSER-1 or Dallas ISD approved equal. The exact model to be selected for the location and application.
 - 13.6.2 Unit to have the Water Sentry Fresh 6000 CTO filter or Dallas ISD approved equal.
 - 13.6.3 Utilize the HTOVLAPR cane touch apron or Dallas ISD approved equal where needed. Verify required locations with Architect.
 - 13.6.4 Renovations: Use the Halsey Taylor HTHBGRN8-WF or Dallas ISD approved equal. The exact model to be selected for the location and application.
 - 13.6.5 Refrigeration package to utilize HFC-134A or Dallas ISD approved equal.
- 13.7 Exterior drinking fountains are not allowed.
- 13.8 Remove all existing recessed water fountains and replace with allowable fixtures noted above.
- 13.9 Remove all existing classroom Bubblers and porcelain drinking stations.
- 13.10 Electric water coolers are not permitted in gymnasiums or in other areas with flooring susceptible to water damage. Locate these in an adjacent corridor with a floor drain.
- 13.11 Provide an electric water cooler in special needs program (SPED) areas.
- 14. Hose Bibbs:
 - 14.1 Locate lockable hose bibbs in large student restrooms, for cleaning purposes.
 - 14.2 Locate frost proof hose bibbs at 100 foot intervals along the exterior wall of the entire building.
 - 14.3 If mechanical equipment is located on the roof, locate frost proof hose bibbs within 50 feet of equipment for servicing.
 - 14.4 ***Provide new hose bibb at new outdoor sports fields. Route from the nearest water source to the new field.***
- 15. Drain Troughs (at Washing Machines):
 - 15.1 Provide manufactured drain troughs at all washing machine locations.
 - 15.2 Size to accommodate equipment it serves.
 - 15.3 Maintain depth at a minimum of 12 inches.
 - 15.4 Equip with lint screen.
 - 15.5 Design for above slab installation wherever possible.
 - 15.6 Approved Manufacturers:
 - 15.6.1 High Mark Manufacturing.
 - 15.6.2 H-M Company.

END OF DIVISION 22



Division 23 – Heating, Ventilation, and Air Conditioning

23 00 00 General Requirements:

1. Mechanical Systems Selection Criteria: Acceptable HVAC system selections to be determined by project types listed below:
 - 1.1 New Construction:
 - 1.1.1 *Primary HVAC System:* The mechanical system to be high efficiency air cooled chiller(s) with air handlers equipped with chilled water coils and pre-heat hot water coils serving single duct Variable Air Volume (VAV) boxes equipped with hot water reheat coils.
 - 1.1.1.1 Locate air cooled chillers on the ground.
 - 1.1.1.2 Locate boilers and hydronic pumps in interior mechanical rooms with access from dedicated exterior doors.
 - 1.1.1.3 Locate air handlers in interior mechanical rooms.
 - 1.1.2 *Secondary HVAC System:* The mechanical system for common use spaces that are occupied outside of school hours to dedicated (stand-alone) direct expansion (DX) packaged systems. Acceptable areas for secondary system types are MDF/IDF, computer rooms, administration areas, gymnasiums, music halls (ex: band/choir), kitchens, cafeterias/cafetorium and auditoriums. DX package system to be located on roof and include gas for heat.
 - 1.2 Additions and Major Renovations:
 - 1.2.1 *Primary HVAC System:* The mechanical system to be high efficiency air cooled chiller(s) with air handlers equipped with chilled water coils and pre-heat hot water coils serving single duct VAV boxes equipped with hot water reheat coils.
 - 1.2.1.1 Located air cooled chillers on the ground.
 - 1.2.1.2 Located boilers and hydronic pumps in interior mechanical rooms with access from dedicated exterior doors.
 - 1.2.1.3 Located air handlers in interior mechanical rooms in addition areas and in renovation areas where space is available.
 - 1.2.2 *Secondary HVAC System:* The mechanical system for common use spaces that are occupied outside of school hours to be stand-alone DX systems. Acceptable areas for secondary system types are MDF/IDF, computer rooms, administration areas, gymnasiums, music halls, kitchens, cafeterias/cafetorium and auditoriums. DX package system to be located on roof and include gas for heat.
 - 1.2.2.1 Additions: Secondary system may be used at MDF/IDF rooms.
 - 1.2.2.2 Renovations: Provide DX mini-split systems at MDF/IDF.

- 1.3 Minor Classroom Additions:
 - 1.3.1 Consider the existing system when determining a solution.
 - 1.3.1.1 Existing Hydronic System:
 - 1.3.1.1.1 If the existing hydronic system is capable of supporting the new addition, expand it to serve the new addition and is to consist of air handlers equipped with chilled water coils and pre-heat hot water coils serving single duct VAV boxes equipped with hot water reheat coils. Engineer to provide calculations.
 - 1.3.1.1.2 If the existing hydronic system is not capable of supporting to the addition, provide a Direct Expansion (DX) packaged system. Engineer to provide calculations.
 - 1.3.1.2 Existing Direct Expansion (DX) Packaged System: If the existing facility has a Direct Expansion (DX) packaged system, provide a Direct Expansion (DX) packaged for the new addition mechanical system.
 - 1.3.1.3 Existing Geothermal or Water Source Heat Pump System: Existing geothermal or water source heat pump systems are not to be expanded. A Direct Expansion (DX) packaged mechanical system is to be provided for the new addition.
- 1.4 Minor Mechanical Equipment (1 for 1) Replacements/Renovations:
 - 1.4.1 Consider the existing system and budgeted scope of work when determining a solution.
 - 1.4.2 Select equipment and systems that match the existing system.
 - 1.4.2.1 Exception 1: If the system life has expired, review options with Dallas ISD designated representative.
 - 1.4.2.2 Exception 2: Where geothermal or water source heat pumps, fan powered boxes and/or floor mounted unit ventilators are to be replaced. Install a direct expansion (DX) packaged mechanical system.
- 1.5 Geothermal Mechanical System Replacement Projects: Do not replace geothermal heat pump systems with new geothermal heat pump systems. Select the new mechanical system type from the options below, budget limitations and existing ductwork conditions. Obtain Dallas ISD designated representative written approval from selected approach.
 - 1.5.1 Option A: Provide a primary and secondary mechanical system in accordance with the Dallas ISD's preferred new construction system type. Primary hydronic with air handlers and VAV boxes with the secondary packaged DX system provided with all new ductwork and piping throughout.
 - 1.5.2 Option B: Provide a primary hydronic system with fan coil units and secondary DX systems for common use areas. This selection to be made when existing ductwork is determined to be in good condition and replacing the ductwork would be cost prohibitive and not fiscally responsible.

- 2. Mechanical Design Conditions:
 - 2.1 Chilled Water Design Criteria:
 - 2.1.1 New construction or renovations (major renovations include all chillers, pumps and associated hydronic AHU's being replaced).
 - 2.1.1.1 Chilled water supply/return temperature: 42°F/58°F
 - 2.1.2 Utilizing existing air handlers: Match existing chilled water design temperatures.
 - 2.2 Hot Water Design Criteria:
 - 2.2.1 New Construction or Renovations:
 - 2.2.1.1 Condensing boilers: 100°F/130°F
 - 2.2.1.2 Non-condensing boilers: 140°F/160°F (Limited Renovations Only)
 - 2.2.2 Utilizing existing air handlers and VAV boxes: Match existing hot water design temperatures
 - 2.3 Condenser Water Design Criteria:
 - 2.3.1 New Construction or Major Renovation:
 - 2.3.1.1 Ambient wet bulb: 78°F
 - 2.3.1.2 Condenser water temperature: 85°F/95°F
 - 2.4 Outdoor Design Criteria:
 - 2.4.1 Outdoor design conditions to be based on weather data tabulated in the latest edition of the ASHRAE Handbook of Fundamentals.
 - 2.4.1.1 Summer: Dry Bulb 101°F, Wet Bulb 75°F
 - 2.4.1.2 Winter: Dry Bulb 22° F
 - 2.5 Indoor Design Criteria:
 - 2.5.1 General: Interior occupied spaces:
 - 2.5.1.1 Summer: temperature: 72° – 74°F, RH: 40% – 55%
 - 2.5.1.2 Winter: temperature: 70° – 72°F, RH: 40% - 55%
 - 2.5.2 Mechanical equipment rooms, electrical (switchgear equipment) rooms, and elevator machine rooms:
 - 2.5.2.1 Summer Temperature: 90°F (max), RH: based on manufacturer or arc flash safety requirements.
 - 2.5.2.2 Winter Temperature: 55°F (min), RH: based on manufacturer or arc flash safety requirements.

- 3. Mechanical Design Requirements:
 - 3.1 General Design Requirements:
 - 3.1.1 Design dehumidification as an integral part of the HVAC system, preferably via passive means.
 - 3.1.2 Supply the chillers, boilers, and air handling units, with associated controls and pumps, with a Relay in a Box (RIB) with manual HOA switch. This is to allow Dallas ISD to turn on and run equipment locally. Activation of the switch the Building Automation System (BAS) that the unit is in manual override. The equipment on the BAS graphic changes color to red to alert that equipment has been manually overridden locally.
 - 3.1.3 Provide housekeeping pads for all mechanical equipment at a minimum 3 inches larger than the mounted equipment on all sides, unless drawings specifically require a greater distance.
 - 3.1.4 For all HVAC equipment located above ceilings, provide laminated identification tags on ceiling grid below to identify unit name and number as defined by the construction documents. Tags to be laminated plastic and fastened to ceiling grid with rivets and not adhesive.
 - 3.1.5 Victaulic or rolled groove piping/fittings are not allowed on Dallas ISD projects.
 - 3.1.5.1 Exception: Victaulic or rolled groove piping/fittings can be used in main mechanical rooms with written approval from Dallas ISD-M&O.
 - 3.1.6 Provide manual bleed valves at connection points to reheat coils.
 - 3.1.7 All motorized two-way control valves to be pressure independent.
 - 3.1.8 Use circuit setters or approved equal at all heating and cooling coils to balance system flow.
 - 3.2 Central Hydronic Plant Design Requirements:
 - 3.2.1 The chilled water piping system to be variable primary. Select chillers for proper turndown and flow reduction. Incorporate a way to maintain minimum flow back to chillers with the use of strategically placed bypass and three-way valves.
 - 3.2.2 Use air-cooled chillers for all facilities where a water chiller replacement is required.
 - 3.2.2.1 Exception: water cooled chillers are acceptable for re-installation where the existing conditions listed below are met:
 - 3.2.2.1.1 Existing water cooled chiller is 500 tons or above.
 - 3.2.2.1.2 Existing cooling tower is less than seven (7) years old and in good working condition.
 - 3.2.3 Design the chillers and associated pumps with redundancy built in.
 - 3.2.4 Consider part-load efficiencies in the operating features of the design.

- 3.2.5 The hot water piping/pumping system to be primary/secondary. Incorporate a way to maintain minimum flow back to boilers with the use of strategically placed three-way valves.
- 3.3 Airside Design Requirements:
 - 3.3.1 Always utilize airside economizer exemption if allowed by code. Higher efficiency equipment rated above base efficiency is the preferred method for both chillers and DX equipment.
 - 3.3.2 Use VAV air handlers with boxes where individual room control is desired or diverse loads are present.
 - 3.3.3 VAV System Design: One (1) VAV box for each classroom.
 - 3.3.4 Calculate static pressures based on actual design.
 - 3.3.5 Check VAV system sound levels at maximum flow. Evaluate inlet vanes and fan discharge dampers for noise in their most restricted position. Achieve duct noise control by controlling air velocity, not by over-sizing terminal units. Locate volume dampers in terminal units at least 6 feet from the closest diffuser.
 - 3.3.6 Use constant volume air handlers when supplying a single space and the load is uniform/predictable. Provide variable speed drive for balancing.
 - 3.3.7 VAV boxes and associated ductwork to be located above classroom ceilings where corridor ceilings do not provide adequate space.
 - 3.3.8 Avoid the use of roof mounted chilled water/hot water units and AHUs with coils. Preferably locate AHUs in a mechanical room with the manufacturer recommended service clearance.
 - 3.3.9 Fan powered boxes are not allowed.
 - 3.3.10 Provide a minimum 23 inches of service clearance for the VAV box controller and valve/actuators.
 - 3.3.11 Designs with dedicated outdoor air systems (DOAS) are not allowed.
 - 3.3.12 DX VAV packaged air handlers are not to be used. Air handlers serving VAV boxes to be hydronic chilled water / hot water only.
 - 3.3.13 Unit ventilators not to be included in new construction or renovation projects.
 - 3.3.14 Enthalpy wheels are not to be installed on any project. Where energy code requires an energy recovery unit use flat plate type only.
 - 3.3.15 All systems to be designed for demand control ventilation.
- 3.4 Load Calculation and Equipment Sizing Requirements:
 - 3.4.1 Base sensible and latent loads for people and equipment on the latest edition of ASHRAE Handbook of Fundamentals.
 - 3.4.2 Base internal heat gain by space on actual occupancies specified in the Educational Specifications. In the absence of a firm count, use the reasonably expected occupancy in lieu of the building code maximums.

- 3.4.3 For preliminary design heat loads, keep lighting levels consistent with the general building lighting concept, which consist of overhead lighting, task lighting or both. Assign room loads and return air heat gain accordingly.
 - 3.4.4 Provide mechanical system provision to add capacity for increased localized load concentrations in the future and allow modification to be made in one area without causing major disruptions in other areas of the facility. Do not provide additional capacity if it causes thermal comfort issues.
 - 3.4.5 Air flow diversity to be a sizing criterion. Take full diversity at the air handling unit and decrease the further the ductwork is from the source until no air flow diversity is taken for the final third of the system.
- 3.5 Renovations:
- 3.5.1 Include an evaluation of each piece of equipment in the renovated area which documents, at a minimum, the following items listed below. Submit the report and applicable information on equipment schedule in drawings.
 - 3.5.1.1 HVAC system type.
 - 3.5.1.2 Equipment Information: Condition, age, make/model, and equipment number.
 - 3.5.1.3 Facility Management Control System (FMCS) Control Type: Gather sufficient data to provide a clear plan for demolition of systems without affecting areas that are not renovated.
 - 3.5.2 Correct code deficiencies only within the alteration area. Upgrades to be required for equipment supporting the alteration area but located outside of it.
 - 3.5.3 Re-use or modify existing equipment if it is in good condition. Replace equipment for which replacement parts are no longer available.
 - 3.5.4 Remove ductwork, piping, etc. that is not re-used, in lieu of abandoning in place, unless removal is not practical. Note on drawings anything abandoned in place.
 - 3.5.5 Existing insulation to be evaluated for condition. Interior lined ductwork that is beyond its useful life to be removed.
- 3.6 Building Pressurization Requirements:
- 3.6.1 Keep the following spaces under negative pressure relative to surrounding building areas:
 - 3.6.1.1 Restrooms.
 - 3.6.1.2 Showers.
 - 3.6.1.3 Locker rooms.
 - 3.6.1.4 Kitchens.
 - 3.6.1.5 Special usage areas.
 - 3.6.1.6 Dishwashing areas (relative to the kitchen).
 - 3.6.1.7 Dressing rooms (associated with high school theater and dance programs).

- 3.6.1.8 Science labs.
 - 3.6.1.9 Nurses' areas.
 - 3.6.1.10 Laundry rooms.
 - 3.6.1.11 Shops: Workshops, scene shops, et a.
- 3.7 Auditoriums (high schools with theater and dance programs):
- 3.7.1 Locate ductwork high above lighting and away from theatrical equipment to assure no operational or maintenance conflicts.
 - 3.7.2 Do not aim air down toward the stage or allow air flow to disturb stage curtains.
 - 3.7.3 Keep ductwork not visible to audience.
 - 3.7.4 In auditoriums, locate equipment outside of the primary stage area for noise mitigation purposes.
 - 3.7.5 Provide conditioned air to light and sound control booth.
- 3.8 Storm Shelter Coordination:
- 3.8.1 Written approval from Emergency Management representative is required. Refer to Division 13 for additional requirements.
 - 3.8.2 Provide a Contractor responsibility matrix on the General Drawing Sheet for storm shelters and in the Mechanical Drawing Sheets.
 - 3.8.3 Coordinate with Architect and other disciplines to assign clear responsibilities relating to which Contractor/discipline are to provide, install, and control individual components. Obtain Dallas ISD designated representative's written approval.
- 3.9 Kiln Room:
- 3.9.1 Design HVAC to maintain temperature at or below 110 degrees Fahrenheit.
 - 3.9.2 Provide an independent thermostat located in the kiln room.
 - 3.9.3 Provide whole room exhaust fan, vented to exterior rated for required CFM.
 - 3.9.4 Exhaust fan to be thermostatically controlled and set to 85 degrees Fahrenheit.
 - 3.9.5 Control to be mounted on the wall adjacent to the entry door to the Kiln Room.
 - 3.9.6 A kiln will generate approximately 23,000 BTU.
- 3.10 ***Elevator Machine Room:***
- 3.10.1 Elevator machine room exhaust fan to be controlled by an individual thermostat.
 - 3.10.2 Elevator shaft vents to be equipped with motorized dampers capable of being automatically closed during normal building operation and are interlocked to open, as required by the fire and smoke detection system.
- 3.11 ***MDF and IDF Rooms: Refer to Division 27 for HVAC requirements.***

- 3.12 Scene Shop: Provide ventilation in accordance with the dust collection system.
- 3.13 Libraries: Design HVAC system to reduce noise to the greatest extent feasible.
- 3.14 Classrooms: Refer to Division 27 for equipment to be considered when calculating heat load.**
- 3.15 Life Cycle Cost Analysis (LCCA):
 - 3.15.1 Where required by green building program, perform a life cycle cost analysis to compare alternatives that fulfill the same performance requirements but differ with respect to initial costs and operating costs. Include all costs arising from owning, operating, maintaining, and ultimately disposing of equipment. Provide LCCA scope to budget/schematic design on all projects that require HVAC systems to be replaced.
 - 3.15.2 Submit any recommended deviations from the TDG as a result of the LCCA to by the Dallas ISD designated representative for review and written approval.

23 05 00 Heating, Ventilation and Air Conditioning (HVAC)

- 1. Construction Documents/Plan Requirements:
 - 1.1 Provide the items listed below on the drawing sheets of the Construction Documents:
 - 1.1.1 Architect to provide a written statement to the effect that the Architect has provided adequate access and space for installation and servicing of all mechanical equipment. Include this statement in all phases from Schematic Design until final Constructions Documents to ensure proper coordination between design professionals.
 - 1.1.2 Architect to coordinate requirements for items requiring integration with mechanical systems but furnished in general construction and equipment furnished outside the Contract.
 - 1.1.3 Include a system design description in the mechanical drawing sheets, including a system description, operating data for the project, identification of the areas of the building the system serves, expected performance readings at the design load conditions and, where applicable, at part load conditions.
 - 1.1.4 Provide an emergency power response matrix for all equipment and components (air handlers, dampers, valves, etc.) with their status and action during a fire alarm and under emergency power. This is applicable to any project with HVAC renovations to ensure the equipment is properly integrated into the emergency system(s).
 - 1.1.5 Provide HVAC equipment control sequences in the mechanical drawings, and not in the in the specifications.
 - 1.1.6 Engineer to require the building automation system (BAS) Contractor to submit the graphics for the system as a required submittal. Upload the pre-approved graphics to the BAS no later than 30 days before staff occupancy.
 - 1.1.7 Provide simplified single-line schematics illustrating flows and relationships of all air and hydronic systems. Note flows and equipment control sequence on the diagram. This applies to all projects that the HVAC system is renovated. It requires the design professional to do a proper job site review.
 - 1.1.8 Provide/show facility management control system (FMCS) main Java application control engine (JACE) controller location on the construction drawing sheets.

- 1.1.9 Provide note on drawing sheets that states, "Controls vendor to screenshot existing controls system graphics for entire facility prior to work commencing and submit this audit information to Dallas ISD designated representative."
- 1.1.10 Provide a general note requiring building structure to independently support all piping, ductwork and equipment.
- 1.1.11 Include chilled/hot water piping schematics on construction drawings showing piping connections to chillers, boilers, AHUs, etc.
- 1.1.12 Direct the Contractors to not operate chilled or hot water pumps or water loops until proper flushing and water treatment has been completed. Refer to section 23 25 00 HVAC Water Treatment for additional information.

23 05 13 Motor Requirements for HVAC Equipment

- 1. All motors to be high efficiency type and suitable for use with a Variable Frequency Drive (VFD).
- 2. All motors to be nominally rated 1800 or 3600 rpm.
- 3. Use direct drive motors whenever possible.
- 4. Motors above 1/16 HP and below 1 HP can be Electrically Commutated Motors (ECM).
- 5. Motors 3/4 HP and larger: Three (3) phase.
- 6. Motors smaller than 1/2 HP: Single phase.

23 05 19 HVAC Piping Meters and Gauges

- 1. Thermometers:
 - 1.1 Die-cast aluminum or brass case, liquid-in-glass, 7 inches long.
 - 1.2 Connector: adjustable type, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device.
 - 1.3 Stem: Copper-plated steel, aluminum, or brass for thermowell installation and of length to suit installation.
 - 1.4 Applications:
 - 1.4.1 Install liquid-in-glass thermometers in the inlet and outlet of each of the following locations:
 - 1.4.1.1 Hydronic zone.
 - 1.4.1.2 Hydronic boiler and chiller.
 - 1.4.1.3 Hydronic coil in air-handling units and built-up central systems.
 - 1.4.1.4 Hydronic heat exchanger.
 - 1.4.1.5 Hydronic heat-recovery unit.
 - 1.4.1.6 Thermal storage tank.
 - 1.4.2 Provide the following temperature ranges for thermometers:
 - 1.4.2.1 Domestic Hot Water: 30 to 180°F, with 2-degree scale divisions.

- 1.4.2.2 Domestic Cold Water: 0 to 100° F, with 2-degree scale divisions.
 - 1.4.2.3 Heating Hot Water: 30 to 240° F, with 2-degree scale divisions.
 - 1.4.2.4 Condenser Water: 0 to 160° F, with 2-degree scale divisions.
 - 1.4.2.5 Chilled Water: 0 to 100° F, with 2-degree scale divisions
- 1.5 Install all thermometers and gauges to be visible from the floor.
- 1.6 Acceptable Manufacturers:
 - 1.6.1 Terice.
 - 1.6.2 Weiss.
 - 1.6.3 Weksler Instruments.
- 2. Pressure Gauges:
 - 2.1 Direct-mounting, dial-type liquid-filled type, drawn steel or cast aluminum, 4-1/2-inch diameter.
 - 2.2 Gauge Application:
 - 2.2.1 Provide gauges for inlet and discharge of each pressure-reducing valve.
 - 2.2.2 Provide gauges at chilled- and condenser-water inlets and outlets of chillers.
 - 2.2.3 Provide gauges at suction and discharge of each pump.
 - 2.2.4 Provide all gauges visible from the floor.
 - 2.3 Acceptable Manufacturers:
 - 2.3.1 Terice.
 - 2.3.2 Weiss.
 - 2.3.3 Weksler Instruments.
- 3. Test Plugs:
 - 3.1 Install corrosion-resistant brass or stainless-steel body with core inserts and gasketed and threaded cap with extended stem for units in insulated piping.
 - 3.2 Provide Pressure and Temperature Test Plugs (PETE) at inlet and outlet of all cooling and heating coils, pumps, and any other HVAC equipment.
 - 3.3 Acceptable Manufacturers:
 - 3.3.1 Flow Design, Inc.
 - 3.3.2 MG Piping Products Co.
 - 3.3.3 National Meter, Inc.
 - 3.3.4 Peterson Equipment Co., Inc.

- 3.3.5 Sisco Manufacturing Co.
- 3.3.6 Trerice, H. O. Co.
- 3.3.7 Watts Industries, Inc.; Water Products Div.

23 05 23 General Duty Valves for HVAC Piping

1. Required Valve Applications:

- 1.1 Refer to piping sections for specific valve applications. If valve applications are not indicated, use the following:
 - 1.1.1 Shutoff Service: Butterfly, or gate valves.
 - 1.1.2 Throttling Service: Ball or control valves.
 - 1.1.3 Pump Discharge: Spring-loaded, lift-disc check valves.
- 1.2 Chilled, Condenser, and Heating Hot Water Piping: Use the following types of valves:
 - 1.2.1 Ball Valves, NPS 2 and smaller: Two (2) or three (3)-piece, 600-psig CWP rating, copper alloy.
 - 1.2.2 Ball Valves, NPS 2-1/2 and larger: Class 150, ferrous alloy.
 - 1.2.3 Butterfly Valves, NPS 2-1/2 and larger: Single-flange or flanged, 150-psig CWP rating for dead-end service, ferrous alloy, with EPDM liner.
 - 1.2.4 Grooved-End, Ductile-Iron Butterfly Valves, NPS 2-1/2 and larger: 175-psig CWP rating.
 - 1.2.5 Lift Check Valves, NPS 2 and smaller: Class 125 or 150, horizontal or vertical, bronze.
 - 1.2.6 Swing Check Valves, NPS 2 and smaller: Class 125 or 150, bronze.
 - 1.2.7 Swing Check Valves, NPS 2-1/2 and larger: Class 125, gray iron.
 - 1.2.8 Grooved-End, Ductile-Iron, Swing Check Valves, NPS 2-1/2 and larger: 175-psig CWP rating.
 - 1.2.9 Wafer Check Valves, NPS 2-1/2 and larger: Dual-plate, wafer-lug or double-flanged, class 125 or 150 ferrous alloy.
 - 1.2.10 Spring-Loaded, Lift-Disc Check Valves: Class 125 or 250, cast iron.
 - 1.2.11 Gate Valves, NPS 2 and smaller: Class 125 or 150, bronze.
 - 1.2.12 Gate Valves, NPS 2-1/2 and larger: Class 125, NRS or OS and Y, bronze-mounted cast iron.
- 1.3 Select valves with the following end connections:
 - 1.3.1 Copper Tubing:
 - 1.3.1.1 NPS 2 and smaller: Threaded ends.

1.3.1.2 NPS 2-1/2 to NPS 4: Flanged or threaded ends.

1.3.1.3 NPS 5 and larger: Flanged ends.

1.3.2 Steel Piping:

1.3.2.1 NPS 2 and smaller: Threaded ends.

1.3.2.2 NPS 2-1/2 and larger: Flanged, grooved, or threaded ends.

2. Valve Installation Requirements:

2.1 Provide valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

2.2 Locate valves for easy access and provide separate support where necessary.

2.3 Provide valves in horizontal piping facing upwards with stem at or above center of pipe.

2.4 Provide valves in position to allow full stem movement.

2.5 Provide isolation valves at each major branch take off.

2.6 Provide chainwheel operators on valves NPS 4 and larger and more than 96 inches above floor.

2.7 Extend chains to 60 inches above finished floor elevation.

2.8 Provide check valves to provide proper direction of flow as follows:

2.8.1 Swing Check Valves: In horizontal position with hinge pin level.

2.8.2 Dual-Plate Check Valves: In horizontal or vertical position, between flanges.

2.8.3 Lift Check Valves: With stem upright and plumb.

23 05 29 Hanger and Support for HVAC Piping and Equipment

1. Pipe Hangers, Supports, and Components:

1.1 Galvanized, Metallic Coatings: For piping and equipment that do not have field-applied finish.

1.2 Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

1.3 Installation: Hangers, support, clamps, engineered support systems and attachments to be installed as required to properly support piping from building structure.

2. Channel Support Systems:

2.1 Coatings: Manufacturer's standard painted or galvanized finish.

2.2 Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

3. Thermal-Hanger Shield Inserts: 100-psi minimum compressive-strength insulation, encased in sheet metal shield.

3.1 Material for cold piping: ASTM C 552, Type I cellular glass or water- repellent-treated, ASTM C 533, Type I calcium silicate with vapor barrier.

3.2 Material for hot piping: ASTM C 552, type I cellular glass or water- repellent-treated, ASTM C 533, type I calcium silicate.

3.3 For Trapeze or Clamped System: Insert and shield cover entire circumference of pipe.

- 3.4 For Clevis or Band Hanger: Insert and shield cover over 180 degrees of pipe.
- 3.5 Insert Length: Extend 2 inches beyond sheet metal shield.

23 05 53 Mechanical Identification

1. Identification Device Types and Requirements:

1.1 Equipment Nameplates:

- 1.1.1 General: Phenolic-resin laminated with data engraved, not stamped, for permanent attachment on equipment. If equipment is located above ceiling, utilize a white phenolic-resin laminated identification tag riveted to the ceiling grid or ceiling structure at that unit.
- 1.1.2 Equipment tags to indicate room number served by unit. Contractor to coordinate with Architect and controls vendor to ensure room naming matches.
- 1.1.3 Nameplate Data: Manufacturer, product name, model number, and serial number.
- 1.1.4 Install and permanently fasten equipment nameplates on each major item of mechanical equipment that does not have nameplate or has nameplate that is damaged or located where not easily visible. Locate nameplates where accessible and visible. Include nameplates for the following general categories of equipment.
 - 1.1.4.1 Fuel-burning units, including boilers, furnaces, heaters, stills, and absorption units.
 - 1.1.4.2 Pumps, compressors, chillers, condensers, and similar motor-driven units.
 - 1.1.4.3 Heat exchangers, coils, evaporators, cooling towers, heat recovery units, and similar equipment.
 - 1.1.4.4 Fans, blowers, primary balancing dampers, and mixing boxes.
 - 1.1.4.5 Packaged HVAC, central-station air handlers and zone-type units.

1.2 Equipment Markers:

- 1.2.1 Terminology: Match schedules as closely as possible.
- 1.2.2 Cellulose, paper-base, phenolic- resin-laminate engraving stock; grade ES-2. Fabricate in sizes required for message.
- 1.2.3 Required Data: Name and plan number, design capacity.
- 1.2.4 Size: 4-1/2 by 6 inches for equipment, 2-1/2 by 4 inches for control devices, dampers, and valves.
- 1.2.5 Install equipment markers with mechanical fasteners on or near each major item of mechanical equipment.
 - 1.2.5.1 Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds (2/3) to three-fourths (3/4) the size of principal lettering.

- 1.2.5.2 Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
- 1.2.5.3 Locate markers where accessible and visible. Include markers for the following general categories of equipment:
 - 1.2.5.3.1 Material main control and operating valves, including safety devices and hazardous units such as gas outlets.
 - 1.2.5.3.2 Fire department hose valves and hose stations.
 - 1.2.5.3.3 Meters, gages, thermometers, and similar units.
 - 1.2.5.3.4 Fuel-burning units, including boilers, furnaces, heaters, stills, and absorption units.
 - 1.2.5.3.5 Pumps, compressors, chillers, condensers, and similar motor-driven units.
 - 1.2.5.3.6 Heat exchangers, coils, evaporators, cooling towers, heat recovery units, and similar equipment.
 - 1.2.5.3.7 Fans, blowers, primary balancing dampers, and mixing boxes.
 - 1.2.5.3.8 Packaged HVAC, central-station air handlers and zone-type units.
 - 1.2.5.3.9 Tanks and pressure vessels.
 - 1.2.5.3.10 Strainers, filters, humidifiers, water-treatment systems, and similar equipment.
- 1.3 Access Panel and Door Markers:
 - 1.3.1 1/16 inch thick, engraved laminated plastic, with abbreviated terms and numbers corresponding to identification.
 - 1.3.2 Install access panel markers with screws on equipment access panels.
- 1.4 Piping Identification Devices:
 - 1.4.1 Manufactured Pipe Markers:
 - 1.4.1.1 General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.
 - 1.4.1.2 Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
 - 1.4.1.3 Pipes with OD less than 6 inches, including insulation: Full-band pipe markers extending 360 degrees around pipe at each location.
 - 1.4.1.4 Pipes with OD 6 inches and larger, including insulation: Either full- band or strip-type pipe markers at least three (3) times letter height and of length required for label.

- 1.4.1.5 Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe marker to indicate direction of flow.
- 1.4.2 Pretensioned Pipe Markers: Pre-coiled semi-rigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.
- 1.4.3 Provide manufactured pipe markers indicating service on each piping system and flow indication arrows.
 - 1.4.3.1 Pipes with OD less than 6 inches, including insulation: Pretensioned pipe markers. Use size to ensure a tight fit.
 - 1.4.3.2 Pipes with OD 6 inches and larger, including insulation: Shaped pipe markers. Use size to match pipe and secure with fasteners.
- 1.4.4 Locate pipe markers and color as follows:
 - 1.4.4.1 Near each valve and control device.
 - 1.4.4.2 Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 1.4.4.3 Near penetrations through walls, floors, ceilings, and non-accessible enclosures.
 - 1.4.4.4 At access doors, manholes, and similar access points that permit view of concealed piping.
 - 1.4.4.5 Near major equipment items and other points of origination and termination.
 - 1.4.4.6 Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 - 1.4.4.7 On piping above removable acoustical ceilings where markers are visible, omit intermediately spaced markers.
- 1.5 Stencils:
 - 1.5.1 General: prepare with letter sizes according to ASME A13.1 for piping; minimum letter height of 1-1/4 inches for ducts; and minimum letter height of 3/4 inch for access panel and door markers, equipment markers, equipment signs, and similar operational instructions.
 - 1.5.2 Stencil Material: Metal or fiberboard.
 - 1.5.3 Stencil Paint: Exterior, gloss, alkyd enamel or acrylic enamel, black, unless otherwise indicated. Paint to be in pressurized spray-can form.
 - 1.5.4 Stenciled Equipment Marker Option: Stenciled markers to be provided instead of laminated plastic equipment markers, if lettering larger than 1 inch high is needed.
- 1.6 Valve Tags:
 - 1.6.1 General: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
 - 1.6.2 Material: 0.032-inch- thick brass or aluminum.

- 1.6.3 Valve-Tag Fasteners: Brass wire-link or beaded chain; or s-hook.
- 1.6.4 Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, plumbing fixture supply stops, shutoff valves, faucets, convenience and lawn-watering hose connections, and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- 1.7 Valve Schedules:
 - 1.7.1 General: For each piping system, on standard-size bond paper, tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1.7.2 Valve-Schedule Frames: 30 inch x 42 inch (paper size Arch E1) display frame for mounting on masonry walls for each page of valve schedule. Include mounting screws.
 - 1.7.3 Provide one (1) each for every mechanical equipment room.
 - 1.7.4 Schedule Location: Mount valve schedule on wall in accessible location in each major equipment room.
- 1.8 Warning Tags:
 - 1.8.1 General: Preprinted or partially preprinted, accident-prevention tags; of plasticized card stock with matte finish suitable for writing.
 - 1.8.2 Size: 3 by 5-1/4 inches minimum.
 - 1.8.3 Fasteners: Brass grommet and wire.
 - 1.8.4 Nomenclature: Large-size primary caption such as "DANGER, CAUTION, or DO NOT OPERATE."
 - 1.8.5 Color: Yellow background with black lettering.
 - 1.8.6 Installation: Write required warning information on, and attach warning tags to, equipment and other items where required.

23 07 00 HVAC Insulation

- 1. Ductwork Insulation Requirements: Externally insulate all ductwork except for the following:
 - 1.1 First 10 feet of the supply and return duct from roof mounted equipment as duct extends through the roof.
 - 1.2 Where duct lining is recommended for sound attenuation.
- 2. Piping Insulation Requirements:
 - 2.1 Insulate all chilled and hot water piping with fiberglass insulation with factory applied all service jacket.
 - 2.2 Minimum insulation thickness:
 - 2.2.1 All outdoor piping: 2 inch thick.

- 2.2.2 All crawlspace piping: 2 inch thick.
- 2.2.3 All indoor chilled water piping: 1-1/2 inch thick.
- 2.2.4 Indoor hot water piping greater than 1-1/2 inch diameter: 2 inch thick.
- 2.2.5 Indoor hot water piping less than 1-1/2 inch diameter: 1-1/2 inch thick.
- 2.3 Piping in crawlspace, mechanical rooms or exposed indoor piping to have PVC or metal jacketing.
- 2.4 Outdoor piping to have a metal jacket and heat trace.

23 08 00 Commissioning of HVAC

1. Architect is to include the following requirements of the Contractor at a minimum in the Contract Documents:
 - 1.1 Mechanical Contractor (MC) and Mechanical Sub-Contractors:
 - 1.1.1 Provide all personnel, tools, materials, and equipment to support the commissioning process. Facilitate the coordination of the commissioning work by the CxP and incorporate commissioning activities into the master schedule.
 - 1.1.2 Incorporate all commissioning related activities into the project schedule, ensuring that Cx activities do not delay project completion.
 - 1.1.3 Notify Dallas ISD and the CxP in writing that equipment and systems are ready for functional testing.
 - 1.1.4 Perform equipment startups using authorized manufacturing representatives.
 - 1.1.5 Provide written documentation to the CxP that equipment and systems are fully operational and ready to be functionally performance tested.
 - 1.1.6 Perform commissioning tests at the direction of the CxP, including change of season testing.
 - 1.1.7 Attend construction phase commissioning coordination meetings.
 - 1.1.8 Provide qualified personnel for participation in commissioning tests.
 - 1.1.9 Provide equipment, materials, and labor necessary to correct deficiencies found during the commissioning process.
 - 1.1.10 Attend testing, adjusting and balancing (TAB) review and coordination meetings.
 - 1.1.11 Participate in HVAC systems, assemblies, equipment, and component maintenance orientations and inspections as directed by the CxP.
 - 1.1.12 Provide information requested by the CxP for commissioning documentation and testing.
 - 1.1.13 Perform all quality control functions to ensure equipment and systems are installed properly. Ensure equipment and systems are brought to a state of readiness and full functionality prior to commencing the commissioning functional performance testing processes.
 - 1.1.14 Provide measuring instruments and HVAC control personnel who are to operate the HVAC controls during the functional performance Test phases.

- 1.1.15 Provide qualified personnel for participation in Commissioning tests.
- 1.1.16 Provide a representative to attend end of warranty testing.

23 09 00 Instrumentation and Control for HVAC

1. Controls System Design/Scope of Work Selection Requirements:
 - 1.1 New Construction: Control system infrastructure to be Distech BacNET IP or Dallas ISD approved equal. IP controllers include but not limited to central plant, AHU's, RTU's, VAV boxes and miscellaneous equipment.
 - 1.2 Major HVAC Renovations (Complete System Replacements):
 - 1.2.1 When the majority (at least 50%) of the mechanical equipment is replaced and/or getting a controls upgrade, the entire building is to receive all new controls.
 - 1.2.2 Control system infrastructure to be Distech BacNET IP or Dallas ISD approved equal. IP controllers include but not limited to central plant, AHU's, RTU's, VAV boxes and miscellaneous equipment.
 - 1.3 Minor Classroom Additions and Minor Mechanical Equipment Replacements/Renovations:
 - 1.3.1 If the existing system has a Java application control engine (JACE), integrate the new controls into the existing system.
 - 1.3.1.1 Match the existing control protocol with the new controls.
 - 1.3.1.2 Do not mix LON and BACnet IP systems.
 - 1.3.2 If the existing system is either pneumatic and/or not Distech branded, ensure the entire building receives all new controls.
 - 1.3.2.1 Control system infrastructure to be Distech BacNET IP or Dallas ISD approved equal. IP controllers include but not limited to central plant, AHU's, RTU's, VAV boxes and miscellaneous equipment.
 - 1.4 Renovations:
 - 1.4.1 Completely upgrade pneumatic systems to new direct digital control (DDC) system. The use of electronic to pneumatic transducers is not allowed.
 - 1.4.2 Replace outdated control systems such as CSI, TAC, Invensys, JCI/Johnson Controls, Circon, Siemens, Trane, Honeywell, etc. **Coordinate scope of work with Dallas ISD designated representative on a project specific basis.**
 - 1.4.3 Replace controls throughout the facility when more than 50% of air handlers and air distribution systems are replaced.
 - 1.4.4 When replacing a VAV air handler and/or its controller, if the existing VAV controls cannot communicate with the air handler, replace the existing controls for the VAV box.
 - 1.4.5 Always include a new controller, actuators, sensors, etc. for one-for-one HVAC equipment replacements. Reconnecting existing controller to new equipment is not allowed.
2. New Construction/Renovations: No JACE shall be overloaded past 80% memory, CPU and/or space. Contractor to provide an additional JACE and rework communication trunks as needed to unload JACE.

3. Keep control systems and strategies simple to minimize first cost, improve reliability, and simplify operation. Consider more sophisticated control strategies, shown to save energy or reduce life cycle costs, only apply where it is not detrimental to overall system reliability and maintainability.
4. For each project, before demo work, Controls Contractor to take screenshots of existing controls system. Contractor is responsible for communication trunks that have been cut during construction.
5. Controls Contractor is responsible for coordinating with Dallas ISD and setting up the correct graphic templates for each building. If Contractor fails to do so, Contractor to make all changes needed to meet graphic template at no extra cost to Dallas ISD.
6. Approved Vendors:
 - 6.1 JMS Integrated Building Solutions.
 - 6.2 TDIndustries.
7. Control Architecture:
 - 7.1 The building automation system (BAS) consists of a Distech system that integrates with the Dallas ISD supervisory system. A Tridium Java application control engine (JACE) controller(s) for integration of field controllers and web-based interface with Dallas ISD intranet, or through the internet with a VPN connection.
 - 7.2 The Java application control engine (JACE) controller to provide programming, scheduling, graphics, and monitoring of the HVAC systems. Provide access to the JACE from any computer on the Dallas ISD intranet or through the internet with a VPN connection.
 - 7.3 Identify the various control systems at each campus to determine to install a new FMCS/CMCS or to expand the existing system to expand. The goal is limiting the number of different control systems at a campus.
 - 7.4 Where a JACE building controller is present, expand the existing controller, or if necessary, provide an additional JACE controller to incorporate and integrate the new field controllers.
 - 7.5 The JACE controller to accept BACnet MS/TP, BACnet IP or Lonworks data from the field controller and other proprietary FMCS components at the campus depending on the scope of work.
 - 7.6 All field controllers (Application Specific Controllers (ASCs) and programmable controllers) to be Distech and to be provided by the same Contractor that provides the JACE building controller.
 - 7.7 All controllers to be BACnet or LonMark certified devices.
 - 7.8 Include controllers, sensors, actuators, etc. as required for a complete operational system.
 - 7.9 Only critical alarms to populate. Critical alarms are based on critical equipment such as chillers, boilers, pumps and VAV/multizone AHU's.
 - 7.10 Supply the chillers, boilers, and air handling units, with associated controls and pumps, and a RIB relay with manual HOA switch. This is to allow Dallas ISD to turn on and run equipment locally. The activation of the switch notifies the Building Automation System (BAS) that the unit is in manual override. The BAS graphic to change color to red to alert that that equipment has been locally overridden.
8. Design the facility management control system (FMCS) in accordance with the following:
 - 8.1 Design simple basic control strategies to allow for ease of maintenance and long-term reliability. All strategies that differ from the master points list and sequences to be approved in writing by Dallas ISD.
 - 8.2 Open NIC license.
 - 8.3 Embedded workbench.
 - 8.4 Use Niagara Framework software for all programming and network management.

9. The FMCS to include at a minimum, the following programs:
 - 9.1 Time of Day Scheduling: Operate all equipment based on a time schedule programmed through the FMCS central clock system.
 - 9.2 Holiday Scheduling: Program systems to operate on the night schedule during holidays and weekends. Temporary scheduling to be available on the JACE scheduler.
 - 9.3 Optimum Start/Stop: Based on indoor and outdoor temperatures and historical data logged by the energy management control system, the optimum start/stop program to calculate the lead time to turn equipment on/off to optimize run times while maintaining the proper temperature during occupancy.
 - 9.4 Night Setback/Setup: Maintain a minimum unoccupied building temperature during the heating season and a maximum temperature during the cooling season by enabling the required systems. Outdoor air dampers to remain closed during unoccupied operation of equipment.
10. All monitored points provided in the control system to comply with Dallas ISD's points list and be labeled according to the specified naming convention.
11. Architect/Engineer to include the following submittal requirements related to the facility management control system in the Contract Documents, at a minimum:
 - 11.1 Control drawings with a clearly defined symbols legend.
 - 11.2 Schematic drawing for each type of system being controlled.
 - 11.3 Full points list detailing and defining all required points.
 - 11.4 Software license for network management tool.
 - 11.5 Matrix with VAV box count and list of major equipment.
 - 11.6 Sequences of operation for all equipment and systems.
12. The sequences of operation is to include, at a minimum, the following items:
 - 12.1 Consistency with Dallas ISD's current Energy Conservation Plan.
 - 12.2 All interactions and interlocks with other related systems.
 - 12.3 Detailed delineation of control between any packaged controls and the building automation system, listing what points the FMCS monitors only vs points the FMCS controls.
 - 12.4 Sequences for start-up, warm-up, occupied, and unoccupied periods.
 - 12.5 Capacity control and equipment staging sequences.
 - 12.6 Temperature and pressure control.
 - 12.7 Detailed description of all control strategies such as economizer, demand limiting, hot water reset, etc.
 - 12.8 Sequences for alarms and emergency procedures.
 - 12.9 Recommended values for all adjustable settings, set-points, and parameters that are to be set or adjusted by operating staff.
 - 12.10 All other control values or settings used for testing and/or operating equipment.
13. Dallas ISD master controls list and sequences is a base document which the Architect/Engineer requests from design manager and modifies for project specific use. Sequences of operation spell out in detail the start-up, shutdown, normal and emergency operating modes, interlocks, safeties, and manual/automatic resets for each system. The specification clearly differentiates between controllers and control sequences furnished and implemented via factory furnished assemblies and those accomplished via the building control network. Clearly define roles and responsibilities of the various trades as related to the controls systems and their interfaces.
14. MDF/IDF rooms to have standalone thermostats.

15. All motorized two-way control valves to be pressure independent for independent room control.
16. In the chilled and hot water plants, all motorized valves to have position sensing feedback provided to FMCS for true position monitoring.
17. Control Actuators: Acceptable Manufacturers: Belimo or Bray.
18. Provide temperature sensors in each classroom for all equipment (VAV boxes, unitary DX equipment, etc.).
19. Temperature sensors for hydronic single zone AHU's and VAV boxes to have a blank face.
20. Temperature sensors for DX single zone RTU serving a classroom to have a blank face with occupancy override button.
21. Temperature sensors for DX RTU serving areas such as Administration, Gyms, Auditoriums, Cafeterias, Kitchens, Choir, Dance and Band to have LCD screen with occupancy override and setpoint adjustment. These sensors to have tamper proof protective covers.
22. All database files and files necessary for system access and troubleshooting, including JACE station backup files, to be loaded on a USB flash drive, and stored within the building controller enclosure. Backup to be done at supervisory server as well.
23. All controller nodes within LNS database files or JACE station files to contain the corresponding room number for which they serve. Keep this information visible in the navigation tree.
24. Where advanced analytical software is required by code, the system to utilize the Niagara based analytics software. Dallas ISD to have the capability to deactivate system if needed.

23 09 25 Variable Frequency Drives

1. General Requirements:
 - 1.1 Have an LCD screen.
 - 1.2 Contain integral electromagnetic interference filter (EMI) filters.
 - 1.3 Minimize the audible motor noise using an adjustable carrier frequency.
 - 1.4 Have integral disconnects.
 - 1.5 Bypass: Provided with a bypass feature that is operated with a VFD/OFF/BYPASS selector switch.
 - 1.6 Provided by mechanical.
 - 1.7 Indoor Applications: Housed in a NEMA 1 enclosure.
 - 1.8 Outdoor Applications: Housed in a NEMA 3R enclosure.
 - 1.9 Include a communication card to interface with the FMCS. Protocol to be BACnet MS/TP, BACnet IP or Lonworks depending on the control system being installed. Interface card is used for monitoring purposes only.
2. Acceptable Manufacturers:
 - 2.1 ABB.
 - 2.2 Danfoss.
3. Warranty to cover parts and labor for a minimum of 30 months from date of substantial completion.
4. Architect is to include the following requirements of the Contractor at a minimum in the Contract Documents:

Start Up Requirements: The manufacturer to provide start up service by a factory trained service technician. The service technician verifies correct installation, starts up the drive and checks for proper operation.

23 09 93 Sequence of Operations

1. General Requirements:

- 1.1 It is the Engineer's responsibility to edit/delete/modify/add control points and sequences as needed to fit their design. There are additional editor notes and highlighted portions that the Engineer needs to review.
- 1.2 New construction and major MEP renovations to include building electrical, domestic water main and gas main monitoring.
- 1.3 When economizer exemption is being taken, delete all economizer/fdd sequences.

2. Building Electrical Metering/Monitoring:

2.1 General:

- 2.1.1 Provide digital monitoring of building MSB. The FMCS is to monitor the electrical energy consumption at the buildings main electric feed. Coordinate with switchgear manufacturer and/or Electrical Contractor.
- 2.1.2 Provide dashboard with daily, weekly, monthly, and yearly usage totals.

2.2 Control Points:

Description	Type
KVA	AI
KWH	AI
Demand	AI
Power Factor	AI
Voltage	AI

3. Domestic Water Main Supply Metering/Monitoring:

3.1 General:

- 3.1.1 The FMCS Contractor to provide a flow meter (Omni Compound C2 water flow meter or equivalent) to be installed on the main domestic water line. Coordinate with Plumbing Contractor.
- 3.1.2 The FMCS monitors flow from the primary water supply to the building. When the amount of flow is greater than programmed (adjustable) the FMCS to send an alarm. Provide all flow meters and controls points for a complete system.
- 3.1.3 Provide dashboard with daily, weekly, monthly and yearly usage totals.

3.2 Control Points:

Description	Type
Flow Meter	AI

4. Natural Gas Main Supply Metering/Monitoring:

4.1 General:

- 4.1.1 The FMCS Contractor to provide a flow meter installed on the main gas line. Coordinate with Plumbing Contractor.

4.1.2 The FMCS monitors gas from the primary gas supply to the building. When the amount of flow is greater than programmed (adjustable) the FMCS sends an alarm. Provide all gas meters and controls points for a complete system. Coordinate with Plumbing Contractor.

4.1.3 Provide dashboard with daily, weekly, monthly, and yearly usage totals.

4.2 Control Points:

Description	Type
Gas Flow Meter	AI

5. Ambient Conditions:

5.1 General: The FMCS monitors the ambient outside conditions at the building. Sensors to be located outside the building for northern exposure.

5.2 Control Points:

Description	Type
Outside Temperature	AI
Outside Humidity	AI
Outside CO2	AI

6. Sump Pumps:

6.1 General: Sump Pumps to be monitored by FMCS. The FMCS to generate an alarm to the pump lose power, stop operating or secondary float switch above designated level for 30 minutes.

6.2 Control Points:

Description	Type
Pump Amps/Status (Each Pump)	AI
Secondary Float Switch (Each Pump)	DI

7. Electrical Room Exhaust Fans:

7.1 General: The FMCS to monitor space temperature for all electrical rooms with exhaust fans. The electrical room exhaust fans are to operate continuously when the space is above 80° F (adjustable).

7.2 Control Points:

Description	Type
Fan Amps/Status (Each Fan)	AI
Space Temperature (Each Room)	AI
Fan Start/Stop Command (Each Fan)	DO

8. Crawlspace Exhaust Fans:

8.1 General: The FMCS to measure crawlspace temperature and humidity. Calculations are to be done to determine dewpoint of crawlspace and ambient dewpoint. The crawlspace fans are to operate continuously when the crawlspace dewpoint is above 60° F (adjustable) and above ambient dewpoint.

8.2 Control Points:

Description	Type
Crawlspace Temperature	AI
Crawlspace Humidity	AI
Fan Amps/Status (Each Fan)	AI
Fan Start/Stop Command (Each Fan)	DO

9. Relief Fans:

9.1 General: The FMCS to measure building pressure. The relief fans are to operate to maintain a positive pressure setpoint of .05 inch In. W.C. (adjustable).

9.2 Control Points:

Description	Type
Building Pressure (Each Sensor)	AI
Fan Amps/Status (Each Fan)	AI
Fan Start/Stop Command (Each Fan)	DO
Fan VFD Speed (Each Fan)	AO

10. Kitchen Hood Exhaust Fans and Makeup Air Units:

10.1 General:

- 10.1.1 Kitchen hood, exhaust fans and makeup air units to have standalone kitchen system controls.
- 10.1.2 Kitchen hood exhaust fans to be hardwired interlocked with associated makeup air units.
- 10.1.3 Kitchen hood exhaust fans and makeup air units to be monitored by FMCS.

10.2 Control Points:

Description	Type
Fan Amps/Status (Each Kitchen Fan)	AI
Fan Amps/Status (Each Makeup Air Unit)	AI

11. Variable Frequency Drives:

11.1 General:

- 11.1.1 The FMCS to interface and monitor points from the VFDs.
- 11.1.2 Achieve interfaces via communication link.
- 11.1.3 Show data on associated unitary graphic.
- 11.1.4 Provide dashboard with daily, weekly, monthly, and yearly usage totals for KWH and Runtime.

11.2 Control Points:

Description	Type
Start/Stop (Each VFD)	DI
Alarm (Each VFD)	DI
Percent Output (Each VFD)	AI
Frequency Output (Each VFD)	AI
Amperage (Each VFD)	AI
KWH (Each VFD)	AI
Runtime (Each VFD)	AI

12. MDF / IDF Rooms:

12.1 General:

12.1.1 Units to have a standalone thermostat. Units to operate continuously.

12.1.2 The FMCS to monitor space temperature for all MDF/IDF rooms. The FMCS generates an alarm if the space temperature exceeds or drops below the assigned alarm limits (adjustable).

12.2 Control Points:

Description	Type
Space Temperature (Each Room)	AI

13. Kiln Hoods and Exhaust Fans:

13.1 General:

13.1.1 Kiln hood(s) and exhaust fan(s) to have standalone controls. Each hood and associated fan to be interlocked with each other.

13.1.2 When kiln is turned on, exhaust fan is to come on and run continuously during kiln running time and for two (2) hours after kiln turns off.

13.1.3 Kiln hood exhaust fans to be monitored by FMCS.

13.2 Control Points:

Description	Type
Fan Amps/Status (Each Kiln Fan)	AI

14. Variable Primary Chilled Water System:

14.1 General: Provide two (2) chillers with motorized isolation valves. The pumping system to be variable primary type with two (2) pumps. The pump(s) to have a minimum flow condition equal to the minimum flow allowed by the chiller manufacturer. Provide a bypass line with an automated control valve to allow the minimum flow of chillers. Minimum flow to be specified by the chiller manufacturer.

14.2 Central Plant System Enabling/Disabling:

14.2.1 Define the occupied/unoccupied mode of operation by the EMCS optimum start/stop schedule.

- 14.2.2 The EMCS to enable the chilled water system based on an ambient temperature above 50° F (adjustable) and requests for cooling. The number of requests to be adjustable. The system enable to assign the lead/lag chillers and lead/lag pumps. Equipment to operate on a lead-lag and equal run time basis.
- 14.2.3 The lead chiller's slow stroking, motorized isolation valve (120 seconds) to open.
- 14.2.4 After a time delay allowing the motorized isolation valve to fully open, start the lead chilled water pump. If lead pump fails to start and flow not proven, auto rotate and start lag pump.
- 14.2.5 Once a chilled water pump has started and water flow has been proven, enable the lead chiller. If lead chiller fails to start, auto rotate and start lag chiller. Open/close the motorized isolation valve with the enabling/disabling of its corresponding chiller.
- 14.2.6 Upon each start of the chilled water system, activate a lag chiller enable delay of one (1) hour (adjustable) in order for the system loop and the lead chiller to stabilize.
- 14.3 Chilled Water Temperature Control:
 - 14.3.1 Control the chilled water setpoint via EMCS by sending a setpoint signal 42°F (adjustable) to each chiller control panel (UCP).
 - 14.3.2 Provide a linear chilled water supply temperature reset algorithm between:
 - 14.3.2.1 42°F (adjustable) chilled water supply when outside air temperature is at or above 70°F (adjustable).
 - 14.3.2.2 46°F (adjustable) chilled water supply when outside air temperature is at or below 50°F (adjustable).
- 14.4 Chiller Demand Limit:
 - 14.4.1 Use chiller demand limiting at least 120 seconds (adjustable) prior to the sequencing and staging up of lag chillers.
 - 14.4.2 EMCS to send the chiller demand limit signal of 40% (adjustable) to chillers.
 - 14.4.3 Once the staging up of lag chiller has occurred, the chiller limit signal stays active for an additional 300 seconds (adjustable) to allow system to stabilize. After time delay is over, the chiller demand limiting signal disables.
- 14.5 Staging of Chiller:
 - 14.5.1 Staging Up (The lag chiller to be enabled when any of the following conditions occur):
 - 14.5.1.1 When the chilled water supply temperature exceeds the set point by 2°F (adjustable) and a 5°F differential from return water temperature for a 15 minute period (adjustable). the EMCS to enable the second chiller. The bypass automatic control valve resets to allow total minimum GPM of both chillers to flow through the bypass.
 - 14.5.1.2 When lead chiller load is at 85% (adjustable) or more for 15 minutes (adjustable).
 - 14.5.1.3 When lead chiller fails or is in alarm.
 - 14.5.2 Staging Down (The lag chiller disables when any of the following conditions occur):

14.5.2.1 When the chilled water supply temperature is at or below the set point and there is at least a 6°F differential from return water temperature for a 15 minute period (adjustable). the EMCS disables the second chiller. The bypass automatic control valve resets to allow total minimum GPM of one (1) chiller to bypass.

14.5.2.2 When chiller loads are at 40% (adjustable) or less for 15 minutes (adjustable).

14.6 Chilled Water Pumping System:

14.6.1 Variable Primary Chilled Pumping System:

14.6.1.1 One (1) variable primary pump to be started when system is enabled. If lead pump fails to start and flow is not proven, auto rotate and start lag pump.

14.6.1.2 The speed of the pumps not to drop below minimum output to maintain minimum flow through enabled chillers.

14.6.1.3 Anytime a there is a call for two (2) chillers to run simultaneously, provide a call for two (2) pumps to run simultaneously.

14.6.1.4 Control the pump VFD by differential pressure transducers across the supply and return piping at locations shown on the drawings or as directed by the Engineer. If the pressure is below setpoint, the pump speed increases. If the differential pressure is above setpoint, the pump speed decreases.

14.6.1.5 The lag pump activates whenever the speed of the first pump is at or above 90% (adjustable) for 15 minutes (adjustable). The lag pump to turn on and operate in unison with the lead pump to maintain building load. Once both pumps are operating at 40% (adjustable), for 15 minutes (adjustable) the lag pump to turn off and the lead pump remain on to maintain building load.

14.6.1.6 The differential pressure setpoint for the pumping system to be reset based on maximum chilled water valve position. If the maximum valve position is above 90% (adjustable), then the differential set point to be set to maximum pressure as determined by the Temperature Control System Contractor. If the maximum valve position is below 50% (adjustable), then the differential pressure setpoint to be set to minimum pressure as determined by the Temperature Control System Contractor. If the maximum valve position is between 90%-50% (adjustable), then the differential pressure setpoint to modulate linearly between the minimum and maximum pressure setpoints.

14.7 Chilled Water Bypass:

14.7.1 Minimum Flow:

14.7.1.1 Initially close the chilled water bypass valve and open as necessary to provide minimum flow to enabled chillers.

14.7.1.2 Bypass valve monitors chiller flow meter to ensure minimum flow is met by modulating bypass control valve open as necessary.

14.7.1.3 As a failsafe backup to the flow meter, bypass valve also monitors the chilled water pressure drop across each chiller evaporator when a chiller is enabled. As the sensed differential pressure falls below the pressure drop associated with the chiller recommended flow rate, as provided by the chiller manufacturer, modulate the bypass control valve to maintain minimum flow. Initial default chiller evaporator pressure drop of 3 psi (adjustable).

14.8 Safeties:

14.8.1 Freeze Protection:

14.8.1.1 When the outside air (OA) temperature drops below 36°F (adjustable), a primary pump to be started and all associated isolation valves opened. All building chilled water valves open to 20%.

14.8.1.2 When the OA temperature rises 2°F above freeze protection setpoint for one (1) hour, the reverse occurs.

14.9 Control Points:

Description	Type
Outside Air Temperature	AI
Building Common Chilled Water Supply Temperature	AI
Building Common Chilled Water Return Temperature	AI
Chiller Supply Water Temperature (Each Chiller)	AI
Chiller Return Water Temperature (Each Chiller)	AI
Chilled Water Bypass Temperature	AI
Chiller Evaporator Differential Pressure (Each Chiller)	AI
Building Flow	AI
Chiller Flow	AI
Makeup Water Flow	AI
Building Chilled Water Differential Pressure (Each Sensor)	AI
Chiller Amps/Status (Each Chiller)	AI
Chiller Alarm (Each Chiller)	AI
Pump Amps/Status (Each Pump)	AI
Motorized Valve Feedback Position (Each Valve)	AI
Chiller Start/Stop Command (Each Chiller)	DO
Pump Start/Stop Command (Each Pump)	DO
Pump VFD Speed (Each Pump)	AO
Chiller Supply Setpoint (Each Chiller)	AO
Chiller Capacity Limit (Each Chiller)	AO
Chiller Isolation Valve (Each Chiller)	AO
Chilled Water Bypass Valve	AO

15. Cooling Tower and Condenser Water Pumps:

15.1 General: There are two (2) cooling towers with VFD's and motorized isolation valves. The associated condenser pumping system consists of two (2) pumps and VFD's.

15.2 Central Plant System Enabling/Disabling:

15.2.1 Enable the cooling tower system any time there is a call for cooling from the associated water cooled chillers occupied/unoccupied mode of operation.

- 15.2.2 This system enable assigns the lead/lag cooling towers and lead/lag pumps. Equipment operates on a lead-lag and equal run time basis.
 - 15.2.3 Open the lead cooling tower slow stroking, motorized isolation valve (120 seconds).
 - 15.2.4 After the time delay, start the lead condenser water pump. If lead pump fails to start and flow is not proven, auto rotate and start lag pump.
 - 15.2.5 Once a condenser water pump has started and water flow has been proven, the lead cooling tower operates. If lead cooling tower fails to start, auto rotate and start lag cooling tower. Open/close the motorized isolation valve with the enabling/disabling of its corresponding cooling tower.
- 15.3 Condenser Water Temperature Control:
- 15.3.1 Incorporate an algorithm based on ambient wetbulb temperature and cooling tower approach to modulate and maintain a leaving condenser water temperature setpoint (adjustable). Initial default setpoint to be 75°F.
 - 15.3.2 Condenser water temperature setpoint (adjustable) to be equal to current ambient wetbulb temperature + tower approach.
 - 15.3.3 Upper limit for condenser water temperature setpoint is 85°F (adjustable).
 - 15.3.4 Lower limit for condenser water temperature setpoint is 55°F (adjustable).
- 15.4 Cooling Tower Bypass: When condenser water going back to tower(s) is 55°F or below (adjustable), the three (3) way bypass valve modulates to maintain a minimum cooling tower leaving water temperature of 55°F (adjustable), and the cooling tower fans remain off.
- 15.5 Control Points:

Description	Type
Outside Air Temperature	AI
Outside Air Humidity	AI
Common Condenser Water Supply Temperature	AI
Common Condenser Water Return Temperature	AI
Chiller Condenser Water Temperature (Each Chiller)	AI
Chiller Condenser Return Water Temperature (Each Chiller)	AI
Makeup Water Flow	AI
Cooling Tower Fan Amps/Status (Each Fan)	AI
Pump Amps/Status (Each Pump)	AI
Motorized Valve Feedback Position (Each Valve)	AI
Vibration Alarm (Each Tower)	DI
Cooling Tower Fan Start/Stop Command (Each Fan)	DO
Pump Start/Stop Command (Each Pump)	DO
Cooling Tower Fan VFD Speed (Each Pump)	AO
Pump VFD Speed (Each Pump)	AO
Cooling Tower Isolation Valves (Each Tower)	AO
Cooling Tower Bypass Valve	AO

16. Condensing Primary/Secondary Heating Water System (OEM Boiler Sequencer):
- 16.1 General: There are two (2) boilers with circulating primary pumps and two (2) building hot water pumps.
 - 16.2 Heating System Enabling/Disabling:
 - 16.2.1 The occupied/unoccupied mode of operation to be defined by the EMCS optimum start/stop schedule.
 - 16.2.2 The EMCS enables the hot water system based on an ambient temperature below 60° F (adjustable) and requests for heating as needed. The number of requests to be adjustable. This system enables the boiler sequencer (provided by boiler manufacturer). Building pumps operate on a lead-lag and equal run time basis.
 - 16.3 Building Hot Water Pumping System:
 - 16.3.1 One (1) variable building pump is to be started when system is enabled. If lead pump fails to start and flow not proven, system must be able to auto rotate and start lag pump.
 - 16.3.2 The pump VFD to be controlled by differential pressure transducer(s) across the supply and return piping at locations shown on the drawings or as directed by the Engineer. If the pressure is below setpoint, the pump speed to be increased. If the differential pressure is above setpoint, the pump speed to be decreased.
 - 16.3.3 The lag pump activates whenever the speed of the first pump is at or above 90% (adjustable) for 15 minutes (adjustable). The lag pump is to turn on and operate in unison with the lead pump to maintain building load. Once both pumps are operating at 40% (adjustable), for 15 minutes (adjustable) the lag pump turns off and the lead pump remains on to maintain building load.
 - 16.3.4 The differential pressure setpoint for the pumping system resets based on maximum hot water valve position. If the maximum valve position is above 90% (adjustable), then the differential set point to be set to maximum pressure as determined by Testing Adjusting and Balancing (TAB) Contractor. If the maximum valve position is below 50% (adjustable), then the differential pressure setpoint to be set to minimum pressure as determined by Testing Adjusting and Balancing (TAB) Contractor. If the maximum valve position is between 90%-50% (adjustable), then the differential pressure setpoint modulates linearly between the minimum and maximum pressure setpoints.
 - 16.4 Boiler Control/Sequencing: The EMCS enables the manufacturer provided boiler sequencer. The sequencer modulates the boilers.
 - 16.5 Primary Circulating Pumps:
 - 16.5.1 Interlock the primary circulating pumps with the boilers.
 - 16.5.2 Primary circulating pumps run continuously anytime there is a call for its associated boiler.
 - 16.6 Hot Water Temperature Control:
 - 16.6.1 The EMCS sends the hot water setpoint to sequencer and sequencer modulates boilers to meet setpoint.
 - 16.6.2 Provide a linear hot water supply temperature reset algorithm in between:
 - 16.6.2.1 100°F (adjustable) hot water supply when outside air temperature is at or above 60°F (adjustable).

16.6.2.2 130°F (adjustable) hot water supply when outside air temperature is at or below 45°F (adjustable).

16.7 Safeties:

16.7.1 Freeze Protection:

16.7.1.1 When the outside air (OA) temperature drops below 36°F (adjustable), a building pump starts, and a all building hot water valves open to 20%.

16.7.1.2 When the OA temperature rises 2°F above freeze protection setpoint for one (1) hour, the reverse occurs.

16.7.2 CO Monitoring:

16.7.2.1 Install a carbon monoxide sensor in boiler rooms.

16.7.2.2 Interlock carbon monoxide sensor with boiler(s) and shutdown boiler(s) when carbon monoxide rises above 50 ppm.

16.7.2.3 Carbon monoxide alarm to disable any supply fans in boiler room and enable all exhaust fans in boiler room.

16.8 Control Points:

Description	Type
Outside Air Temperature	AI
Building Common Hot Water Supply Temperature	AI
Building Common Hot Water Return Temperature	AI
Boiler Supply Water Temperature (Each Boiler)	AI
Boiler Return Water Temperature (Each Boiler)	AI
Building Flow	AI
Makeup Water Flow	AI
Building Hot Water Differential Pressure (Each Sensor)	AI
Boiler Amps/Status (Each Boiler)	AI
Boiler Alarm (Each Boiler)	AI
Circulation Pump Amps/Status (Each Pump)	AI
Building Pump Amps/Status (Each Pump)	AI
CO Monitoring Alarm	DI
Boiler Sequencer System Enable	DO
Boiler Sequencer Hot Water Setpoint	AO
Building Pump Start/Stop Command (Each Pump)	DO
Building Pump VFD Speed (Each Pump)	AO

17. Non-Condensing Primary/Secondary Heating Water System (OEM Boiler Sequencer):

17.1 General: There are two (2) boilers with circulating primary pumps and two (2) building hot water pumps.

17.2 Heating System Enabling/Disabling:

17.2.1 The occupied/unoccupied mode of operation to be defined by the EMCS optimum start/stop schedule.

- 17.2.2 The EMCS to enables the hot water system based on an ambient temperature below 60° F (adjustable) and requests for heating as necessary. The number of requests to be adjustable. This system enables the boiler sequencer (provided by boiler manufacturer). Building pumps operate on a lead-lag and equal run time basis.
- 17.3 Building Hot Water Pumping System:
 - 17.3.1 One (1) variable building pump to be started when system is enabled. If lead pump fails to start and flow is not proven, system auto rotates and starts lag pump.
 - 17.3.2 The pump VFD to be controlled by differential pressure transducer(s) across the supply and return piping at locations shown on the drawings or as directed by the Engineer. If the pressure is below setpoint, the pump speed increases. If the differential pressure is above setpoint, the pump speed decreases.
 - 17.3.3 The lag pump activates when the speed of the first pump is at or above 90% (adjustable) for 15 minutes (adjustable). The lag pump turns on and operates in unison with the lead pump to maintain building load. Once both pumps are operating at 40% (adjustable), for 15 minutes (adjustable) the lag pump turns off and the lead pump remain on to maintain building load.
 - 17.3.4 The differential pressure setpoint for the pumping system resets based on maximum hot water valve position. If the maximum valve position is above 90% (adjustable), then the differential set point sets to maximum pressure as determined by TAB Contractor. If the maximum valve position is below 50% (adjustable), then the differential pressure setpoint sets to minimum pressure as determined by TAB Contractor. If the maximum valve position is between 90%-50% (adjustable), then the differential pressure setpoint modulates linearly between the minimum and maximum pressure setpoints.
- 17.4 Boiler Control – Sequencing: The EMCS enables the manufacturer provided boiler sequencer. The sequencer modulates the boilers.
- 17.5 Primary Circulating Pumps:
 - 17.5.1 Interlock the primary circulating pumps with boiler.
 - 17.5.2 Primary circulating pumps run continuously anytime there is a call for its associated boiler.
- 17.6 Mixing Valve:
 - 17.6.1 Each boiler is to have a 3-way mixing valve provided by boiler manufacturer.
 - 17.6.2 Mixing valve is to limit low water temperatures from entering boiler.
- 17.7 Hot Water Temperature Control:
 - 17.7.1 The EMCS sends the hot water setpoint to sequencer and sequencer modulates boilers to meet setpoint.
 - 17.7.2 Provide a linear hot water supply temperature reset algorithm between:
 - 17.7.2.1 140°F (adjustable) hot water supply when outside air temperature is at or above 60°F (adjustable).
 - 17.7.2.2 160°F (adjustable) hot water supply when outside air temperature is at or below 45°F (adjustable).

17.8 Safeties:

17.8.1 Freeze Protection:

17.8.1.1 When the outside air (OA) temperature drops below 36°F (adjustable), a building pump starts, and all building hot water valves to be open to 20%.

17.8.1.2 When the OA temperature rises 2°F above freeze protection setpoint for one (1) hour, the reverse occurs.

17.8.2 CO Monitoring:

17.8.2.1 Install a carbon monoxide sensor in boiler rooms.

17.8.2.2 Interlock carbon monoxide sensor with boiler(s) and shutdown boiler(s) when carbon monoxide rises above 50 ppm.

17.8.2.3 Carbon monoxide alarm to disable any supply fans in boiler room and enable all exhaust fans in boiler room.

17.9 Control Points:

Description	Type
Outside Air Temperature	AI
Building Common Hot Water Supply Temperature	AI
Building Common Hot Water Return Temperature	AI
Boiler Supply Water Temperature (Each Boiler)	AI
Boiler Return Water Temperature (Each Boiler)	AI
Building Flow	AI
Makeup Water Flow	AI
Building Hot Water Differential Pressure (Each Sensor)	AI
Boiler Amps/Status (Each Boiler)	AI
Boiler Alarm (Each Boiler)	AI
Boiler Circulation Pump Amps/Status (Each Pump)	AI
Building Pump Amps/Status (Each Pump)	AI
CO Monitoring Alarm	DI
Boiler Sequencer System Enable	DO
Boiler Sequencer Hot Water Setpoint	AO
Building Pump Start/Stop Command (Each Pump)	DO
Building Pump VFD Speed (Each Pump)	AO

18. Single Zone Variable Air Volume Air Handling Unit (Preheat/Chilled Water/ Hot Water Reheat):

18.1 General: The unit is to have supply fan, hot water coil, chilled water coil and outside air damper. The Control System Contractor to provide a dedicated stand-alone DDC controller for each unit.

18.2 Unit Enable/Disabling:

18.2.1 The EMCS optimum start/stop schedule defines the occupied/unoccupied mode of operation.

18.2.2 During unoccupied times, as required to maintain the unoccupied heating and cooling setpoints 55°F (adjustable) heating and 85°F (adjustable) cooling as sensed by the space temperature sensor.

18.3 Fan Control:

- 18.3.1 During cooling mode, the unit supply air fan runs continuously, the VFD modulates the supply air fan to maintain space setpoint, and the chilled water valve modulates to maintain cooling supply air temperature setpoint. Minimum fan speed set to 20Hz (adjustable).
- 18.3.2 During heating mode, the unit supply air fan to run continuously, the VFD to modulate the supply air fan to maintain space setpoint, and the hot water valve to modulate to maintain space temperature setpoint. Minimum fan speed to be set at 35Hz (adjustable).

18.4 Temperature Control:

18.4.1 Warm-up or Cool-down:

- 18.4.1.1 The EMCS determines the required warm-up or cool-down period based on the optimized start algorithm.
- 18.4.1.2 Upon enabling the unit, the unit heats and cools as required to maintain the occupied heating and cooling setpoints (initially 70°F heating, 74°F cooling) as sensed by a space temperature sensor.
- 18.4.1.3 During warm-up, the supply air discharge temperature is 90°F (adjustable). During cool-down, the supply air temperature is 55°F (adjustable).
- 18.4.1.4 Once the occupied setpoint temperature threshold has been reached, the EMCS switches the unit to the occupied mode.

18.4.2 Occupied Mode:

- 18.4.2.1 Preheat Coil: The preheat valve modulates to maintain precool discharge air temperature of 50°F (adjustable).
- 18.4.2.2 Heating Mode: When space temperature is below heating setpoint, the unit is in heating mode. The reheat valve modulates to maintain space temperature and discharge temperature of no more than 90°F (adjustable).
- 18.4.2.3 Cooling Mode: When space temperature is above cooling setpoint, the unit is in cooling mode. The chilled water valve modulates to maintain a scheduled cooling supply air setpoint at all times during cooling mode. Initially unit discharge supply air temperature of 55°F (adjustable). Provide a linear supply air temperature reset algorithm between:
 - 18.4.2.3.1 55°F (adjustable) supply air temperature supply when outside air temperature is at or above 80°F (adjustable).
 - 18.4.2.3.2 60°F (adjustable) supply air temperature supply when outside air temperature is at or above 50°F (adjustable).
- 18.4.3 Unoccupied Mode: The EMCS enables the unit as required to maintain the unoccupied heating and cooling setpoints (initially 55°F heating and 85°F cooling) as sensed by the space temperature sensor.

18.5 Outside air Damper Control:

- 18.5.1 Warm-up or Cool-down: The outside air damper to be closed.

- 18.5.2 Occupied Mode: EMCS monitors the CO2 level in the space:
 - 18.5.2.1 When CO2 levels are below 1100 ppm (adjustable), the outside air damper to be at the minimum position (adjustable) as set by TAB. Reference scheduled CFM.
 - 18.5.2.2 When CO2 levels are above 1200 ppm (adjustable), the outside air damper to be at the maximum position (adjustable) as set by TAB. Reference scheduled CFM.
- 18.5.3 Unoccupied mode: The outside air damper to be closed.
- 18.6 Dry Bulb Economizer Mode (Utilize when economizer exemption cannot be taken): In occupied or unoccupied mode, when space temperature is above space setpoint, outside air temperature is 60°F (adjustable) or below and there is a call for cooling, the unit is to be in economizer mode. Outside air damper opens 100% and provides free cooling to the space until the space temperature setpoint is satisfied. If space is not satisfied within 10 min (adjustable), mechanical cooling to be enabled.
- 18.7 Dehumidification Mode:
 - 18.7.1 Activate dehumidification mode when space temperature is satisfied, and the space relative humidity is above 60% (adjustable).
 - 18.7.2 Dehumidification mode to temporarily disable the cooling supply air temperature reset and maintain cooling coil to a constant discharge air temperature at 53°F (adjustable). Reheat valve modulates to maintain neutral discharge air temperature to prevent overcooling.
 - 18.7.3 Fan speed to be at minimum.
 - 18.7.4 Disable dehumidification when return air relative humidity is 2% (adjustable) below humidity setpoint or if there is a call for cooling/heating.
- 18.8 Safeties:
 - 18.8.1 Freeze Protection:
 - 18.8.1.1 When the outside air (OA) temperature drops below 36°F (adjustable), chilled water and hot water valves open to 20% if not already open.
 - 18.8.1.2 When the OA temperature rises 2°F above freeze protection setpoint for one (1) hour, the reverse occurs.
 - 18.8.2 Freeze Stat: Provide a temperature low limit switch to disable the unit and close all dampers when it senses that the air temperature is below 36°F (adjustable).

18.9 Control Points:

Description	Type
Fan Amps/Status	AI
Filter Alarm	DI
Space Temperature	AI
Mixed Air Temperature	AI
Return Air Temperature	AI
Space Humidity	AI
Space CO2	AI
Pre-Heat Supply Temperature (Pre Cool)	AI
Cooling Supply Air Temperature	AI
Unit Discharge Air temperature (Re Heat)	AI
Freeze Status Alarm	DI
Fan Start/Stop Command	DO
Fan VFD Speed	AO
Chilled Water Valve	AO
Pre-Heat Hot Water Valve	AO
Re-Heat Hot Water Valve	AO
Outside Air Damper	AO

19. Variable Air Volume Air Handling Unit (Chilled Water/ Hot Water Preheat):

- 19.1 General: The unit is to have supply fan, hot water coil, chilled water coil and outside air damper. The Control System Contractor provides a dedicated stand-alone DDC controller for each unit.
- 19.2 Unit Enabling/Disabling:
 - 19.2.1 The EMCS optimum start/start schedule defines that occupied/unoccupied mode of operation.
 - 19.2.2 During unoccupied times, a minimum number of associated VAV boxes, 40% (adjustable), to request the AHU before AHU operates.
- 19.3 Fan Control:
 - 19.3.1 The unit operates when the associated VAV boxes it serves are in occupied mode and operational.
 - 19.3.2 The supply fan VFD is controlled by a static pressure transducer 2/3rds the way down the longest supply duct run. If the static pressure is below setpoint, the supply fan speed increases. If the static pressure is above setpoint, the supply fan speed decreases.
 - 19.3.3 Provide a static pressure reset algorithm with minimum and maximum limits of .5 inches to 1.2 inches (adjustable). VAV boxes to be polled for damper position. Static pressure slowly decreases until 25% (adjustable) of the VAV box damper positions are at least 90% open.
- 19.4 Temperature Control:
 - 19.4.1 Warm-up or Cool-down:
 - 19.4.1.1 The EMCS determines the required warm-up or cool-down period based on the optimized start algorithm.

- 19.4.1.2 Upon enabling the unit, the unit heats or cools as required to satisfy the occupied heating or cooling setpoints of 60% (adjustable) of the VAV boxes (initially 70°F heating, 74°F cooling) as sensed by a space temperature sensor.
 - 19.4.1.3 During warm-up, the supply air discharges temperature of 90°F (adjustable). During cool-down, the supply air temperature is 55°F (adjustable).
 - 19.4.1.4 Once the occupied setpoint temperature threshold has been reached, the EMCS switches the unit to the occupied mode.
- 19.4.2 Occupied Mode:
- 19.4.2.1 Preheat Coil: The preheat valve modulates to maintain precool discharge air temperature of 50°F (adjustable). Preheat coil disables when ambient outside air temperature is above 55°F (adjustable).
 - 19.4.2.2 Cooling Coil: The chilled water valve modulates to initially maintain unit discharge supply air temperature of 55°F (adjustable). Provide a linear supply air temperature reset algorithm between:
 - 19.4.2.2.1.1 55°F (adjustable) supply air temperature supply when outside air temperature is at or above 80°F (adjustable).
 - 19.4.2.2.1.2 60°F(adjustable) supply air temperature supply when outside air temperature is at or below 50°F (adjustable).
- 19.4.3 Unoccupied Mode: The EMCS enables the unit as required to maintain the unoccupied heating and cooling setpoints (initially 55°F heating and 85°F cooling) as sensed by the VAV box space temperature sensors. A minimum number of associated VAV boxes, 40% (adjustable), to request the AHU before AHU operates.
- 19.5 Outside Air Damper Control:
- 19.5.1 Warm-up or Cool-down: The outside air damper to be closed.
 - 19.5.2 Occupied Mode: EMCS monitors the CO2 level at return air duct/plenum:
 - 19.5.2.1 When CO2 levels are below 1100 ppm (adjustable), the outside air damper to be at the minimum position (adjustable) as set by TAB. Reference scheduled CFM.
 - 19.5.2.2 When CO2 levels are above 1200 ppm (adjustable), the outside air damper to be at the maximum position (adjustable) as set by TAB. Reference scheduled CFM.
 - 19.5.3 Unoccupied Mode: The outside air damper to be closed.
- 19.6 Dry Bulb Economizer Mode (Utilize when economizer exemption cannot be taken): In occupied or unoccupied mode, outside air temperature is 60°F (adjustable) or below and there is a call for cooling, the unit to be in economizer mode. Outside air damper opens 100% and provides free cooling. If cold deck setpoint is not meet within 10 min (adjustable), mechanical cooling to be enabled.
- 19.7 Dehumidification Mode:
- 19.7.1 Dehumidification mode activates when the return air relative humidity is above 60% (adjustable).

19.7.2 Dehumidification mode temporarily disables the cooling supply air temperature reset and maintains constant discharge air temperature at 53°F (adjustable).

19.7.3 Dehumidification disables when return air relative humidity is 2% (adjustable) below humidity setpoint.

19.8 Safeties:

19.8.1 Freeze Protection:

19.8.1.1 When the outside air (OA) temperature drops below 36°F (adjustable), chilled water and hot water valves open to 20% if not already open.

19.8.1.2 When the OA temperature rises 2°F above freeze protection setpoint for one (1) hour, the reverse occurs.

19.8.2 Freeze Stat: Provide a temperature low limit switch to disable the unit and close all dampers when it senses that the air temperature is below 36°F (adjustable)

19.8.3 Static Pressure Switch: Provide a high static pressure switch to disable the unit and close all dampers when pressure switch is activated.

19.9 Control Points:

Description	Type
Fan Amps/Status	AI
Filter Alarm	DI
Mixed Air Temperature	AI
Return Air Temperature	AI
Return Air Humidity	AI
Return Air CO2	AI
Preheat Supply Air Temperature (PreCool)	AI
Unit Discharge Air temperature	AI
Static Pressure Sensor	AI
Freeze Status Alarm	DI
High Static Alarm	DI
Fan Start/Stop Command	DO
Fan VFD Speed	AO
Chilled Water Valve	AO
Hot Water Valve	AO
Outside Air Damper	AO

20. VAV Terminal Unit with Hot Water Reheat:

20.1 General: The variable air volume (VAV) terminal unit with hot water reheat to serve intended spaces. The Control System Contractor is to provide a dedicated stand-alone DDC controller for each unit.

20.2 Unit Enabling/Disabling:

20.2.1 The EMCS schedule defines the occupied/unoccupied mode of operation.

20.2.2 During unoccupied times, as required to maintain the unoccupied heating and cooling setpoints 55°F (adjustable) heating and 85°F (adjustable) cooling as sensed by the space temperature sensor.

20.3 Temperature Control:

20.3.1 Warm-up or Cool-down:

- 20.3.1.1 The EMCS determines the required warm-up or cool-down period based on the optimized start algorithm.
- 20.3.1.2 Upon enabling the unit, the unit heats and cools as required to maintain the occupied heating and cooling setpoints (initially 70°F heating, 74°F cooling) as sensed by a space temperature sensor.
- 20.3.1.3 During warm-up, the VAV box modulates to max heating CFM and the hot water valve closes. Once the occupied setpoint temperature threshold has been reached, the EMCS switches the VAV box to the occupied mode.
- 20.3.1.4 During cool-down, the VAV box modulates to max cooling CFM and the hot water valve closes. Once the occupied setpoint temperature threshold has been reached, the EMCS switches the VAV box to the occupied mode.

20.3.2 Occupied Mode:

- 20.3.2.1 The unit heats and cools as required to maintain the occupied heating and cooling setpoints (initially 70°F heating, 74°F cooling) as sensed by a space temperature sensor.
- 20.3.2.2 On a rise in space temperature, the unit modulates to provide max cooling CFM. As space temperature decreases, the box modulates down to its minimum cooling CFM. As the space temperature continues to fall to below the spaces heating set point, the VAV terminal modulates its heating minimum heating CFM. At this point, the hot water valve modulates to maintain heating leaving air temperature setpoint of 90°F (adjustable). The VAV box modulates CFM to maintain space temperature setpoint.
- 20.3.2.3 The unit enters heating mode only if outside air temperature is below 60° F (adjustable).

20.3.3 Unoccupied Mode: The VAV box to modulate CFM and hot water valve as needed to maintain unoccupied space temperature setpoints.

20.4 Control Points:

Description	Type
Space Temperature	AI
Discharge Air Temperature	AI
Discharge Air CFM Flow	AI
Damper Position	AO
Hot Water Valve	AO

21. Single Zone DX RTU:

21.1 General:

- 21.1.1 System consists of a direct expansion (DX) cooling section, heating section, supply fan section and an outside air damper.
- 21.1.2 Temperature sensors for DX single zone RTU serving a classroom to have a blank face with occupancy override button.
- 21.1.3 Temperature sensors for DX RTU serving areas such as Administration, Gymnasiums, Auditoriums, Cafeterias, Kitchens, Choir, Dance and Band to have LCD screen with occupancy override and setpoint adjustment. These sensors to have tamper proof protective covers.

21.2 Unit Enabling/Disabling:

- 21.2.1 The ENCS optimum start/stop schedule defines the occupied/unoccupied mode of operation.
- 21.2.2 During unoccupied times, as required to maintain the unoccupied heating and cooling setpoints 55°F (adjustable) heating and 85°F (adjustable) cooling as sensed by the space temperature sensor.
- 21.2.3 When the override pushbutton is depressed, the unit indexes to the occupied mode for an adjustable period of time (initially 1 hour). After the override time period has expired, the unit reverts back to the unoccupied mode.

21.3 Fan Control: The units internal controller control the fan speed. If unit requires fan speed to be controlled by external source, Contractor to provide everything necessary to achieve fan control as noted below.

- 21.3.1 Fan runs in low speed during first stage heating or cooling as set by TAB.
- 21.3.2 Fan runs in high speed during second stage heating or cooling as set by TAB.

21.4 Outside Air Damper Control:

- 21.4.1 Warm-up or Cool-down: The outside air damper to be closed.
- 21.4.2 Occupied Mode: EMCS monitors the CO2 level in the space:
 - 21.4.2.1 When CO2 levels are below 1100 ppm (adjustable), the outside air damper to be at the minimum position (adjustable) as set by TAB. Reference scheduled CFM.
 - 21.4.2.2 When CO2 levels are above 1200 ppm (adjustable), the outside air damper to be at the maximum position (adjustable) as set by TAB. Reference scheduled CFM.
- 21.4.3 Unoccupied Mode: The outside air damper to be closed.

21.5 Temperature Control:

- 21.5.1 Warm-up or Cool-down:
 - 21.5.1.1 The EMCS determines the required warm-up or cool-down period based on the optimized start algorithm.

21.5.1.2 Upon enabling the unit, the unit heats and cools as required to maintain the occupied heating and cooling setpoints (initially 70°F heating, 74°F cooling) as sensed by a space temperature sensor.

21.5.1.3 Once the occupied setpoint temperature has been reached, the EMCS switches the unit to the occupied mode.

21.6 Occupied Mode:

21.6.1 Space set point to be user adjustable within $\pm 2^\circ\text{F}$ (adjustable).

21.6.2 In the occupied mode of operation, the unit supply fan cycles with a call for heating or cooling.

21.6.3 The unit heats and cools as required to maintain the occupied heating and cooling setpoints (initially 70°F heating, 74°F cooling) as sensed by a space temperature sensor.

21.6.4 When space temperature rises above occupied cooling setpoint, the DDC controller energizes the first stage of mechanical cooling. When space temperature continues to rise 2°F (adjustable) above occupied cooling setpoint, the DDC controller energizes the second stage of mechanical cooling.

21.6.4.1 First Stage Cooling: Low speed supply CFM and first stage of compressor(s).

21.6.4.2 Second Stage Cooling: High speed supply CFM and second stage of compressor(s).

Unit runs in second stage cooling until space temperature drops to occupied space cooling setpoint. Unit then runs in first stage of cooling until space temperature drops 1°F (adjustable) below space temperature setpoint and then cycles off.

21.6.5 When space temperature drops below occupied heating setpoint, the DDC controller energizes the first stage of heating. When space temperature continues to drop 2°F (adjustable) below occupied heating setpoint, the DDC controller energizes the second stage of heating.

21.6.5.1 First Stage Heating: Low speed supply CFM and first stage of heating.

21.6.5.2 Second Stage Heating: High speed supply CFM and second stage of heating.

Unit runs in second stage heating until space temperature rises to occupied space heating setpoint. Unit then runs in first stage heating until space temperature rises 1°F (adjustable) above space temperature setpoint and then cycles off.

21.7 Unoccupied Mode:

21.7.1 The EMCS enables the unit as required to maintain the unoccupied heating and cooling setpoints (initially 55°F heating and 85°F cooling) as sensed by the space temperature sensor.

21.7.2 When override button is pushed, the unit indexes to occupied mode for one (1) hour (adjustable). After the override time has expired, the unit reverts to unoccupied mode.

- 21.8 Dry Bulb Economizer Mode (Utilize when economizer exemption cannot be taken):
- 21.8.1 In occupied or unoccupied mode, when space temperature is above space setpoint, outside air temperature is 60°F (adjustable) or below and there is a call for cooling, the unit be in economizer mode. Outside air damper opens 100% and provides free cooling to the space until the space temperature setpoint is satisfied. If space is not satisfied within 10 min (adjustable), mechanical cooling enables.
 - 21.8.2 Units equipped with a powered exhaust fan, the fan enables any time the unit is in economizer mode.
 - 21.8.3 The EMCS Contractor to provide an control all sensors necessary for economizer mode operation and FDD.
- 21.9 Fault Detection and Diagnostics (FDD) (Utilize when economizer exemption cannot be taken): Each DX rooftop unit to have its economizer status monitored by the EMCS. The unit's fault detection and diagnostics to be capable of generating a visible alarm to be seen by the EMCS should the unit be in economizer when conditions are not met, or vice versa.
- 21.10 Control Points:

Description	Type
Supply Fan Amps/Status	AI
Compressor Amps/Status (Each Compressor)	AI
Mixed Air Temperature	AI
Supply Air Temperature	AI
Outside Air Temperature (Global)	AI
Space Temperature	AI
Space CO2 Concentration	AI
Outside Air Damper Feedback	AI
Fan Start/Stop Command (Each Fan)	DO
Fan Speed (Only If Required by Unit)	AO
Compressor Cooling Command (Each Stage)	DO
Heating Command (Each Stage)	DO
Outside Air Damper	AO

23 10 00 Facility Fuel Systems

1. General Requirements:
 - 1.1 Gas piping entering the building is preferred to be above grade with a self-tightening swing joint prior to entering the building and protected from accidental damage by vehicles, foundation settling, and vibration.
 - 1.2 Gas is not be piped through confined spaces such as trenches or unventilated shafts.
 - 1.3 Diaphragms in gas piping to be vented to the outside.
 - 1.4 Gas Piping Requirements:
 - 1.4.1 Above slab and within the interior of the building to meet the following:
 - 1.4.1.1 Standard weight.
 - 1.4.1.2 Schedule 40 black steel pipe.
 - 1.4.1.3 Malleable iron fittings.

- 1.4.1.4 Conform to ASTM A-53.
- 1.4.2 Outside and below grade piping to meet the following:
 - 1.4.2.1 Polyethylene gas pressure pipe.
 - 1.4.2.2 Fitting with fused joints.
- 1.5 Corrugated steel piping sleeved with schedule 40 PVC to be used in concealed locations such as walls or casework.

23 21 13 Hydronic Piping

1. For chilled/hot water systems, main distribution piping used to convey water to and from equipment to be a four (4)-pipe system with return piping.
2. Evaluate temperature control and pressure drop at terminal units (including control valves) prior to selection.
3. Design water velocity in piping not to exceed 8 feet/second.
4. Carefully coordinate large mechanical piping with the overall construction as required to assure proper support, clearance, and accessibility.
5. Piping Material:
 - 5.1 Chilled and Hot Water Piping:
 - 5.1.1 1/2 inch through 2 inches: Type L hard drawn copper.
 - 5.1.2 2-1/2 inches and larger: Standard black steel pipe.
 - 5.2 All piping to meet ASTM 536-84.
6. Pipe Fittings:
 - 6.1 Chilled and Hot Water Piping:
 - 6.1.1 1/2 inch through 2 inches: Wrought copper sweat fittings.
 - 6.1.2 2-1/2 inches and larger: Welded long-turn fittings and flanged connections.
 - 6.2 150 lb. ASA forged.
 - 6.3 Dissimilar metals require di-electric unions.
7. Provide pre-insulated piping for underground piping.
8. Utilize welded joint piping for hydronic systems.
9. Provide isolation valves, and unions as necessary for piping, at equipment to facilitate equipment repair and replacement. Equipment requiring isolation includes boilers, chillers, pumps, coils, terminal units, and heat exchangers.
10. Provide a shut-off valve upstream of strainers in the supply and return chilled water lines.
11. Provide a coalescing air and dirt separator for every hydronic system.
12. Provide all necessary connections and pot feeders for hydronic chemical treatment.
13. Pipe all control valves and other valves with stems in the up position.
14. Place vent valves in all high places in the piping where air pockets could form.

15. Isolate piping as it enters a mechanical shaft to prevent propagation of vibration to the building structure. Seal all openings, except shafts dedicated to gas piping that are ventilated.
16. Utilize isolation hangers for all piping in mechanical rooms and adjacent spaces, up to 50 feet from equipment to minimize vibration.
17. Attach anchors and guides for vertical pipe risers rigidly to the structure to control pipe movement. Design flexible pipe connectors into the piping before it reaches the riser.
18. The Mechanical Contractor to not operate hot or chilled water pumps or water loops without proper flushing and water treatment per specification.
19. Run all piping parallel to building lines and arranged so as not to interfere with removal of other equipment or devices nor to block access to doors, windows, manholes or other access openings.

23 21 23 Hydronic Pumps

1. Pump Types:
 - 1.1 Base mounted end suction.
 - 1.2 Horizontal split case.
2. Pump Characteristics:
 - 2.1 Casing: Cast iron or greater.
 - 2.2 Impeller: Bronze or greater.
 - 2.3 Shaft and Sleeve: Stainless steel with bronze sleeve or greater.
3. Pump Motors:
 - 3.1 Premium efficiency non-overloading TEFC or TEAO motors. ODP not allowed.
 - 3.2 Only 1800 or 3600 nominal rpm rated motors.
 - 3.3 Meet ASHRAE 90.1 rating. Demand of no more than 30% of design wattage at 50% design water flow.
4. Equip all pumps with variable frequency drives. Pumps with Integrated VFDs are not acceptable. VFDs to be remote mounted.
5. Support pumps and piping separately so piping is not supported by pumps.
6. If base mounted pump, mount entire unit on a cast iron drip rim baseplate. Install baseplate on an inertia base, set on top of the housekeeping pad.
7. Provide a minimum of 4 inch thick housekeeping pad for each pump.
8. Provide one (1) extra mechanical seal per pump.
9. Pump Connection Requirements:
 - 9.1 Connect piping to pumps. Install valves that are the same size as piping connected to pumps.
 - 9.2 Install non-slam check valve and globe valve on discharge side of pumps.
 - 9.3 Install suction diffuser and shutoff valve on suction side of pumps.
 - 9.4 Install triple-duty valve on discharge side of pumps.
 - 9.5 Install flexible connectors on suction and discharge sides of base-mounted pumps between pump casing and valves.

- 9.6 Install pressure gauges on pump suction and discharge. Install at integral pressure-gauge tapplings where provided.
 - 9.7 Install temperature and pressure gauge connector plugs in suction and discharge piping around each pump.
10. Acceptable Manufacturers:
- 10.1 Armstrong.
 - 10.2 Bell & Gossett.
 - 10.3 Taco.
 - 10.4 Grundfos/Paco.

23 25 00 HVAC Water Treatment

- 1. General Requirements:
 - 1.1 Closed-Loop System: One (1) bypass feeder on each system with isolating and drain valves downstream from circulating pumps, unless otherwise indicated.
 - 1.2 Open-Loop Systems for Cooling Towers: Chemical feed pumps or controlled- release canister feed system to feed cooling tower inhibitor and biocides.
 - 1.3 Open-Loop, Condenser Water Piping: Pump sequestering agent and corrosion inhibitor from Chemfeed or controlled-release canister feed system into condenser water supply to tower.
- 2. Architect to include the following requirements at a minimum in the Contract Documents.
 - 2.1 Specifications to include flushing and water treatment coordination.
 - 2.2 All chemicals required for cleaning and treating of systems prior to Owner acceptance to be provided by the Contractor.
 - 2.3 After Owner acceptance, Dallas ISD directly contracts with another company for chemicals.

23 30 00 HVAC Ductwork Systems

- 1. Ductwork Requirements:
 - 1.1 Fabricate ductwork from galvanized sheet metal except for special systems that require stainless or black steel.
 - 1.2 Minimize pressure loss in ductwork by using smooth transitions and elbows. Supply, return, and exhaust air ducts leakage limits:
 - 1.2.1 In systems up to 3 inches W.G: 3% of total airflow.
 - 1.2.2 In systems from 3 inches W.G. through 10 inches W.G.: 5% of total airflow.
 - 1.3 Provide air foil turning vanes, when mitered elbows are used.
 - 1.4 Flex duct is acceptable for low pressure ductwork downstream of the terminal box in classroom or office spaces. The length of the flex ducts not to exceed the distance between the terminal box and the diffuser plus 20 percent or 10 feet, whichever is shorter, to permit relocation of diffuser in the future while minimizing replacement of ductwork. Flex duct runs not to contain any bends.
 - 1.5 Exterior ductwork only to be used when required. The location and construction of ducts exposed to outdoor conditions are generally regulated by the building codes. Consider the following criteria when locating ducts outdoors:

- 1.5.1 Waterproofing.
- 1.5.2 Proximity to odor emitting systems or materials.
- 1.5.3 Resistance to external loads (wind, snow, and ice).
- 1.5.4 Heat transfer.
- 1.5.5 Susceptibility to physical damage.
- 1.5.6 Hazards at air inlets and discharges.
- 1.5.7 Insulation requirements.
- 1.5.8 Maintenance needs.
- 1.6 At a minimum, insulate ductwork with double wall insulated and wrapped with a weatherproof material.
- 2. Return Air/Ductwork Requirements:
 - 2.1 Ceiling return plenums are not allowed in laboratories and are discouraged in all other applications. Fully ducted return-air systems are preferred.
 - 2.2 Eliminate the use of corridors as a return air path in existing facilities where possible.
 - 2.3 Provide ducted return for unitary equipment.

23 34 00 HVAC Fans (Exhaust and Supply)

- 1. Ventilation Exhaust/Supply Systems Requirements:
 - 1.1 Provide roof mounted fans whenever possible.
 - 1.2 All single restrooms to have operational exhaust fans controlled by an independent switch or occupancy sensor separate from the light switch.
 - 1.3 The FMCS to control all crawlspace exhaust fans.
 - 1.4 In laundry areas provide exhaust vent for dryer. Minimize venting distances. Provide booster fans if necessary.
 - 1.5 Where return air fans are required, size the return fan at lower volume than the supply fan to maintain a slightly positive pressure in the building.
 - 1.6 Provide separate exhaust hoods/exhaust systems for the following:
 - 1.6.1 Open skilllets.
 - 1.6.2 Cooking ranges.
 - 1.6.3 Dishwashers in kitchens.
 - 1.7 Kitchen Exhaust Systems:
 - 1.7.1 Conceal kitchen ductwork. Black iron is allowed for concealed duct work.
 - 1.7.2 Provide drains at low points.

- 1.8 Separately exhaust spaces where hazardous gases or chemicals to be present, and in the following spaces:
 - 1.8.1 Garages.
 - 1.8.2 Housekeeping/laundry areas.
 - 1.8.3 Science laboratories.
 - 1.8.4 Laboratory prep rooms where hazardous gases or chemicals are used.
 - 1.8.5 Art rooms.
 - 1.8.6 Shops of any kind.
 - 1.8.7 Copying/printing rooms.
 - 1.8.8 Custodial closets.
 - 1.9 Exhaust ductwork to be of stainless steel in accordance with the type of fume expected and compatible with the functional process needs.
 - 1.10 Ventilate vertical shafts carrying gas piping at top and bottom to prevent leaked gas from accumulating.
 - 1.11 Provide ventilation systems to control humidity levels in crawl spaces.
 - 1.12 Louvers for mechanical room ventilation to allow adequate combustion air for boilers. Consider freeze protection when sizing and locating louvers.
 - 1.13 All fans provided to bear the UL label.
 - 1.14 Provide fans with engraved aluminum nameplates indicating CFM, static pressure, manufacturer, serial number, and model number.
 - 1.15 All exhaust fans operating in a corrosive environment (Science Labs, etc.) to have a factory applied acid resistant coating.
 - 1.16 All roof mounted fans to have electrical wiring and conduit internal to roof curb and fan housing. No external wiring or conduit to be allowed on roof.
 - 1.17 Avoid use of side wall mounted fans where possible.
2. Roof Mounted Exhaust Fans:
- 2.1 Roof mounted, direct driven centrifugal exhaust ventilator. Fan to be spun aluminum and mounted on vibration isolators.
 - 2.2 Required Features:
 - 2.2.1 Disconnect switch: factory wire the switch and motor to the junction box.
 - 2.2.2 Minimum 18 gauge galvanized steel or aluminum.
 - 2.2.3 Factory installed variable speed controller.
 - 2.2.4 Minimum 18 inch curb height.
 - 2.2.5 Lifting lugs.

3. Ceiling Mounted Exhaust Fans:
 - 3.1 Centrifugal, direct driven exhaust fan required features:
 - 3.1.1 Disconnect switch: internal wiring box with switch.
 - 3.1.2 Powder painted white steel grille.
 - 3.1.3 Factory installed variable speed controller.
 - 3.1.4 Provide 277 volt to 120 volt transformer.
4. Kitchen Supply Fans:
 - 4.1 Roof mounted centrifugal forward curve fans, belt drive, mounted on vibration isolators.
 - 4.2 Filters are to be permanent, 1 inch thick, washable, and aluminum.
 - 4.3 Disconnect switch: Internal wiring box with switch.
5. Kitchen Exhaust Fans:
 - 5.1 Roof mounted, upblast centrifugal exhaust ventilator. Fan to be spun aluminum and mounted on vibration isolators.
 - 5.2 Required features:
 - 5.2.1 Disconnect switch: internal wiring box with switch.
 - 5.2.2 Vented extension roof curb (minimum 8 inches from finished roof.).
 - 5.2.3 Hinged base.
 - 5.2.4 Lifting lugs.
 - 5.2.5 Grease trough.
6. Acceptable Manufacturers:
 - 6.1 Cook.
 - 6.2 Greenheck.
 - 6.3 Captiveaire.
 - 6.4 Twin City Fan.

23 36 00 Air Terminal Units

1. Single Duct Air Terminal Units (VAV Boxes) Requirements:
 - 1.1 VAV terminal unit air flows never to be designed to shut down to zero when the system is operating. Maintain outside air requirements under minimum flow conditions.
 - 1.2 Configuration: Volume-damper assembly inside unit casing with control components located inside a protective metal shroud.
 - 1.3 Access: Removable panels for access to dampers and other parts requiring service, adjustment, or maintenance; with airtight gasket.
 - 1.4 Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.

- 1.5 Damper Position: Normally closed.
- 1.6 Hot-Water Heating Coil: Copper tube, mechanically expanded into aluminum- plate fins, leak tested underwater to 200 psig, and factory installed.
- 1.7 Terminal Unit Controls: The FMCS Sub-Contractor to furnish to the terminal unit manufacturer the unitary controller and damper actuator. The FMCS Sub-Contractor to field install the room temperature sensor and discharge air temperature sensor.
- 1.8 Identification: Label each air terminal unit with plan number, nominal airflow, maximum and minimum factory-set airflows, coil type, and ARI certification seal.
- 1.9 Filter grilles are not allowed.
- 1.10 Acceptable Manufacturers:
 - 1.10.1 Environmental Technologies, Inc.; ETI.
 - 1.10.2 Nailor.
 - 1.10.3 Titus.
 - 1.10.4 Trane.
 - 1.10.5 Carrier.
 - 1.10.6 Price.

23 40 00 HVAC Air Cleaning Devices

- 1. Air Filtration/Filter Requirements:
 - 1.1 Provide final filters to meet Green Building Program requirements – MERV 13 Minimum.
 - 1.2 Architect to specify that the Contractor is to replace filter media at substantial completion in all areas affected by construction.
- 2. Bipolar Ionization Requirements:
 - 2.1 Bipolar ionizers are acceptable to use in high volume spaces to help clean the air and reduce odor in spaces such as: cafeterias, auditoriums, gyms, locker rooms.
 - 2.2 Bipolar ionizers to utilize needle point technology. Ionizers utilizing tubes are not acceptable.
 - 2.3 Ionization devices or status to not be shown on the FMCS.

23 50 00 Central Heating Equipment

- 1. Steam systems are to be completely renovated and converted to hot water systems.
- 2. Hot water systems to be primary/secondary systems.
- 3. Main building loop pumps to be headered.
- 4. Boilers used and selected for the hot water plant to be the same size.
- 5. Mixing condensing and non-condensing boilers is not allowed.
- 6. Boilers to be vertical configuration. Horizontal boilers are not allowed.
- 7. Design boilers and associated pumping with some redundancy built in.

8. Place boilers to permit pulling of tubes from all units. The clearance to be equal the length of the tubes plus 2 feet. Boilers to be easily accessible for internal inspections and cleaning.
9. Hot water heating systems utilizing condensing boilers operate from 100-130° F and have stainless steel heat exchangers.
10. Hot water heating systems utilizing non-condensing boilers operate from 140-160° F and have copper heat exchangers.
11. Provide all necessary connections and pot feeders for hydronic chemical treatment.
12. Provide pressurized diaphragm tanks.
13. Design hot water systems to remove accumulated air.
 - 13.1 Provide a coalescing air and dirt separator.
 - 13.2 Only use automatic bleed valves in accessible spaces in mechanical rooms where they can be observed by maintenance personnel and piped directly to open drains.
 - 13.3 Use manual valves at terminal units and other less accessible high points in the system.
14. Install all boilers and associated equipment on 4 inch housekeeping pads. Extend pads 3 inches past equipment on all sides.
15. Design team to coordinate with Dallas ISD for current boiler inspection process so contractor requirements can be included in the construction documents.
16. Interlock boilers to CO sensor, combustion/ventilation and flue fans. Coordinate install with security panel.
17. Supply boilers with and have standalone OEM boiler sequencer/staging module. FMCS to enable sequencer.
18. Provide boilers with a water temperature reset that adjusts water temperature based on outside air temperature.
19. Provide and connect sub-meter on make-up water piping for heating water system. Dwyer model WNT-A-C or greater or Dallas ISD approved equal. Integrate meter into FMCS.

23 52 16 Condensing Boilers

1. General Requirements:
 - 1.1 At minimum, each boiler to be capable of a 10:1 turndown.
 - 1.2 Boilers to have LCD screen.
 - 1.3 Boilers are to be vertical configuration equipped with circulation pump with the capability to communicate to additional system boilers for efficiency and automatic lead lag standalone sequencing.
 - 1.4 Each boiler to be provided with LONWORKS® or BACnet® interface for FMCS integration. Interface is to be used for monitoring purposes only.
 - 1.5 Boilers to have standalone sequencer and all associated sensors to connect multiple boilers together to stage and modulate boilers. System to have a water temperature reset that adjusts water temperature based on outside air temperature.
 - 1.6 Each boiler to have adjustable high limit water temperature controller with manual reset.
2. Heat Exchanger:
 - 2.1 Heat exchangers that consist of a primary and secondary heat exchanger are not allowed.

- 2.2 Near condensing boilers are not allowed.
- 2.3 Each hot water boiler to consist of a stainless-steel heat exchanger.
- 3. Piping Connections – Piping: Install piping from equipment drain connection to nearest floor drain. Piping to be at least full size of connection and adhere to proper codes for neutralization.
- 4. Exhaust Venting:
 - 4.1 Flue system to be double wall stainless steel with termination kit.
 - 4.2 Install flue venting system per manufacturer’s recommendations and state/provincial codes.
- 5. Installation Requirements:
 - 5.1 Engage a factory-authorized service representative to test, inspect, and adjust boiler components and equipment installation and to perform startup service.
 - 5.2 Provide a factory startup report by the boiler supplier. Startup report to be made and delivered to the Mechanical Engineer and the test and balance agency.
 - 5.3 Equipment Mounting:
 - 5.3.1 Install boilers on cast-in-place 4 inch concrete equipment base.
 - 5.3.2 Install and connect condensation neutralization system for each boiler.
 - 5.3.3 Hardwire interlock each boiler to carbon monoxide (CO) sensor.
- 6. Acceptable Manufacturers:
 - 6.1 Patterson-Kelly.
 - 6.2 Lochinvar.
 - 6.3 LAARS.
 - 6.4 Aerco.
- 7. Warranty:
 - 7.1 Warranty to cover each boiler, including boiler, trim, boiler control system, and all related components, accessories, and appurtenances against defects in workmanship and material for a minimum of one (1) year from date of start-up.
 - 7.2 Warranty to cover heat exchanger and fuel burner for a minimum of ten (10) years from substantial completion.

23 52 33 Copper Fin Tube Boilers

- 1. General Requirements:
 - 1.1 Each boiler to have a minimum turndown of 4:1.
 - 1.2 Boilers are to be vertical configuration equipped with circulation pump and temperature low limit valve, with the capability to communicate to additional system boilers for efficiency and automatic lead lag standalone sequencing.
 - 1.3 Each burner shall of all radial-fired type and constructed of steel with a stainless steel inner screen, designed to produce a complete 360 degree flame pattern. The diffuser shall be of welded steel construction and designed for easy service. A viewing port shall be provided for visual observation of burner performance. Berner shall require no maintenance, inspection or service.

- 1.4 Boilers to have LCD screen.
 - 1.5 Boilers to have standalone sequencer and all associated sensors to connect multiple boilers together to stage and modulate boilers. Provide a water temperature reset that adjusts water temperature based on outside air temperature.
 - 1.6 Provide CO sensor for boiler system that shuts boiler off in time of alarm or sensor failure.
 - 1.7 Provide each boiler with LONWORKS® or BACnet® interface for FMCS integration. Interface is to be used for monitoring purposes only.
2. Acceptable Manufacturers:
 - 2.1 HARSCO Patterson-Kelley.
 - 2.2 Lochinvar.
 - 2.3 Laars.
 - 2.4 Thermal Solutions.
3. Special Warranty Requirements: Manufacturer agrees to repair or replace vertical copper fin tube boilers that fail in materials and workmanship within specified twelve (12) months from date of Substantial Completion. Warranty includes all parts, labor, and shipping.
 - 3.1 Warranty to cover heat exchanger for a minimum five (5) years (limited warranty) and twenty (20) years against thermal shock.
 - 3.2 Warranty to cover burner for minimum of ten (10) years (limited warranty).
4. Architect to include the following requirement of the Contractor at a minimum in the Contract Documents:
 - 4.1 Boiler Installation Requirements:
 - 4.1.1 Install boilers level on 4 inch concrete base. Stack Frame is not allowed.
 - 4.1.2 Connection Requirements:
 - 4.1.2.1 Connect gas piping full size to boiler gas-train inlet with union or flanges.
 - 4.1.2.2 Connect hot water piping to supply and return boiler tappings with shutoff valve and union or flange at each connection.
 - 4.1.2.3 Install piping from water boiler safety relief valves to nearest floor drain.
 - 4.1.2.4 Install piping adjacent to boiler to allow service and maintenance.
 - 4.2 Startup Service Requirements:
 - 4.2.1 Do not conduct any boiler startup without proper water treatment.
 - 4.2.2 Engage a factory-authorized service representative to test, inspect, and adjust boiler components and equipment installation and perform startup service.
 - 4.2.3 Perform installation and startup checks according to manufacturer's written instructions.

23 60 00 Central Chilled Water Equipment

1. Chiller Selection Requirements:

- 1.1 Chillers to be high efficiency and selected to take airside economizer exemption. Higher efficiency equipment rated above base efficiency is the preferred method.
- 1.2 Systems with multiple chillers to have chillers of equal size. Pony chillers are not allowed.
- 1.3 Chilled water systems to be variable primary systems.
- 1.4 Pumping system to be headered. Dedicated pumps to chillers is discouraged.
- 1.5 Design and rate air cooled chillers for 105°F ambient.
- 1.6 Air cooled chillers to be high efficiency variable speed (VFD) screw at 140 tons or above. Below 140 tons, high efficiency scroll chillers are acceptable.
- 1.7 Air cooled screw chillers to be R-134a. Air cooled scroll chillers to be R-410a.
- 1.8 All air cooled chillers to be copper tube and aluminum fin or all-aluminum microchannel.
- 1.9 Air cooled chillers with integral pump packages are not allowed.
- 1.10 All water cooled chillers to be high efficiency variable speed (VFD) centrifugal chillers. Magnetic bearing chillers are acceptable.
- 1.11 All centrifugal chillers to be R134a.
- 1.12 Design chiller supply/return water temperature at 42°F/58°F for new construction and major renovations.

2. Chiller Installation/Accessories Requirements:

- 2.1 Place chillers to permit pulling of tubes from all units. Clearances to equal the length of the tubes plus 2 feet. Chillers to be easily accessible for internal inspections and cleaning.
- 2.2 Consider sound levels to adjoining properties and regulations by zoning and historic preservation ordinances when selecting outdoor chiller.
- 2.3 Install all chillers on 6 inch housekeeping pads. Extend pads 3 feet past equipment on each side.
- 2.4 Interlock chillers to pumps whenever possible.
- 2.5 Provide all necessary connections and pot feeders for hydronic chemical treatment.
- 2.6 Provide expansion tank and coalescing air and dirt separator.
- 2.7 Equip chiller rooms with refrigerant monitoring system, emergency strobes and exhaust fans.
- 2.8 Provide flanges on chilled water supply and return piping for connection to rental equipment if needed. Size flanges according to piping. Show flanges in piping detail on construction drawings.

3. Cooling Tower Selection Requirements:

- 3.1 Multiple-cell towers and isolated basins are required to facilitate operations and maintenance. Manifold piping to allow for any combination of equipment use.
- 3.2 Cooling towers to be 304 stainless steel.
- 3.3 Multiple fans are preferred but might not be practical with some smaller towers. Induced draft is preferred.

- 3.4 Induced draft towers to have a clear distance equal to the height of the tower on the air intake side(s) to keep air velocity low. Forced draft towers require a clearance of twice the tower width on the intake side(s) to minimize air recirculation.
- 3.5 Fan motors to be located outside of air stream. Exception: Direct Drive Fans.
- 4. Cooling Tower Installation/Accessories Requirements:
 - 4.1 Provide clean-outs for sediment removal and flushing from basin and piping in accessible locations.
 - 4.2 Provide platforms, ladders, railing and motor davit.
 - 4.3 Cooling Towers Siting Requirements:
 - 4.3.1 Do not interfere with the appearance of the building.
 - 4.3.2 Allow for ease of maintenance.
 - 4.3.3 Prevent drift or plume fogging on the building or surrounding buildings.
 - 4.3.4 Locate away from any building wall or parking lot to prevent corrosion of finishes.
 - 4.3.5 Minimize effect of start/stop noise and radiated noise on occupied spaces in the vicinity.
 - 4.3.6 Maintain local zoning or historic preservation ordinances.
 - 4.3.7 Avoid interference with or by surrounding vegetation.
 - 4.4 Where site constraints prevent locating cooling towers on the ground, located on the building, in which case, provide vibration and sound isolation. Support design to allow re-roofing under the tower.
 - 4.5 Provide flanges on condenser water supply and return piping for connection to rental equipment if needed. Size flanges according to piping. Flanges are to be shown in piping detail on construction drawings.
 - 4.6 Provide sub-meter on make-up water piping at chilled water system and cooling tower system. Dwyer model WNT-A-C or greater. Integrate meters into FMCS.

23 64 16 Centrifugal Water Chillers

- 1. Compressors:
 - 1.1 Compressor capacity control: variable with VFD, inlet guide-vane assembly for stable operation free of surge, cavitation, or vibration throughout throttling.
 - 1.2 Magnetic bearing chillers are acceptable. When centrifugal chiller is not magnetic bearing, equip chiller with hot gas bypass. Include with submittals manufacturer performance data showing all chillers are capable of capacity turndown from 100% to 15% (or less) at constant 85F Entering Condenser-water temperature.
- 2. Evaporator:
 - 2.1 Tubes to be seamless, externally finned, individually replaceable tubes; expanded into tube sheets.
 - 2.1.1 Material: Copper.
 - 2.1.2 Size: 3/4 inch OD; 0.028-inch wall thickness.
 - 2.2 Water boxes to be marine type, removable, carbon steel, with vent and drain connection.
 - 2.3 Evaporator to have hinges on both sides for ease of maintenance.

- 2.4 3/4 inch thick flexible elastomeric insulation to be factory applied to evaporator, suction lines, and other surfaces where condensation might occur.
- 2.5 Include with submittals the minimum condenser water flow rates (GPM) for each chiller submitted.
- 3. Condenser:
 - 3.1 Condenser tubes to be seamless, externally finned, individually replaceable tubes; expanded into tube sheets.
 - 3.1.1 Material: Copper.
 - 3.1.2 Size: 3/4 inch OD; 0.028-inch wall thickness.
 - 3.2 Water boxes to be marine type, removable, carbon steel, with vent and drain connection.
 - 3.3 Condenser to have hinges on both sides for ease of maintenance.
 - 3.4 Include with submittals documentation stating the minimum and maximum-allowed entering condenser water temperature for each chiller submitted.
- 4. Control Functions: Include Facility Management and Control System Interface: Provide hardware and software as required to communicate to the Facility Management and Control System via software interface using LON or BACnet communication protocol. This interface to be used for diagnostics and monitoring purposes only.
- 5. Control Panel:
 - 5.1 Manufacturer's standard touch-screen microprocessor-based chiller controls; unit mounted, and factory wired with a single-point power connection and separate control circuit.
 - 5.2 Rate chiller disconnect at 65k AIC.
- 6. Unit Mounted Variable Frequency Drive (VFD):
 - 6.1 Provide VFD with built-in harmonic filter.
 - 6.2 VFD to be integral to chiller. Standalone and/or remote mounted VFD's are not acceptable.
 - 6.3 The VFD to be factory mounted, wired and tested on the chiller prior to shipment.
 - 6.4 Chiller and VFD shall comply with IEEE standard 519-1992 for total harmonic distortion. Include harmonic filter if required for IEEE 519-1992 compliance.
- 7. Vibration control: direct isolation (no base) and vibration isolators, rubber mounts with minimum deflection of 0.25 inch.
- 8. Chiller Connection:
 - 8.1 Install piping adjacent to machine to allow service and maintenance.
 - 8.2 Connect to supply and return piping with shut-off valve and flange or mechanical joint.
 - 8.3 Extend safety-relief valves or rupture-disc discharge piping from chiller and purge condenser receiver to exterior of building.
- 9. Acceptable Manufacturers:
 - 9.1 Carrier.
 - 9.2 Trane.
- 10. Warranty: Warranty to cover parts, labor, labor and refrigerant for a minimum of five (5) years from date of substantial completion.

11. Architect is to include the following requirements of the Contractor at a minimum in the Contract Documents:
 - 11.1 Contractor to thoroughly flush all water piping to the unit before making the final piping connections to the unit.
 - 11.2 Chiller to have a minimum 6 inch housekeeping pad.
 - 11.3 Contractor to furnish and install all accessories as listed below:
 - 11.3.1 Spring-loaded check valves.
 - 11.3.2 Flow switch and/or auxiliary contacts to prove chilled and condenser water flow.
 - 11.3.3 Factory-mounted Thermal-dispersion type switches preferred. Paddle-type flow switches shall not be used.
 - 11.3.4 Vapor-proof/tight chilled water and condenser water flow switch.
 - 11.3.5 Chilled water and condenser water supply/ return thermometers.
 - 11.3.6 Pressure gauges in inlet and outlet piping of the evaporator and condensers.
 - 11.3.7 Provide drain valve to the bottom and top of the evaporator and condenser water box.
 - 11.3.8 Provide new strainers in evaporator water inlet and condenser water inlet of pumps.
 - 11.3.9 Vent at the highest point in chilled water piping system.
 - 11.3.10 Heat tape and insulate the chilled water lines and any other portions of the system, as required, to prevent sweating under normal operating conditions or freezing during low ambient temperature conditions.
 - 11.3.11 Install 1/4 inch test ports in chilled and condenser water lines.
 - 11.3.12 Provide 6 inch supply/return tie-in connections (for future temporary chilled water service).
 - 11.3.13 Supply wiring (in conduit) for field supplied devices and fused- disconnect switches.
 - 11.3.14 Provide all accessories required for a complete and fully operational chilled water distribution system.
 - 11.3.15 For piping, provide at least 18 inch spool in supply and return on condenser for removal for cleaning.
 - 11.4 Prepare and turn over to Dallas ISD designated representative closeout documentation to include, at a minimum:
 - 11.4.1 Cover sheet with date, school name and address. Include name of General Contractor, installing mechanical contractor, and chiller manufacturer on the cover page.
 - 11.4.2 Chiller submittals (as-builts).
 - 11.4.3 Completed startup report for all chillers.
 - 11.4.4 Manufacturer's unit-specific warranty documentation, detailing the start and end dates for each specific unit warranty.

- 11.4.5 Coordinate with Dallas ISD-M&O for their preference of written reports (in binder format) and/or digital reports (on USB flash drive or other preferred method), and number of copies of each.
- 11.4.6 Closeout documentation to be presented at time of Dallas ISD personnel training or other Dallas ISD-M&O preferred time.

23 64 26 Air Cooled Chillers

- 1. Packaged Air Cooled Chillers:
 - 1.1 Factory-assembled and tested air cooled chiller complete with casing, variable speed compressor, heat exchanger, condenser coils and fans, VFD and controls integrated with compressor operation.
 - 1.2 Rate chiller disconnect at 65k AIC.
- 2. Compressors:
 - 2.1 Air Cooled Screw Chillers:
 - 2.1.1 Variable speed screw compressor with VFD.
 - 2.1.2 Refrigerant to be R-134a.
 - 2.2 Air Cooled Scroll Chillers:
 - 2.2.1 Multiple scroll compressors.
 - 2.2.2 Refrigerant to be R-410a.
 - 2.3 Capacity Control to be modulating with throttling range from 100 to 15 percent of full load.
- 3. Heat Exchangers:
 - 3.1 Evaporator:
 - 3.1.1 Shell and tube type, mechanically cleanable.
 - 3.1.2 Tube Construction to be individually replaceable, expanded into tube sheets.
 - 3.1.2.1 Material: Copper.
 - 3.1.2.2 Internal Finish to be enhanced.
 - 3.1.3 Provide each shell with a drain and vent connection.
 - 3.1.4 Test and stamp refrigerant side for 225 psig working pressure. Design water side for 300 psig working pressure.
 - 3.2 Condenser:
 - 3.2.1 Copper tubes with mechanically bonded aluminum fins or all-aluminum microchannel leak tested at 450 psig.
 - 3.2.2 Provide factory mounted, full length, louvered hail guards, steel panels to protect the condenser coils, wiring, sensors and piping. Panels to cover all the condenser coils and all refrigeration coils.

- 3.2.3 Full-unit louvered panels: made of steel and painted to match unit exterior. Louvered panels shall cover entirety of both condenser coil and lower compressor/evaporator area, around the full perimeter of each chiller.
 - 3.2.4 Compressor-sound attenuating enclosure: For air-cooled chillers with screw compressors, include from factory a solid-paneled enclosure around compressors and discharge refrigerant piping to prevent compressor breakout noise.
 - 3.2.5 Condenser fans to be equipped with high efficiency variable speed condenser fans for head-pressure control.
4. Insulation: Insulate with 0.75 inch thick flexible elastomeric rubber, closed cell insulation with maximum K value of 0.26. Provide thermostatically controlled heat tape to protect evaporator to 0°F.
 5. Controls:
 - 5.1 Control Panel: Stand alone, touch-screen display microprocessor based.
 - 5.2 Facility Management and Control System Interface: Provide hardware and software as required to communicate to the Facility Management and Control System via software interface using LON or BACnet communication protocol. This interface to be used for diagnostics and monitoring purposes only.
 6. Unit Mounted Variable Frequency Drive (VFD):
 - 6.1 VFD to be integral to chiller. Standalone and/or remote mounted VFD's are not allowed.
 - 6.2 The VFD to be factory mounted, wire and tested on the chiller prior to shipment.
 7. High and Low Ambient Control: Provide factory high and low ambient kits. Chillers to be capable of operation from 0° F to 125° F.
 8. Installation Requirements:
 - 8.1 Concrete Bases: Anchor chiller mounting frame to minimum 6 inches concrete housekeeping pad.
 - 8.2 Vibration Isolation: Mount on rubber pads with a minimum deflection of 0.25 inch.
 - 8.3 Maintain manufacturer's recommended clearances for service and maintenance.
 - 8.4 Charge water chiller with refrigerant if not factory charged.
 - 8.5 Install separate devices furnished by manufacturer.
 9. Connection Requirements:
 - 9.1 Install piping adjacent to chiller to allow service and maintenance.
 - 9.2 Evaporator connections: Connect inlet to evaporator with controller-bulb well, shutoff valve, thermometer, strainer, pressure gage, and union or flange. Connect outlet to evaporator with shutoff valve, flow switch, balancing valve, thermometer, pressure gauge, and union or flange.
 10. Acceptable Manufacturers:
 - 10.1 Carrier.
 - 10.2 Trane.
 11. Warranty: Warranty to cover repair or replacement, including associated labor and refrigerant, of components of water chillers that fail in materials or workmanship for a minimum of five (5) years from substantial completion (Manufacturer's standard Special Warranty form).
 12. Architect to include the following requirements of the Contractor at a minimum in the Contract Documents:
 - 12.1 Contractor to thoroughly flush all water piping to the unit before making the final piping connections to the unit.

- 12.2 The Contractor to furnish and install all accessories as listed below:
- 12.2.1 Spring-loaded check valves.
 - 12.2.2 Flow switch and/or auxiliary contacts to prove chilled and water.
 - 12.2.3 Vapor-proof/tight chilled water flow switch.
 - 12.2.4 Chilled water supply/return thermometers.
 - 12.2.5 Pressure gauges in inlet and outlet piping of the evaporator.
 - 12.2.6 Drain valve to the bottom and top of the evaporator water box.
 - 12.2.7 New strainers in evaporator water inlet of pumps.
 - 12.2.8 Air vent at the highest point in chilled water piping system.
 - 12.2.9 Heat tape and insulate the chilled water lines and any other portions of the system, as required, to prevent sweating under normal operating conditions or freezing during low ambient temperature conditions.
 - 12.2.10 1/4 inch test ports in chilled and condenser water lines.
 - 12.2.11 6 inch supply/return tie-in connections (for future temporary chilled water service).
 - 12.2.12 Power supply wiring (in conduit) for field supplied devices and fused-disconnect switches.
 - 12.2.13 Hail guard and architectural louvered panels (security panels) for all air cooled chillers. Wire mesh access guards are not allowed.
 - 12.2.14 All accessories required for a complete and fully operational chilled water distribution system.
 - 12.2.15 Minimum 18 inch spool for piping in supply and return on condenser for removal for cleaning.
- 12.3 Prepare and turn over Owner closeout documentation to include, at a minimum:
- 12.3.1 Cover sheet with date, school name and address. Include name of General Contractor, installing mechanical contractor, and chiller manufacturer on the cover page.
 - 12.3.2 Chiller submittals (as-builts).
 - 12.3.3 Completed startup reports for all chillers.
 - 12.3.4 Manufacturer's unit-specific warranty documentation, detailing the start and end dates for each specific unit warranty.
 - 12.3.5 Coordinate with Dallas ISD-M&O for their preference of written reports (in binder format) and/or digital report (on USB-drive or other preferred method), and number of copies of each.
 - 12.3.6 Closeout documentation to be presented at time of Dallas ISD personnel training or other Dallas ISD-M&O preferred time.

23 65 13 Forced Draft – Draft Cooling Towers

1. General Requirements:
 - 1.1 Tower installations to be 2-Cell where tonnage allows. If two (2) or more cells are not possible, design single cell with two (2) or more fans.
 - 1.2 Crossflow towers are preferred.
 - 1.3 Fan motors that are outside the air stream are preferred for belt-drive towers. Motors in air stream are acceptable for direct-drive towers.
2. Basin heater to maintain 40 deg F condenser-water temperature at 0 deg F outside-air temperature.
3. Fans:
 - 3.1 Type and material to be propeller, cast aluminum or composite.
 - 3.2 Drive to be gear drive or direct drive when available. Belt drive to be used where direct drive is not available.
 - 3.3 Bearings to be self-aligning ball bearings with lubrication lines and fittings.
 - 3.4 Mechanical vibration cutout switch to be solid state, with adjustable time delay and NEMA 250, type 4 enclosure.
 - 3.5 Fans to have VFD's. Provide VFD's by one (1) of the approved manufactures listed in the VFD section.
4. Water Distribution System:
 - 4.1 Pipes to be schedule 40 PVC or stainless steel.
 - 4.2 Nozzle materials to be schedule 40 PVC, polypropylene, or brass.
 - 4.3 Hot-water basin and basin cover to be type 304 stainless steel.
 - 4.4 Hot-water-basin balancing valves to be manufacturer's standard butterfly valves arranged to balance flow to each distribution basin and shut flow off during servicing.
5. Casing material to be complete 304 stainless steel casing with stainless steel fasteners.
6. Cold water basin material to be 304 stainless steel and to include:
 - 6.1 Removable strainer with openings smaller than nozzle orifices.
 - 6.2 Overflow connection.
 - 6.3 Makeup water connection.
 - 6.4 Flume plate between adjacent cells (for multiple-cell units).
 - 6.5 Equalizer connection (for multiple-cooling-tower system).
 - 6.6 Lined tower basins.
7. Fill material to be PVC, CPVC, or FRP; resistant to rot, decay, and biological attack; with maximum flame-spread index of 5 according to ASTM E 84; and fabricated, formed, and installed by manufacturer to ensure that water breaks up into droplets.
8. Drift eliminator material to be same as fill material.
9. Air inlet louver material to be PVC, FRP, or stainless steel.
10. Water-level control to be mechanical float assembly type.

11. Handrails, Ladders, Platforms and Davit:

- 11.1 Handrails to be aluminum complying with 29 CFR 1910.23 as specified by the manufacturer. Include perimeter handrails around top of colling towers is with ladder and safety gate.
- 11.2 Ladders and safety cages to be aluminum complying with 29 CFR 1910.27. Include ladders with safety cage and safety gate external to cooling towers for access to hot water basin. Include ladder extensions where applicable for easier access from roof/grade. Include ladders internally for motor access.
- 11.3 Interior work platforms where possible: to be stainless steel with a bar grating floor.
- 11.4 Include internal stainless walkway for internal tower maintenance access.
- 11.5 Davit to facilitate fan/motor replacement.

12. Installation Requirements:

- 12.1 Provide all new necessary VFD's, starters and disconnects. Install VFDs in equipment rooms. Install knife disconnects at tower.
- 12.2 Provide new, manual isolation valves on entering and leaving water piping at cooling tower.

13. Connection Requirements:

- 13.1 Install flexible pipe connectors at final connections of towers mounted on vibration isolators.
- 13.2 Connect overflow drain and bleed lines to sanitary sewage system.
- 13.3 Provide and connect sub-meter on make-up water piping at each cooling tower system. Dwyer model WNT-A-C or greater. Integrate meter into FMCS.
- 13.4 Connect to water-level control with shutoff valve and union or flange at each connection. Provide heat tracing for make- up/domestic water piping.
- 13.5 Connect to supply and return cooling-tower connections with shutoff valve, flow-control valve, and union or flange on supply connection to the tower and shutoff valve and union or flange to return connection from the tower to the chiller. Include bypass piping to tower basin and bypass control valve. Insulate and jacket all outdoor piping. Provide heat tracing on condenser water piping.
- 13.6 Connect wiring and ground cooling towers according to Division 26 requirements. Provide line voltage power to heat tracing on domestic water makeup and condenser water piping. Provide power to cooling tower fan and basin heaters.

14. Acceptable Manufacturers:

- 14.1 BAC
- 14.2 Evapco, Inc.

15. Warranty:

- 15.1 Warranty to cover repair or replacement of any components of open-circuit, mechanical-draft cooling tower that fails in materials or workmanship for a minimum of five (5) years from substantial completion (Manufacturer's standard Special Warranty form).
- 15.2 Direct Drive Towers: Fans, fan shafts, bearings, sheaves, gearboxes, drive shafts, couplings, and mechanical equipment support must be warranted against defects in materials and workmanship for a period of seven (7) years with direct drive fan system from date of shipment. Include VFD shall have five (5) year warranty.

23 73 00 Central Station Air Handling Units

1. General Requirements:

- 1.1 Draw-through units are preferred.
- 1.2 Unit base to be minimum 6 inches tall formed or welded full perimeter base rail.
- 1.3 Unit Casing:
 - 1.3.1 Unit to conform to casing leakage no more than 1% of design airflow at 8 inches total static pressure.
 - 1.3.2 Supply air handling unit with 3 inches double walled panels for walls, roof, and floor constructed of G90 mill galvanized sheet metal.
 - 1.3.3 Cabinet construction to be thermal-break, no thru-metal throughout the cabinet and base.
 - 1.3.4 Exterior casing of 16 gauge minimum galvanized steel.
 - 1.3.5 Interior lining of the walls and roof panels of 20 gauge minimum galvanized steel.
 - 1.3.6 Interior lining of the floor panels to be a solid lining of 16 gauge minimum galvanized.
 - 1.3.7 Subfloor of 20 gauge minimum galvanized steel.
 - 1.3.8 Provide a minimum, 3 inch foam insulation (R-19 or greater) on walls with exterior, interior and blankoffs. Floors to be at least 4 inch foam insulation with subfloor.
 - 1.3.9 Wall panels and access doors to deflect no more than L/240 at 8 inch inches total static pressure.
 - 1.3.10 All wall and roof panels to be completely removable for unit access and removal of components.
 - 1.3.11 On exterior units, exterior paint finish to be capable of withstanding at least 2,500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure.
- 1.4 Drain Pan:
 - 1.4.1 Sealed double wall insulated drain pan constructed of galvanized steel exterior panels and 304 stainless steel interior liner.
 - 1.4.2 Coil supports and bulkheads to be 304 stainless steel.
- 1.5 Fan and Motor:
 - 1.5.1 Direct drive.
 - 1.5.2 Fan array systems on air handlers over 6000 CFM (minimum of two (2) direct-drive SWSI Plenum-type fans).
 - 1.5.3 All fans to be connected to variable-speed drive (VFD) for balancing and/or speed control. VFDs to be field-wired for indoor units and factory-installed and wired for outdoor units. VFDs shall be provided by one of the approved manufacturers listed in the VFD section.

- 1.5.4 Factory mounted motor overload panel for all units with multiple fans.
 - 1.5.5 Fan motors to be 1800 or 3600 rpm.
 - 1.5.6 Fan motors to be TEFC or TEAO. ODP not allowed.
 - 1.5.7 Integral coplanar silencers in fan cubes.
 - 1.5.8 All fans to be isolated with gravity-backdraft dampers from the factory on each fan. Include damper pressure drop in total pressure drop calculations during fan selections.
- 1.6 Heating/Cooling Coils:
- 1.6.1 Maximum face velocity across coils to be 490 fpm.
 - 1.6.2 Construct coil casings of 304 stainless steel with formed end supports and top and bottom channels:
 - 1.6.3 Coils to be drainable with a design working pressure of 300 psig at temperatures up to 300°F.
 - 1.6.4 Each heating section to be minimum of two-rows and located in the preheat position for integral freeze protection.
- 1.7 Mixing Box:
- 1.7.1 The section to consist of multi-leaf, parallel acting, low-leak blades.
 - 1.7.1.1 Size the return air, outside air, and exhaust air dampers for 100% of unit airflow.
 - 1.7.1.2 Outdoor units: Provide a weatherproof louver and bird screen assembly to protect the outside and exhaust air dampers from the elements. Rain hoods to not be used in lieu of weather proof louver.
- 1.8 Damper:
- 1.8.1 Dampers in Inlet section to be low leak. Actuators to be provided and installed in the field by FMCS Contractor.
 - 1.8.2 Provide damper blades with extruded vinyl edge seals and stainless steel jamb seals.
- 1.9 Access Doors:
- 1.9.1 Provide air handling unit with access doors in the fan, filter, and inlet sections on the coil header side, as well as in any sections with welded panels. Doors to be of double wall construction with a solid liner. Access doors to also be included between heating and cooling coils where space allows.
 - 1.9.2 Doors to be of thermal-break, double wall construction with a solid liner, 3 inch thickness or greater, to match unit construction. Doors of 2 inches or lesser construction are not allowed.
 - 1.9.3 Include a 3 inch x 8 inch view pane in fan section door on fan sections.
 - 1.9.4 Provide at minimum, 18 inches access door between all coils for cleaning and inspection.

- 1.9.5 Provide air handlers with hinged access doors equipped with handles for maintenance access.
- 1.10 Curb: Outdoor Units:
 - 1.10.1 Provide air handling unit with the manufacturer's standard curb, shipped loose for field installation by others prior to unit placement. Roof curb to be a prefabricated galvanized steel-mounting curb.
 - 1.10.2 Curb to be a minimum of 14 inches high.
 - 1.10.3 Isolation curb (where sound requirements exist) to have rigid upper and lower steel structure with vibration isolation springs and elastomeric waterproof membrane. Isolation springs to have two (2) having 2 inch static deflection and vertical and horizontal restraints.
- 1.11 Piping Cabinet:
 - 1.11.1 On exterior units, cooling and heating coils, piping and control valves to be properly supported and located in an enclosure for protection.
 - 1.11.2 Manufacturer to provide weatherproof enclosure of sufficient size for installation and service of control valves. Enclosure to have hinged access doors.
- 1.12 Controls:
 - 1.12.1 Equip air handling unit with a single-point motor starter panel in an enclosure with a variable frequency drive. DDC provided by FMCS Contractor.
 - 1.12.2 VFD to meet requirements that are listed in VFD section.
- 1.13 Economizer: Engineer to verify if airside economizer exemption (when allowed by code) is to be taken. If not taken, design each air handler with an air-side economizer cycle when outdoor air temperatures are below a preset high temperature limit, usually 55°F. All economizers to be capable of automatically reducing outside air intake to the minimum quantities when outside air intake no longer reduces cooling energy usage. Provide a means to relieve excess outdoor air during air economizer operation to prevent over-pressurizing the building.
- 1.14 Energy Recovery Units: Where required by code to be flat plate type. Enthalpy wheels are not allowed.
- 1.15 Filters to be Merv 13.
- 2. Installation Requirements:
 - 2.1 Air handling units require a minimum clearance of 30 inches on all sides, except the side where filters and coils are accessed. On that side, clearance to equal the length of the coil plus 2 feet.
 - 2.2 Install air handlers in mechanical rooms on 4 inches housekeeping pads. Pads to be 3 inches larger than equipment.
 - 2.3 Ensure cooling coils and drain pans are readily accessible for inspection, cleaning, and maintenance in their normal operating position.

3. Acceptable Manufacturers:
 - 3.1 Trane.
 - 3.2 Carrier.
 - 3.3 Temtrol.
 - 3.4 York/Miller Picking.
4. Pool Air Handling Units:
 - 4.1 Acceptable Manufacturers:
 - 4.1.1 AAON.
 - 4.1.2 Seresco.
 - 4.1.3 Dectron.
 - 4.2 Fan-array preferred: Minimum of two (2) direct-drive SWSI Plenum-type fans.
 - 4.3 Five (5) year warranty and maintenance agreement.
 - 4.3.1 Vendor to submit on the warranty and become an approved vendor for Dallas ISD. As a requirement of proposing for a project, the vendor is to show proof of being an approved vendor for Dallas ISD.
 - 4.3.2 Vendor certificate to be included in the product submittal.

23 80 00 Decentralized HVAC Equipment

1. Take airside economizer exemption allowed by code when possible. Higher efficiency equipment that is rated above base efficiency is the preferred method.
2. Variable speed compressors and digital scroll compressors are not allowed on single zone units except at kitchen hood make-up/DOAS.
3. DX VAV rooftop units and DX DOAS units are not allowed except at kitchen hood make-up/DOAS.
4. DDC RTU Controllers are to be provided by Dallas ISD's BAS provider tied into an RTU terminal strip.
5. Direct Drive fans are preferred for all general building exhaust/supply fans, wherever possible, for maintenance purposes. Utilize VFDs for balancing on all 3-phase motors, and EC Motors on all single-phase applications.
6. Designer to avoid the use of DOAS units and energy-recovery units where possible and where code allows, to aid in lowering maintenance requirements throughout Dallas ISD.
7. When required for separate zoning, it is allowable to provide a separate air handling unit or HVAC system (RTU with gas heat) for the following areas: auditoriums, cafeterias, multi-purpose rooms, gymnasiums (and supporting areas), kitchens, media centers, MDF/IDF closets, and administrative areas.
8. Design of the mechanical systems that supports the technology systems to address 24- hour utilization. Cooling, heating, and humidity control for MDF/IDF closets to be independently thermostat controlled and not affected when facility HVAC operations are shut off.
9. Size cooling units for MDF and IDF closets based on network equipment to be installed.
10. Consider potential leakage and protection of network equipment when locating HVAC units and piping.

11. Do not locate HVAC units in MDF/IDF closets where they obstruct access to any network equipment.
12. Use the following guidelines for calculation of cooling and heating loads, unless otherwise specified:
 - 12.1 Typical classroom:
 - 12.1.1 Five (5) computers in elementary schools.
 - 12.1.2 Seven (7) computers in middle and high schools.
 - 12.1.3 One (1) to two (2) printers.
 - 12.1.4 Interactive display (ID).
 - 12.2 Offices:
 - 12.2.1 Computer (with integral screen/display).
 - 12.2.2 Printer.
 - 12.2.3 Interactive display (ID).
 - 12.3 Computer labs:
 - 12.3.1 Thirty-three (33) computers (with integral screen/display).
 - 12.3.2 Four (4) printers.
 - 12.3.3 Interactive display (ID).
13. Show routing of drain lines on the drawings for DX equipment away from classroom spaces, etc.

23 81 19 Self Contained Air-Conditioners (Packaged HVAC Units)

1. General Requirements:
 - 1.1 All units to be provided with the following:
 - 1.1.1 Standard mechanical thermostat strip for 3rd party control. Units with OEM branded controls and/or integration boards are not allowed. Controls to be provided by others.
 - 1.1.2 Factory installed internal condensate drain connection and sloped stainless steel drain pan.
 - 1.1.3 Low ambient freeze protections.
 - 1.1.4 Brass service valves installed in discharge and liquid lines.
 - 1.1.5 Hinged access panels with handles.
 - 1.1.6 Steel hail guards.
 - 1.1.7 MERV 13 filters.
 - 1.2 All units 3 tons to 6 tons are to have two (2) stage compressor and a minimum two (2) speed fan.
 - 1.3 All units 7.5 tons and above are to have a minimum two (2) compressors with dual refrigeration circuits.

- 1.4 Heat pump packaged units are not allowed.
- 1.5 Variable speed compressors and digital scroll compressors are not allowed on single zone units.
- 1.6 Indoor fan to be forward curved, centrifugal, direct drive multispeed motor for all sizes available by selected approved manufacturer. Include VFD or EC Motor for balancing and fan-speed control.
- 1.7 Condenser fan to be propeller type, directly driven by motor.
- 1.8 Refrigerant coils to be aluminum-plate fin and seamless copper tube. Aluminum microchannel condenser coils are acceptable.
- 1.9 Refrigerant to be R410a.
- 1.10 Heat Exchanger:
 - 1.10.1 Stainless steel construction.
 - 1.10.2 Two (2) or four (4) stage heat.
- 1.11 Mixing Box Requirements:
 - 1.11.1 Return air and outside air compartment with 0-100% outside air damper. Actuator to be provided by others.
 - 1.11.2 Low leak dampers that are tested in accordance with AMCA 500D.
 - 1.11.3 Relief damper: gravity actuated with bird screen and hood.
- 1.12 Powered GFCI convenience outlets: Include a factory-mounted and wired outlet on one (1) RTU for each group of units within a fifty (50) foot radius.
- 1.13 Roof curb: steel with corrosion-protection coating, gasketing, and factory- installed wood nailer; complying with NRCA standards; minimum height of 14 inches clear above adjacent roof finish elevation.
- 1.14 Equipment Start-up Report:
 - 1.14.1 Submit an equipment start up report for each unit as provided by the equipment manufacturer. Start up report to include the following, but not limited to:
 - 1.14.1.1 Verification of system air flow.
 - 1.14.1.2 Proper operation of all motors and fans.
 - 1.14.1.3 Proper tensioning of belts and pulleys.
 - 1.14.1.4 Proper control of economizer damper.
 - 1.14.1.5 Proper compressor operation.
 - 1.14.1.6 Proper operation of cooling and heating modes.
- 2. Prepare and turnover to owner closeout documentation to include (at a minimum):
 - 2.1 Cover sheet with date, school name and address. Include name of general contractor, installing mechanical contractor, and packaged unit manufacturer on cover page.
 - 2.2 Packages until submittals (as-builts).

- 2.3 Completed startup reports for all packaged units.
 - 2.4 Manufacturer's unit specific warranty documentation, detailing the start and end dates for each specific unit warranty.
 - 2.5 Coordinate with Dallas ISD-M&O for their preference of written reports (in binder format) and/or digital reports (on a USB-flash drive or other preferred method), and number of copies each.
 - 2.6 Closeout documentation to be presented at time of Dallas ISD personnel training or other Dallas ISD-M&O preferred time.
3. Acceptable Manufacturers:
- 3.1 AAON – Preferred.
 - 3.2 Trane.
4. Warranty:
- 4.1 Complete warranty period for ten (10) years on all equipment and components.
 - 4.2 Installing contractor to provide a one (1) year labor warranty on all equipment and components.
 - 4.3 Warranty to cover heat exchangers for a minimum of fifteen (15) years from substantial completion.

END OF DIVISION 23

Division 26 – Electrical

26 05 00 General Requirements

1. Refer to Responsibility Matrix in Division 01 for the division of scope between the General Contractor and vendors directly contracted by Dallas ISD.
2. Main service entrance equipment to be located 2 feet minimum plus specified curb height above the established flood level in that area.
 - 2.1 Exterior mounted equipment to have 6 inch curb.
 - 2.2 Interior mounted equipment to have 4 inch curb.
3. Locating electrical rooms next to elevator shafts to be avoided to allow better horizontal distribution of branch circuits.
4. Stacking of electrical closets is preferred in multi-story buildings to allow conduit, bus duct, etc. to run vertically in a straight line.
5. Generators: Acceptable Manufacturer: Cummings or Dallas ISD approved equal.
6. Panelboard/Circuiting Requirements:
 - 6.1 Distribution panels for power outlets supporting the technology system (ex: MDF/IDF equipment, classroom computers, LCD projectors, ID, etc.) are not to include service for any other items, such as “convenience” duplex power outlets and lighting devices. In addition, these panels are to be labeled to indicate their use only for the technology systems. The circuits for the power outlets supporting the technology systems are to be labeled according to the District-approved room numbering system for the facility.
 - 6.2 Surge protection devices (SPD) on distributed panelboards to be wired into panels using wire leads no longer than 18 inches.
 - 6.3 MDF/IDF room circuits for rack mounted equipment and equipment in communication rooms (ex: telephone switch, fire and security alarms) to have surge protective device (SPD) protection.
 - 6.4 All HVAC equipment to be on separate circuits and on separate panels from other loads.
 - 6.5 Perform a short circuit analysis. Label devices for the arc-flash protection required. Device coordination study and arc flash study performed by the equipment manufacturer are required with wire sizes and run lengths coordinated with the electrician and panel/breaker information coordinated with the submittals.
7. Conduit/Wiring Requirements:
 - 7.1 MDF and IDF rooms: Provide two (2) empty 1 inch power conduits and back boxes with pull strings adjacent to the power outlets for the rack equipment. Conduits to be run back to the electrical panel(s) for the technology system. Reference Division 27 for additional requirements.
 - 7.2 For new construction, provide conduits sleeved through the foundation grade beam(s) to allow for the future extension of the electrical system to future additions.
 - 7.3 Conduits are not to be placed under slab floors.
 - 7.4 Suspend conduit from the building structure, not from lay-in ceiling suspension system or similar means.
 - 7.5 Use of metal clad (MC) cable / flexible conduit is not allowed.
 - 7.5.1 Exception: Lighting fixture whips, reference section 26 50 00.

- 7.6 Use of aluminum wiring is not allowed.
- 8. Computer Lab Raceway Requirements:
 - 8.1 Use of raceways in computer labs is allowed only when wall construction type will not allow concealed conduits.
 - 8.2 Raceways to accommodate 20 technology outlets and 10 quad isolated ground electrical outlets.
 - 8.3 Raceways cast into the concrete floor system and raised flooring systems are not to be used due to the cost.
 - 8.4 All raceways to be installed as discretely as possible with little or no disturbance to classroom functionality or aesthetics.
 - 8.5 Limit raceways to one (1) vertical raceway per wall where possible.
 - 8.6 Raceways located in open ceiling areas and on exterior pathways to be metal with tamper resistant screws. Color to match architect color scheme.
 - 8.7 Reference Division 27 for additional requirements.
- 9. Data drops and electrical outlets located above science room and media center casework, at auditorium stages, and for special architectural elements and furniture are required to show dimensions and notes to assure correct installation locations.
- 10. Provide requirements that major equipment (electrical panels, switch gear, UPS, generators) is to be tested by the installer to verify that it functions according to its design objectives and specifications. Dallas ISD-M&O representative of the specific trade or discipline to be present during testing to verify function.
- 11. Renovations:
 - 11.1 Correct code deficiencies only within the alteration area. Upgrades may be required for equipment supporting the alteration area but located outside of it.
 - 11.2 Equipment in good condition to be reused or modified. Equipment for which replacement parts are no longer available to be evaluated for replacement. Remove all equipment, wiring, conduit, etc. that is not re-used.
 - 11.3 Main switchgear not to be installed below grade level. Relocate main switchgear to a grade level interior electrical room or to the exterior when replacing existing switchgear located in below grade equipment rooms or basements.
- 12. Storm Shelter Coordination:
 - 12.1 Written approval from Dallas ISD-EM is required. Refer to Division 13 for additional requirements.
 - 12.2 Contractor responsibility matrix to be provided on the general drawing code sheet for storm shelters and on the electrical drawing sheets.
 - 12.3 Coordinate with architect and other disciplines to assign clear responsibilities relating to the which contractor/disciplines will provide, install and control individual components associated with storm shelters.

26 08 00 Commissioning of Electrical Systems

- 1. Project specifications to include the contractor requirements listed below.
 - 1.1 Electrical Contractor (EC) and Electrical Sub-Contractors:
 - 1.1.1 Provide all personnel, tools, materials, and equipment to support the commissioning process. Facilitate the coordination of the commissioning work with the CxP and incorporate commissioning activities into the master construction schedule.

- 1.1.2 Incorporate all commissioning related activities into the construction schedule, ensuring that activities do not delay construction/project completion.
- 1.1.3 Notify the Owner's Representative and the CxP in writing that equipment and systems are ready for functional testing.
- 1.1.4 Perform equipment startups using authorized manufacturing representatives.
- 1.1.5 Provide written documentation to the CxP that equipment and systems are fully operational and ready to be functionally performance tested.
- 1.1.6 Perform commissioning tests at the direction of the CxP.
- 1.1.7 Attend construction phase commissioning coordination meetings.
- 1.1.8 Provide qualified personnel for participation in commissioning tests.
- 1.1.9 Provide equipment, materials, and labor necessary to correct deficiencies found during the commissioning process.
- 1.1.10 Participate in plumbing systems, assemblies, equipment, and component maintenance orientations and inspections as directed by the CxP.
- 1.1.11 Provide information requested by the CxP for commissioning documentation and testing.
- 1.1.12 Perform all quality control functions to ensure equipment and systems are installed properly. Ensure equipment and systems are brought to a state of readiness and full functionality prior to commencing the commissioning functional performance testing processes.
- 1.1.13 Provide a qualified and owner approved representative to attend end of warranty testing.

26 09 41 Lighting Controls

1. Design Requirements:

- 1.1 Include all required devices for a complete and properly operating system to automatically control the lighting to meet the intent of the IECC version the project is permitted under.
- 1.2 A centralized lighting control system is preferred. Relay panels are not allowed unless noted on lighting control chart and drawings.
- 1.3 Sequence of operations and scene descriptions for each space type to be clearly provided on the lighting drawing sheets. One (1) general lighting sequence that applies to many or all room types is not allowed.
- 1.4 Interior lighting controls are not to be integrated into building Energy Management Control System (EMCS) but are to be capable of integration in the future.
- 1.5 Battery operated devices and controls are not allowed.
- 1.6 Sensor Design and Layout: Engineer to include the following statement at a minimum in the Construction Documents - The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only rooms that are to be provided with sensors. Provide additional sensors if required to properly and completely cover the respective room. Ensure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structural components.

2. Performance Requirements:

2.1 Motion Sensors:

- 2.1.1 Corner mounted (preferred) or ceiling mounted for rooms greater than 40 square feet.
- 2.1.2 Sensor switches are allowed in rooms less than 40 square feet.
- 2.1.3 All motion sensors to be dual technology.

- 2.1.4 All motion sensors to be set to 20 minute time delay or to code specified amount whichever is more stringent and adjusted to maximum sensitivity, unless otherwise noted on the drawings. Sensors to be capable of being set to 5 minutes and 1 minute for testing.
- 2.1.5 All motion sensors to have masking or internal shielding available to control coverage pattern in the field. Stickers or other external adhesive masking are not allowed.
- 2.2 Smart Switches:
 - 2.2.1 Smart switches to control the luminaires in the space for all on/off, dimming and/or "scene" controls.
 - 2.2.2 All programmable switches are to be engraved or permanently labeled during manufacturing so that the function of each button is clearly identified. All labeling or engraving to be of high quality and be provided by the lighting system manufacturer.
 - 2.2.3 Where keyed switches are indicated on the plans (group student restrooms only), the "off" feature of the smart switch is to be disabled for a schedule similar to 7AM-5PM. Coordinate and program exact schedule with Dallas ISD.
- 2.3 Room Controllers:
 - 2.3.1 In the event of a hardware or software or component failure, the lighting in the space is to default to the "on" position.
 - 2.3.2 Locate the room controller above the lay-in ceiling above the switches near the exit door. Provide a permanent label on the lay-in ceiling grid to identify its location. The label shall say "lighting controller".
- 2.4 Network Controller:
 - 2.4.1 Provide network controller be capable of being programmed/reprogrammed via PC software. Controller to be capable of receiving input via contact closure, user PC software, fire alarm control panel, etc. and issuing building-wide commands to enable/disable a scene at all luminaires inside and outside the building.
 - 2.4.2 Include astronomical time clock capable of seven (7) different day types per week, automatic holiday "shutoff" feature for 24-hours, 12-hour minimum program backup capabilities or to meet code, whichever is greater.
 - 2.4.3 BACnet Testing Laboratories (BTL) BACNET/IP listed capable of future communication with EMCS.
- 3. Lighting Control Sequence Requirements:
 - 3.1 Typical Classroom:
 - 3.1.1 Vacancy sensors to be utilized in all classrooms and to deactivate lighting after 20 minutes of inactivity.
 - 3.1.2 Smart switches in classrooms to have only the following buttons:
 - 3.1.2.1 On/off (these may be combined or separate buttons)
 - 3.1.2.2 Scene 1: Teaching wall.
 - 3.1.2.3 Scene 2: AV mode.
 - 3.1.2.4 Dimming control up.
 - 3.1.2.5 Dimming control down.

- 3.1.3 On/Off Function:
 - 3.1.3.1 “On” button to activate lighting to 100% capacity and not return lighting to previous setting.
 - 3.1.3.2 “Off” button to deactivate all room lighting to 0%.
- 3.1.4 Teaching wall mode to be provided.
- 3.1.5 A/V mode to be provided.
- 3.1.6 Dimming functions to be provided for each classroom and be capable of increasing and decreasing lighting levels in all operational modes (general on/off mode, A/V mode and teaching wall mode).
- 3.1.7 Where daylighting is required by code, program the system to automatically respond.
- 3.2 Special Instruction Classrooms (science labs, culinary rooms, art rooms and lecture halls, et al):
 - 3.2.1 These areas are to be controlled the same as typical classrooms except where special condition or architectural components require the controls to be modified.
 - 3.2.2 Where departure from typical classroom controls is necessary, they should remain as close to typical as possible and require approval from Dallas ISD designated representative.
- 3.3 Corridors and Commons Areas:
 - 3.3.1 To be controlled through occupancy sensors.
 - 3.3.2 Where daylighting is required by code, program the system to automatically respond.
- 3.4 Group Student Restrooms:
 - 3.4.1 To be controlled with occupancy sensors set to deactivate lighting after 20 minutes of inactivity.
 - 3.4.2 Provide a keyed switch to allow owner to deactivate lighting. See smart switch requirements above for additional information.
 - 3.4.3 Where daylighting is required by code, program the system to automatically respond.
- 3.5 Offices:
 - 3.5.1 Vacancy sensors to be provided in all offices and to deactivate lighting after 20 minutes of inactivity.
 - 3.5.2 Provide dimming capabilities in all offices.
 - 3.5.3 Where daylighting is required by code, program the system to automatically respond.
- 3.6 Individual Staff Restrooms: To be controlled with vacancy sensor switch set to deactivate lighting after 20 minutes of inactivity.
- 3.7 Individual Student Restrooms (pre-K, elementary schools, and special needs areas): To be controlled with occupancy sensor switch set to deactivate lighting after 20 minutes of inactivity.
- 3.8 Competition Gymnasiums, Cafeteria and Cafeteriums:
 - 3.8.1 Lighting control to be designed by the Engineer to provide functionality appropriate for all intended usages.
 - 3.8.2 Where daylighting is required by code, the system to automatically respond.
- 3.9 Gymnasiums (Auxiliary and Practice):
 - 3.9.1 To be controlled with occupancy sensors set to deactivate lighting after 20 minutes of inactivity.
 - 3.9.2 Where daylighting is required by code, program the system to automatically respond.

- 3.10 Libraries:
 - 3.10.1 Lighting control to be designed by the Engineer to provide zoned lighting.
 - 3.10.2 Where daylight is required by code, the system is to be programed to automatically respond.
- 3.11 JROTC Shooting Ranges;
 - 3.11.1 To be controlled by dual zone manual "On/Off" smart switch oly.
 - 3.11.2 Independent dimming capabilities to be provided for each zone.
 - 3.11.3 Lighting Zones:
 - 3.11.3.1 Zone 1: Range Area.
 - 3.11.3.2 Zone 2: Area above targets (fixtures are to be located directly above targets).
- 4. Project specifications to include the contractor requirements listed below:
 - 4.1 Shop Drawing Requirements:
 - 4.1.1 Submit shop drawings of each reflected ceiling plan in the project showing the specific locations of all parts of the lighting control system including motion sensors, photocells, smart switches, room controllers, enhanced building controls (only if required), etc. Motion sensors are to include sensor type, sensor mounting, and other pertinent data to allow evaluation of the proposed system.
 - 4.1.2 Submit wiring diagram for all motion sensors, photocells, smart switches, room controllers, etc.
 - 4.1.3 Submit a sequence of operations for each unique space type describing the function of each button on each switch and the effects on the lighting in the space. This sequence of operations is to follow the District's standard sequences with the added information describing how the lighting control system pieces/parts work together.
 - 4.1.4 Submit a list of switch types with a list of proposed button labels. This list is to be similar to the button information on lighting control drawings with added information showing switch button layouts and actual labels for this project.
 - 4.2 Third Party Commissioning Contractor Requirements:
 - 4.2.1 Attend commissioning meetings as request by Dallas ISD's commissioning provider.
 - 4.2.2 Complete and return any commissioning checklists prior to functional testing.
 - 4.2.3 Provide a service technician or programmer that is knowledgeable of the project requirements to assist the commissioning provider during functional testing.

26 09 61 Theatrical Lighting Controls

- 1. Acceptable Manufacturer: Electronic Theatre Controls (ETC) or Dallas ISD approved equal.
 - 1.1 Manufacturers submitted for approval are required to meet the following qualifications:
 - 1.1.1 Provide phone support free of charge 365 days a year, 24 hours a day.
 - 1.1.2 Continue to support and repair product after it is discontinued from manufacturing. When possible, provide loaner equipment if repair is needed.
 - 1.1.3 Provide at least eight (8) factory-trained and authorized lighting service technicians in the state of Texas and 230 nationwide.
 - 1.1.4 Manufacture all products in the USA. Quality control is onsite and lead time of standard products is minimal.
 - 1.1.5 One (1) manufacturer for lighting and rigging systems and sold via authorized dealer.

- 1.1.6 Four (4) sets of B size (11x17 inch) drawings for approval submitted within 6-8 weeks of receipt of order.
- 1.1.7 Two (2) year limited warranty on parts and workmanship.
- 1.1.8 Unison DRd Dimmer Racks and associated dimmer modules include an eight (8) year warranty on parts and workmanship.
- 1.1.9 All LED fixtures include a five (5) year warranty on parts and workmanship and ten (10) year warranty on LED emitters (excluding S4wrđ).
- 1.1.10 Startup and owner training to be performed by a factory engineer.

26 21 00 Low-Voltage Electrical Service Entrance

1. General Requirements:

1.1 New Electrical Services to be:

- 1.1.1 Underground.
- 1.1.2 277/480 volt.
- 1.1.3 3-phase.
- 1.1.4 4-wire.

1.2 New electrical services spare capacity for future load growth:

- 1.2.1 Elementary Schools: 20%.
- 1.2.2 Middle Schools and High Schools: 35%.

1.3 Electrical underground primary and secondary conduits:

- 1.3.1 Encased in red concrete. Red pigment to be integrally mixed into 3000 PSI concrete.
- 1.3.2 Minimum cover of 2 feet.

1.4 Renovations / Additions:

- 1.4.1 Do not increase the electrical service size if it is not required for the work on the current project.
- 1.4.2 Remove main gear from below grade equipment rooms when replacing and locate new gear on the exterior of the building.
- 1.4.3 Only one (1) electric service per campus is allowed. Exception: Portable buildings.
- 1.4.4 Additions: Connecting to the existing service and expand existing service if required.
- 1.4.5 Portable Buildings: Electrical service for portables to be routed directly from the utility. Portables are not to be powered from existing building electrical service.

1.5 Provide wiring and conduit to bring the signal from the meter demand pulse device in the electric meter enclosure into the building for attachment to the EMCS.

1.6 Include conduits sleeved through the foundation grade beam to allow for future extension of the electrical, data, telephone, fire, security, surveillance video, PA and clock systems, et al to an addition.

1.7 Main service entrance equipment to have power monitoring unit:

- 1.7.1 Square D Powerlogic or Dallas ISD approved equal.
- 1.7.2 Unit to provide power monitoring, power reporting, and alarm notification (loss of power).
- 1.7.3 Unit to be connected to Dallas ISD energy management system.

- 1.7.4 Unit manufacturer to be responsible for modifying the Dallas ISD energy management platform to accept the graphic and information from the power monitoring unit.
2. Acceptable manufacturers: (Note: All switchgear to be of one (1) manufacturer)
 - 2.1 Square D.
 - 2.2 Eaton.
 - 2.3 General Electric.

26 22 00 Low-Voltage Transformers

1. In auditoriums, locate transformers outside the primary stage area to reduce noise.

26 27 00 Low-Voltage Distribution Equipment

1. Limit the number of receptacles on a circuit to eight (8).
2. No more than three (3) quad power receptacles are allowed per circuit for any location.
3. No sharing of circuits between rooms or areas is allowed.
4. Floor receptacles are not permitted, except where required by code.
5. Power receptacles sharing back boxes or junction boxes with data outlets is not allowed.
6. Convenience receptacles: 120 volt, 3 wire.
 - 6.1 All convenience receptacles and motors 1/4hp or less to be 120 Volt.
 - 6.2 All grounding to be via ground wire. Conduit not to be used as a grounding means.
7. Switch and receptacle cover plates to be brushed stainless steel.
8. Outdoor Receptacles:
 - 8.1 Locate adjacent to each exterior door.
 - 8.2 Plastic covers on exterior receptacles are not allowed.
9. Copy Machine Locations: Provide both 240V and 120V receptacles on dedicated circuits.
10. **Horizontal window blind installations: Provide power for motorized blind operation. Coordinate with Architect for locations of manual vs. motorized blinds.**
11. Switches and receptacles within chalkboards, markerboards, or tackboards are not allowed.
12. Refer to educational specifications and Division 27 for quantities of wall receptacles per wall in all teaching spaces.
13. Electrical requirements of all equipment furnished by Dallas ISD, such as kitchen equipment, appliances, shop equipment, etc. to be verified with owner's representative. Place such equipment on dedicated circuits.
14. Provide dedicated circuit for direct digital control (DDC) equipment.
15. All receptacles in MDF/IDF space to be powered by dedicated circuits with surge protection device (SPD).
16. **Power Clusters in MDF/IDF Closets: Refer to Division 27 for requirements.**
17. Provide one (1) quad, receptacle at each cash register or point-of-sale (POS) register in cafeteria and cafeteria manager's office. Provide Surge Protection Device (SPD) on electrical circuit.
18. Auditoriums in Middle Schools and High Schools:
 - 18.1 Provide power for the following motorized equipment if applicable: Lights in front of house, winch system, motorized projection screen, ad fly system.
 - 18.2 Provide power in ceiling above apron.

- 18.3 Provide electrical battens, located as directed.
- 18.4 Locate controls stage right.
- 18.5 Locate controls in booth and at stage manager position on backstage right.
- 19. Light and sound control booth: Provide power for lighting control board, sound control mixer, amplifiers, equalizers, processors, intercom system, CD player, and audio/visual projector system, as applicable.
- 20. Black box theaters: Provide power to stage lighting grid.
- 21. Scene Shops:
 - 21.1 Provide receptacles for floor mounted power tools (ex: drill press, bench sander, band saw).
 - 21.2 Provide receptables at work bench via drop cord or cord reels.
 - 21.3 Provide power to dust collector system.
 - 21.4 Provide power for air compressor.
- 22. Libraries:
 - 22.1 Provide grounded quad power outlets inside of all adjustable storage cabinets, at least two (2) per wall in library storage sub rooms.
 - 22.2 Provide at least one (1) grounded quad outlet per library display case.
 - 22.3 Provide two (2) quad outlets per circulation desk area.
 - 22.4 Provide three (3) to four (4) grounded quad outlets per wall in library.
- 23. Dedicated Makerspaces and Learning Experience Spaces:
 - 23.1 Provide three (3) to four (4) grounded quad outlets per wall.
- 24. ***Provide hard-wired disconnect switch for kiln. Locate disconnect at kiln room door.***
- 25. ***Gymnasiums: Refer to Educational Specifications and Division 11 for quantities and specifications of equipment requiring power.***

26 28 00 Low-Voltage Circuit Protective Devices

- 1. Provide thermo-magnetic breakers (including breakers with GFI protection) except where not allowed by NEC.
- 2. Digital solid state breakers to only be used where required by NEC.

26 30 00 Facility Electric Power Generating and Storing Equipment

- 1. Refer to 27 05 00 for Uninterruptible Power System (UPS) requirements.

26 41 00 Lightning Protection

- 1. Provide simplified lightning risk assessment per NFPA 780 for new schools and additions on an individual basis.
- 2. Provide UL Master Label system.
- 3. ***Refer to Division 27 for additional information and requirements. Coordinate requirements with Dallas ISD-IT-Infrastructure on a project specific basis.***

26 50 00 Lighting

1. Interior Lighting:
 - 1.1 LED luminaires to be used for all areas.
 - 1.2 Lighting service in the building to be 277-volt, balanced on all phases.
 - 1.3 Accent lighting to be energy efficient, durable, and easy to maintain.
 - 1.4 Exit and emergency egress lighting to be connected to a branch circuit serving lighting in the area ahead of any switching.
 - 1.5 Equipment and Mechanical Room Lighting:
 - 1.5.1 Lay out lighting in equipment rooms so as not to interfere with equipment.
 - 1.5.2 Locate luminaires in mechanical and other similar equipment rooms to clear all obstructions. Obtain approval from the Architect and Engineer before placing luminaires where the location of any equipment as shown on the drawings must be significantly changed to accommodate lighting layout.
 - 1.6 Stairwell Lighting:
 - 1.6.1 Wall-mounted.
 - 1.6.2 Center above landings.
 - 1.6.3 Avoid placing fixtures above stair runs. Consideration should be given to accessibility for luminaire maintenance.
 - 1.7 Stage Areas: Special purpose lighting systems to be determined on a project specific basis. See additional information in Section 26 55 00.
2. LED Luminaires:
 - 2.1 All LED general purpose luminaires to be either Energy Star or DesignLights Consortium (DLC) approved.
 - 2.2 Expected Life: All LED luminaires to have a minimum L70 of 50,000 hours.
 - 2.3 Color Rendering: All interior LED luminaires to have a minimum Color Rendering Index (CRI) of 80. All exterior LED luminaires to have a minimum CRI of 70.
 - 2.4 Color temperature to be 4000K.
3. High Bay LED Luminaires: LED high bay luminaires to meet the following requirements in addition to the requirements for LED luminaires listed above.
 - 3.1 All high bay luminaires located in gyms, play areas, multipurpose spaces, etc. to have a wire guard.
 - 3.2 Lens, if provided, or wire guard of high bay luminaires to be hinged and to have retainer latches for tool-less maintenance.
4. Exit Signs: LED exit signs to also meet the following requirements in addition to the general requirements for LED luminaires.
 - 4.1 Rated for at least ten (10) years unless otherwise noted.
 - 4.2 Provide with maintenance free batteries good for at least 90 minutes or per code minimum, whichever is greater.
 - 4.3 Provide with status indicator lamp and test switch.
 - 4.4 UL tested and approved with 100 feet visibility.
 - 4.5 Exit signs in gyms to have a wire guard.
 - 4.6 Exit signs are not to be switched.

- 4.7 Provide vandal resistant housing in all locations.
5. Pole-Mounted Exterior Luminaires: LED pole-mounted luminaires to meet the following requirements in addition to the general requirements for LED luminaires.
 - 5.1 Provide with an option for internal glare control or external glare shield where applicable.
 - 5.2 All exterior surfaces of pole mounted luminaires to provided with a powder coat finish.
 - 5.3 See Section 26 56 00 for additional site lighting requirements, including poles.
6. Accessories: Lenses for LED troffers shall be 100% virgin acrylic and have a nominal thickness of 0.125 inch.
7. Warranty requirements:
 - 7.1 Provide a five (5) year manufacturer's warranty for all LED luminaires. Warranty to include all luminaire components including, but not limited to, LED arrays, LED drivers, luminaire body and hardware. LED arrays will be considered defective if a total of 15% or more of the individual light emitting diodes fail to illuminate.
 - 7.2 Provide a five (5) year manufacturer's full warranty for all battery packs.
 - 7.3 Warranties to cover the cost of materials and labor for repair and installation.
8. Architect to include the following installation requirements at a minimum in the Contract Documents:
 - 8.1 Support surface mounted luminaires from the building structure with a minimum of two (2) 1/4 inch threaded rods per fixture. Use 1-1/2 inch x 1-1/2 inch steel framing channel where required to span joists and otherwise facilitate structural support.
 - 8.2 Mount recessed luminaires in the center of a ceiling tile or as shown on the drawings. Provide support for recessed luminaires by means of bar hangers extended across the main ceiling support members and also supported from the building structure.
 - 8.3 Run fixture whips (flex conduit/metal clad cable) from a junction box to each fixture (not to exceed four fixtures per junction box) access plate. Fixture whips between light fixtures are not to be accepted. Whips not to exceed 6'-0" in total length.
 - 8.4 Locate all remote drivers above the ceiling above each luminaire or in an adjacent room with a low ceiling for easy access. Mount drivers on rubber insulators.
 - 8.5 Move any luminaire up to 6 feet in any direction as directed by Architect at no additional cost.

26 52 13 Emergency Lighting

1. Emergency lighting fixtures:
 - 1.1 Use two-lamp, LED, wall-mounted "bug eye" fixtures.
 - 1.2 Provide vandal resistant housing in all locations.
 - 1.3 Mount as high as possible to avoid damage.
 - 1.4 Provide access panel for emergency lighting located in hard ceiling.
2. **Acceptable Manufacturer: Lithonia EU2C or Dallas ISD approved equal.**
3. **Refer to Division 27 for additional information and requirements. Coordinate requirements with Dallas ISD-IT-Infrastructure on a project specific basis.**
4. Emergency lighting to be separate from other lighting fixtures.
5. All luminaires used for emergency lighting, including exit lights, to be UL 924 listed.

6. Emergency battery packs shall be factory installed. Battery backup to operate fixture for at least 90 minutes or per code minimum, whichever is greater. All battery backups installed in exterior luminaires to be rated for damp location and rated to operate at 32°F.

26 55 00 Special Purpose Lighting (High School Performance Arts: Theater and Dance Programs)

1. Acceptable Manufacturer: Electronic Theatre Consultants (ETC) or Dallas ISD approved equal.
2. Auditorium/Performance Areas:
 - 2.1 Dimmer system located in control booth or electrical closet near control booth.
 - 2.2 Lighting:
 - 2.2.1 Cyclorama:
 - 2.2.1.1 LED.
 - 2.2.1.2 Fourth electric.
 - 2.2.2 Front of House:
 - 2.2.2.1 32 source fours or LED ellipsoidal.
 - 2.2.2.2 Career Pathways: Six (6) motorized lights with additional capacity.
 - 2.2.3 Above Stage: Twenty (20) LED PAR/wash fixtures and thirty-six (36) LED profile spotlights.
 - 2.2.4 Dance Lighting:
 - 2.2.4.1 Four (4) floor pockets on each side of stage.
 - 2.2.4.2 Three (3) floor pockets across front of stage.
 - 2.2.4.3 Three (3) wall boxes along backstage wall.
 - 2.2.4.4 One (1) switched circuit per floor pocket.
 - 2.2.4.5 18 LED PAR or profile spotlights.
 - 2.2.5 House Lights:
 - 2.2.5.1 DMX-controlled LED with smooth dimming from 0-100% intensity.
 - 2.2.5.2 Controlled by stage manager, control booth or push-button preset stations.
 - 2.2.6 Follow Spots:
 - 2.2.6.1 Two (2) LED medium-long throw.
 - 2.2.6.2 Balcony or above booth.
 - 2.2.7 Provide LED work lights.
 - 2.2.8 Provide two (2) LED working lights for each on-stage lighting batten.
 - 2.2.9 Curtain Warmers:
 - 2.2.9.1 LED.
 - 2.2.9.2 Grouped on single circuit.
 - 2.2.10 Provide stage edge safety lights with LEDs 12 inches O.C.
 - 2.3 Light and Sound Control Booth:
 - 2.3.1 Lighting control board.
 - 2.3.2 Dimmer rack.

- 2.4 Provide capability to control/dim house lights.
- 2.5 Provide capability to control lights backstage an in lighting and sound control booth.
- 3. Black Box Theater: Provide full dimming rack (less if LED equipment).
- 4. Dressing Rooms: Incandescent or LED lighting only.
- 5. Cafeteria Stage:
 - 5.1 Front of House: Minimum of eight (8) zoom-style LED profile spotlights.
 - 5.2 Above Stage: Minimum of twelve (12) LED PAR/wash fixtures.

26 56 00 Exterior Lighting

- 1. All exterior lighting to be LED lighting. Sodium fixtures are not allowed.
- 2. Pole Requirements:
 - 2.1 Pole Height:
 - 2.1.1 Poles located at parking lots and driveways to be a maximum of 30 feet tall.
 - 2.1.2 Poles located at walkways to be a minimum of 15 feet tall.
 - 2.2 Steel non-tapered, 5 inch square with cross arm brackets configured as appropriate.
 - 2.3 Watertight access hole at base, large enough to accommodate wiring connections and fuses.
- 3. Wall-mounted fixtures are allowed along the other exterior facades. Mounting height to be a minimum of 10'-0" above the ground.
- 4. Follow IES recommendation for exterior illumination levels.
- 5. Avoid locating light fixtures on the ground where they would be susceptible to water infiltration and vandalism.
- 6. Minimize light trespass from the site by using cut-off fixtures and shielding, if necessary.
- 7. Circuit parking lot and exterior security lighting separately from other building loads.
- 8. Parking Lot Lighting Control:
 - 8.1 Parking lot lights to not be controlled via building management and controls systems (BMCS).
 - 8.2 Provide time clock.
 - 8.3 Provide fixtures with internal photocell and occupancy sensor. Follow IES recommendation for level of exterior illumination.
- 9. Flat-top fixtures are not allowed due to concerns about the nesting of birds.
- 10. Canopy and Walkway Lighting Fixture Requirements:
 - 10.1 Provide vandal resistant fixtures in canopies and covered walks.
 - 10.2 Avoid locating light fixtures in canopies and covered walks where they might easily be damaged.

END OF DIVISION 26



Division 27 – Communications











27 05 00 General Requirements




1. General:
 - 1.1 For all projects, Architect is to read, reference, and utilize both these Technical Design Guidelines and reference the Educational Specifications to develop an understanding of the technology systems and their instructional applications.
 - 1.2 Placement of technology interface devices (computers, phones, interactive displays, WAPs, etc.) to be sensitive to the age and size of the users and the functionality of each space.
 - 1.3 Architect to coordinate with the Dallas ISD-IT-Infrastructure designated representative to integrate Dallas ISD's District-Wide Premise Wiring Specification into the school's design. This collaboration is to start at the Schematic Design phase and continue until construction is complete. This specification has been developed to establish a level of quality, performance and consistency throughout Dallas ISD.
 - 1.4 Contracting Method: Architect is to include T-series drawing in the Contract Documents to define the routes, equipment for the routes, raceways, locations of equipment and the locations of drops. General Contractor to install the infrastructure to house cabling system. Dallas ISD-IT-Infrastructure to contract with a Cabling Contractor to install cabling and equipment.
 - 1.5 Coordination: Refer to the Responsibility Matrix in Division 01. Architect, including their technology consultant, and Dallas ISD-IT-Infrastructure are required to coordinate during all phases of the project.
 - 1.6 E-Rate and Bond Program Coordination:
 - 1.6.1 New Construction/Additions: Require full technology and technology supporting systems as a part of the project.
 - 1.6.2 Renovations: Receive E-Rate funded network maintenance separate from full construction projects.
 - 1.7 Technology Systems Impact on Other Building Systems: The electronic devices of the technology systems generate heat and require protection from electrical power fluctuations, surges and electromagnetic fields. The mechanical and electrical systems to address the support and protection required for year-round operation of these technology systems.
 - 1.8 If a major change in available technology occurs during design (For example Category 7 cable standards are released and the product is available) Architect(s) and/or BICSI certified RCDD are to submit a design waiver requesting a change to Dallas ISD designated representative.
 - 1.9 Reference the following Divisions for additional requirements to be coordinated:
 - 1.9.1 Division 06 – Wood, Plastics and Composites.
 - 1.9.2 Division 11 – Equipment.
 - 1.9.3 Division 21 – Fire Suppression.
 - 1.9.4 Division 26 – Electrical.

1.10 Technology Definitions and Acronyms:

AWG	American Wire Gauge	MPP	Multipurpose Plenum Cable
BICSI	Building Industry Consulting Services International, Inc.	MPR	Multipurpose Riser Cable
CMP	Communications Plenum Cable	OFNP	Optical Fiber Non-Metallic Plenum Rated
CMR	Communications Riser Cable	OFNR	Optical Fiber Non-Metallic Riser Rated
COW	Computer On Wheels	OTD	Optical Time Domain Reflectometer
Data Port	Single Category 6e or newer jack connected to a single cable segment	Portable	Permanent classroom space (not swing space)
Duplex Electrical Outlet	Two (2) electrical receptacles	POS	Point of sale
Duplex Dataport	Two (2) Single Category 6e dataports or newer	PSTN	Public switched telephone network
EF	Entrance Facility	RDP	Rate Demarcation Point
EIA	Electronic Industries Alliance	Quad-Electrical Outlet	Four (4) electrical receptacles
Electrical Outlet	Single 120 Volt power receptacle	RCDD	Registered Communications Distribution Designer
EMT	Electrical Metallic Conduit.	RMU	Rack Mount Unit (1.75 inches)
ER	Equipment Rooms (i.e. MDF, IDF)	SCS	Structured Cabling System
FDC	Fiber Distribution Center (Rack or Wall Mounted)	Swing Space	Temporary portable building in support of construction
FOC	Fiber Optic Cable	TIA	Telecommunication Industry Association
GC	General Contractor	TMG	Telecommunications Main Grounding Busbar
GRC	Galvanized Rigid Conduit	TR	Telecommunication Room
HVAC	Heating, Ventilation, & Air Conditioning	UL	Underwriters Laboratory
IDF	Intermediate Distribution Frame	UPS	Uninterruptible Power Supply
IMC	Intermediate Metallic Conduit	UTP	Unshielded Twisted Pair
ID	Interactive Display	VoIP	Voice over IP or Voice over Internet Protocol
ITS	Information and Technology Services	WAP	Wireless Access Point
MDF	Main Distribution Frame		

- 1.11 Technology Symbols: The following symbols are to be used for consistency between Architect's drawings, General Contractor submittals, and vendors contracted directly by Dallas ISD. Coordinate with the MEP engineers so as not to create confusion due to similar symbols in their sets.

Data Device Symbols		
Device	Symbol	Description
New Data Outlets:		
Four-pair unshielded twisted pair cable run, category as specified. "x" indicates number of cable runs (jacks). If there is no number indicated there shall be one cable run (jack).		
Typical		
POS	POS 	
Wall-Mounted	W 	Coordinate exact height and placement with Architect (typically at +48" aff.).
Floor-Mounted		
Ceiling-Mounted (video projector)	PRJ 	
Power-Over-Ethernet (IP-based camera)	BC 	Standard installation requires a single cable run for signal, control and power. Use keynotes to designate specific requirements for installations such as wall-mounting or non-standard power configuration.
Bio-Clock	CAM 	Coordinate exact height and placement of J-box with Architect (typically at 48 inches A.F.F. to top of single gang back box).
Other Symbols:		
Existing Data Outlet	E 	
Multimedia Outlets (teacher station A/V)		Note to refer to specifications and details. All other audiovisual (A/V) applications to be identified using keynotes.
Keynotes		"X" indicates keynote identifier. Keynotes to be identified in series with letters (Example: Keynote N).

Wireless Access Point Symbols		
Device	Device	Device
Wireless Access Point (WAP):		
Exterior Wall-Mounted		<p>Exterior sleeving requirements:</p> <ul style="list-style-type: none"> • Provide sleeve through exterior wall at a height not greater than 14 feet and in line with other devices such as security cameras. • Route sleeve within 1st floor ceiling into adjacent lower ceiling towards cable pathway/cable tray. • Require sleeve to be trimmed at face of masonry (maximum 1/4" protrusion). • Fire stop on both ends and slope at 1:10 to the outside to prevent moisture infiltration. • WAP installation does not require predrilled or precast anchor support.
Interior Wall-Mounted		<p>WAP's may be mounted on sheetrock walls. Exception: In gymnasiums, mount WAP's on masonry or concrete walls. Mounting on sheetrock walls in gymnasiums requires additional support and prior approval from IT-Infrastructure.</p> <p>Interior sleeving requirements:</p> <ul style="list-style-type: none"> • Provide sleeve/conduit and backbox at height not greater than 14 feet and in line with other devices such as fire/clocks. • Route sleeve/conduit into adjacent lower ceiling towards cable pathway/cable tray. • WAP installation does not require predrilled or precast anchor support. • Classrooms above 14 feet A.F.F.: On wall adjacent to cable tray at 12 feet. Provide back box and conduit. • Gymnasium and Auditoriums above 14 feet A.F.F.: On wall at 12 feet. Provide back box and conduit.
Ceiling-Mounted		<p>Standard lay-in ceilings (less than 14 feet A.F.F.): Mount at center of classroom or as required to provide appropriate coverage in other areas. Locate at main tee for support. Coordinate locations at office areas with Dallas ISD-IT-Infrastructure.</p> <p>Hard ceiling or non-standard ceiling tile (ex: 4"x4"): Architect to coordinate locations with IT-Infrastructure.</p> <p>Open ceiling: Cabling to be in continuous conduit and terminate into a double gang backbox.</p>

2. Intradisciplinary Requirements:

2.1 Furniture / Casework / Millwork:

- 2.1.1 Furniture for computers, printers, etc. to be provided by Dallas ISD. All millwork and casework to be installed by the General Contractor.
- 2.1.2 Design to conceal the routing of cables.
- 2.1.3 Counters for computers to be 2'-6" deep and have openings and covers to accommodate technology components.

- 2.1.4 Any surfaces extending over a computer work surface to be a minimum of 2'-0" clear above the work surface.
- 2.1.5 Drawers to only be used in administrative areas and teacher workstations.
- 2.1.6 Keyboard drawers are not allowed.
- 2.1.7 All built-in furniture and cabinet doors and drawers to be provided with locks, even if located in lockable room.
- 2.1.8 Refer to Divisions 06 and 12 for additional requirements.
- 2.2 Cabling:
 - 2.2.1 Network cabling for security cameras to be provided by the Dallas ISD-IT contracted vendor.
 - 2.2.2 Typical, Category 6 or newer cabling.
 - 2.2.3 Refer to Responsibility Matrix in Division 01.
- 2.3 Pathways and Raceways:
 - 2.3.1 Pathways and raceways are the support system for the infrastructure. All horizontal and backbone cable are to be properly supported. Infrastructure support systems include, but not limited to the following:
 - 2.3.1.1 Properly supported conduits, inside, outside, above ground or underground.
 - 2.3.1.2 Cable trays.
 - 2.3.1.3 Independent cable j-hook hangers.
 - 2.3.1.4 Surface raceway systems to be metal raceways and boxes.
 - 2.3.2 New Construction/Additions:
 - 2.3.2.1 Preferred method is a combination of cable trays and j-hook hangers.
 - 2.3.2.1.1 Cable trays are to be used for main horizontal cable pathways to and from MDFs and IDFs.
 - 2.3.2.1.2 Cable trays are to be installed in the main hallways.
 - 2.3.2.1.3 Use independently supported j-hook hangers where cables exit the cable tray system and run to the termination points.
 - 2.3.2.1.4 All backbone cable is to also follow these cable tray pathways.
 - 2.3.2.1.5 Category 6 or newer and auxiliary system cables are to be combed and independently bundled.

- 2.3.2.1.6 Bundle ties are to be easily removed for the addition or removal of cables and are to be plenum rated.
- 2.3.2.1.7 The primary cable routes are to be located over corridors for future maintenance and access.
- 2.3.2.1.8 Plenum-rated cabling, cable support hardware and cable ties are required in plenum-rated and above-ceiling spaces.
- 2.3.2.2 General Contractor to be responsible for the wall boxes, conduits with bushings, sleeves with bushings, and raceways. A 1 inch conduit with a pull string is to be included at each wall box. The conduit is to extend from the wall box to above the wall providing a clean pathway for data cables.
- 2.3.3 Renovations:
 - 2.3.3.1 Preferred method of support above classrooms or office spaces outside of the MDF and IDF is independently supported j-hook cable hangers. These hangers are to be suitable for installation of Category 6 or newer cables and support bend radius applications.
 - 2.3.3.2 At Hallways: Provide cable tray for support.
- 2.3.4 Firestopping:
 - 2.3.4.1 New and existing raceways, conduit sleeves, cable trays, and cables for power, data, and communications systems penetrating non-rated and fire-rated floors, walls, and other partitions of building construction are to be fire-stopped where they penetrate new or existing building construction.
 - 2.3.4.2 Verify that cabling and other penetrating elements and supporting devices have been completely installed and temporary lines and cables have been removed.
 - 2.3.4.3 General Contractor is responsible for firestopping all MDF and IDF sleeves, cores and cable pathways.
- 2.3.5 Refer to Section 27 15 01 for additional requirements.

3. Electrical:

3.1 General:

- 3.1.1 Dedicated Isolated Ground Circuits: Orange colored receptacles.
- 3.1.2 Dallas ISD prefers the use of wall outlets in all areas except for the power clusters in IDF and MDF.
- 3.1.3 Outlets Required in Center of Rooms:
 - 3.1.3.1 Design for use of floor boxes. Flush-faced, floor mounted with whips to outlet box. Run conduit from floor box to nearest wall. Run within wall to 6 inches above suspended ceiling.
 - 3.1.3.2 Tombstone outlets or data/power poles are not preferred. Review with Dallas ISD-IT-Infrastructure prior to using these types of outlets.

3.1.3.3 Design must ensure that floor box outlets for both power and data must be coordinated with type of data faceplates specified for project. Additional accommodations required for mounting to fit specified data faceplates to be the General Contractor's responsibility.

3.2 Grounding:

- 3.2.1 Grounded power outlets to use separate ground wire run from each outlet box back to a common, dedicated, isolated earth ground.
- 3.2.2 Electrical power in MDF/IDF rooms to be provided via dedicated isolated ground circuits.
- 3.2.3 Dedicated isolated ground circuits are not required outside the MDF/IDF closet unless required by code.
- 3.2.4 Provide each power outlet and the data outlet with separate back boxes.
- 3.2.5 All racks and ladder trays to be grounded.
- 3.2.6 Refer to Division 26 for additional requirements.

3.3 Raceways:

- 3.3.1 Wall surface-mounted enclosed metal raceways for electrical and data cabling are not allowed unless the installation of wiring within the wall cavity is not allowed per the TDG or applicable code or is not possible based on existing conditions.
- 3.3.2 Electrical/cable raceways cast into the concrete floor systems and raised flooring systems are not allowed.
- 3.3.3 Raceways to be installed as discretely as possible with little or no disturbance to classroom functionality or aesthetics.
- 3.3.4 Installation of than one (1) vertical raceway per wall to be avoided where possible.
- 3.3.5 Verify layout for large rooms with more than standard number of drops, additional entrances into the room, or vertical drops with Dallas ISD-IT.

3.4 Electrical Panels:

- 3.4.1 Distribution panels for the technology system (ex: MDF/IDF equipment, classroom computers, interactive displays, projectors, et al.) are to be isolated from all other panels and contain only technology power. This includes isolation from all lighting.
- 3.4.2 Panels to be labeled as "Technology" electrical panels.
- 3.4.3 Shared circuits between rooms are not allowed.
- 3.4.4 Technology panels to be coordinated with Division 26.

3.5 Surge Protection:

- 3.5.1 Technology electrical distribution panels to be provided with surge protectors.
- 3.5.2 Surge Protectors to be mounted close to panels.
- 3.5.3 Refer to Division 26 for additional information.

3.6 Telecommunications Entrance Facilities Surge Arresters and Suppressors:

3.6.1 Provide carbon or gas charged elements connected to all copper lines running into the building from outside service providers and between buildings (ex: to portable buildings, field house, remote entrance gates, etc.) and central distribution sites on campus.

3.6.2 Copper cable runs between buildings. Refer to Responsibility Matrix in Division 01.

4. Campus-Wide Infrastructure:

4.1 Voice Communications:

4.1.1 Refer to Responsibility Matrix in Division 01 for division of scope between General Contractor and Dallas ISD contracted vendor.

4.1.2 Architect to coordinate with Dallas ISD IT - Infrastructure to assure compliance.

4.1.3 Phone systems and service to the building to be provided by Service Provider.

4.1.4 Locate outlets for public pay phones, complying with accessibility standards, as directed by Dallas ISD.

4.1.5 New Construction/Additions:

4.1.5.1 Voice over IP (VoIP) telephony system.

4.1.5.1.1 IP phone digital handsets.

4.1.5.1.2 Switched ethernet data network.

4.1.5.1.3 Telephone connectivity infrastructure using the data network to be provided in all classrooms and all offices including library office and circulation desk. Refer to Responsibility Matrix in Division 01 for division of cabling scope.

4.1.5.1.4 VoIP phones at teacher's desks to provide for a switched 100/1000 Mb/s ethernet connection for the teacher workstation or laptop.

4.1.5.1.5 VoIP phones to plug into the planned data drops.

4.1.5.2 Enhanced 911(E-911) system to be routed through local PSTN gateway serving the following functions:

4.1.5.2.1 911 calls.

4.1.5.2.2 Emergency backup.

4.1.5.2.3 Critical mass notification

4.1.5.3 Wireless Call Out:

4.1.5.3.1 Fire Alarm Systems: AES.

4.1.5.3.2 Security Systems: Hands-free operated phone with a direct phone line to allow access to Dallas ISD's central security office.

- 4.1.5.3.3 Elevator Critical Communication System: Phone required in each elevator to be a hands-free operated phone with direct phone line to allow access to Dallas ISD's central security office. Phone to meet all city and state code requirements including TAS/ADA.
- 4.1.6 Additions:
 - 4.1.6.1 Architect to review potential expansion of existing PBX system, when required, into any office spaces in the additions with Dallas-M&O during the Design phase.
 - 4.1.6.2 If addition includes a new MDF closet space, Architect to coordinate with Dallas ISD-M&O for direction on relocating existing PBX equipment and data/phone wiring infrastructure to the new MDF space.
- 4.1.7 Renovations:
 - 4.1.7.1 Existing facilities to verify with Dallas ISD-M&O whether the facility will continue to use PBX systems currently installed or will be updated to VoIP on a project specific basis.
 - 4.1.7.2 Phones are not required to be added to existing classrooms.
- 4.1.8 Refer to Figure 27 05 00-01 for typical voice and data configuration.

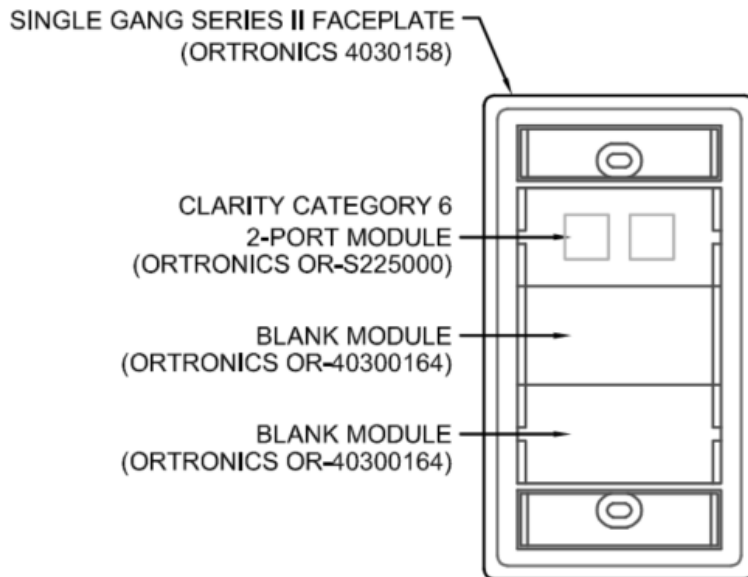


Figure 27 05 00-01 Voice/Data Outlet Configuration

- 4.2 Point of Sale (POS) Terminals:
 - 4.2.1 Cafeteria:
 - 4.2.1.1 Two (2) data outlets (RJ45 wall plates) per POS terminal..
 - 4.2.1.2 One (1) quad.

- 4.2.1.3 Isolated ground.
- 4.2.1.4 120 vac/15 amp power outlet at each cash register or POS register.
- 4.2.2 Cafeteria Manager's Office:
 - 4.2.2.1 Four (4) data outlets (RJ45 wall plates).
 - 4.2.2.2 Two (2) quad.
 - 4.2.2.3 Isolated ground.
 - 4.2.2.4 120 vac/15 amp power outlets.
- 4.3 Interactive Displays and Projectors:
 - 4.3.1 Ceiling-Mounting Projector Locations (identified in Division 12):
 - 4.3.1.1 One (1) duplex electrical outlet.
 - 4.3.1.2 One (1) category 6 or newer (higher) data cable terminated and left coiled above ceiling.
 - 4.3.2 Cable Bundle Termination: One (1) HDMI 1.3 modular connector.
 - 4.3.3 Multimedia Outlet:
 - 4.3.3.1 Provide at classroom teaching wall interactive display, other electronic displays, large venue projectors, multimedia systems, et al.
 - 4.3.3.2 Two (2) duplex dataports.
 - 4.3.3.3 One (1) HDMI 1.3 modular connector.
 - 4.3.3.4 Multimedia Outlet: Provide 2 inch conduit run and 4-11/16 inch square x 3 inch deep box with 1 inch extension ring at outlet location.
 - 4.3.3.5 Coordinate blocking and quads with multimedia outlet locations. Refer to Figure 29 05 00-06.
 - 4.3.3.6 Refer to Figure 27 05 00-02 for typical configuration.

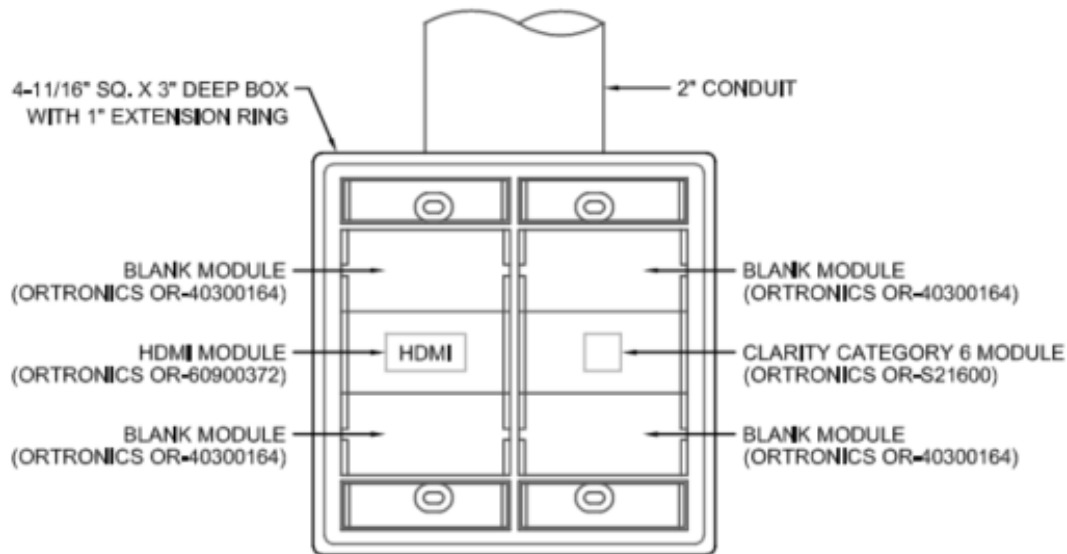


Figure 27 05 00-02 Multimedia Outlet Configuration

4.3.4 Between Multimedia Outlet and Ceiling-Mounted Projector: One (1) HDMI 1.3 cable.

4.4 Fiber Optic Backbone Cabling (between, to and from portable buildings):

4.4.1 General Contractor is responsible for installation of all fiber optic pathways, conduits (with bushings), sleeves, lightning protection, grounding and wall cabinets to complete fiber optic installation. Dallas ISD-IT-Infrastructure contracted vendor is responsible for the installation of the fiber optic, fusion splicing, weatherproof splicing enclosures or splice boxes (coyotes). Where special conditions need it, Dallas ISD-IT-Infrastructure may request that Architect and Architect contracted Technology Consultant design a fiber pathway (ex: storm shelter IDF/MDF).

4.4.2 All portable buildings to be connected to the campus network. From MDF, install a 24 fiber 50/125 micron multimode optical cable to a weatherproof cabinet or splice box that is centrally located among the portable buildings. Cabinet to be mounted overhead in the walkway cover. From this cabinet, install 6 fiber 50/125 micron multimode optical cable to each portable building (up to 4 portable buildings). Multimode fiber cable to be installed and secured to structure in the walkway cover.

4.4.3 Provide one (1) wall-mounted lockable cabinet. Terminate all fibers within the cabinet for connection to Dallas ISD provided network switch. All fiber optic cable strands are to be terminated, tested and certified.

4.4.4 Install three (3) Category 6 data ports or newer within each classroom within the portable. All Category 6 or newer cables run to the wall-mounted cabinet and terminate on the patch panel.

4.4.5 Classrooms in portable buildings are to have the same general layout and meet the same connectivity and multimedia outlet/device standards as standard classrooms.

4.4.6 Construction Swing Space: Provide for a wireless connection in lieu of cabled connection unless directed otherwise by Dallas ISD designated representative.

- 4.5 Wireless Access Points (WAP):
 - 4.5.1 Wireless access points to be connected to the Dallas ISD network. Locations and number of access points to be established as part of initial site survey.
 - 4.5.1.1 Design of WIFI coverage and WAP placement to be based on site survey maps for minimal interference and Dallas ISD-IT-Infrastructure WAP device baseline dBm signal strength as set by the WAP device manufacturer.
 - 4.5.1.2 Dallas ISD-IT-Infrastructure WIFI engineer to be consulted by Architect and Architect contracted Technology Consultant for wireless coverage design.
 - 4.5.1.3 Refer to Wireless Access Point Symbols table for placement guidelines.
 - 4.5.2 Prior to installation, Dallas ISD-IT-Infrastructure or WAP Contractor to perform a detailed radio propagation survey after the physical building structure is complete and major systems installed. Any variations in recommended locations and/or quantities are to be resolved and updated on Contract Documents as directed by Dallas ISD designated representative.
 - 4.5.3 The following components are to be installed for each WAP.
 - 4.5.3.1 Two (2) Category 6A or newer cable from the MDF or closest IDF to a point above the ceiling. Where no lay-in ceiling is available route to a point 1 foot below the ceiling, with the WAP to be mounted on the wall. In both cases the data port is to be terminated within a standard box that can be moved for adjustment.
 - 4.5.3.2 Low voltage power for the access points is POE based and provided through the data cable from the network switch.
 - 4.5.3.3 All cables and patch cords are to be labeled. Label existing patch panel to identify location. Dallas ISD-IT-Infrastructure contracted vendor to provide patch panel identity label on ceiling grid and green dot.
 - 4.5.3.4 Provide 15 feet of cable slack at WAP.
 - 4.5.4 WAP installation is required within a potentially damaging space such as a gymnasium, the WAP unit is to be in protective enclosure or a location that the WAP cannot be damaged from gymnasium activities.

5. Room Specific Requirements:

5.1 IT-Infrastructure Network Rooms (MDF/IDF):

5.1.1 General Requirements:

- 5.1.1.1 MDF and IDF rooms should be labeled with room number and sequential room name for identification. (ex: 116 MDF, 156 IDF 01, 201 IDF 02, 309 IDF 03, etc.).
- 5.1.1.2 MDF and IDF locations to be determined based on maximum cable run lengths:

- 5.1.1.2.1 Cable runs are to not exceed 250 feet in total length (including vertical and horizontal runs) to any device location from the network room.
- 5.1.1.2.2 Architect and Architect contracted Technology Consultant to calculate vertical and horizontal cable path runs. Calculation to include two (2) patch cords at 15 feet each and two (2) service loops at 10 feet each (total 50 feet).
- 5.1.1.2.3 Distances to storm shelter, competition gyms and auditorium areas to be verified to avoid the necessity for additional, corrective IDFs.
- 5.1.1.2.4 Dallas ISD-IT-Infrastructure contracted vendor to test cables for length to conform to passing if they are under 300 feet with patch cords included.
- 5.1.1.3 Floors are to be a level, smooth hard sealed concrete surface. Refer to Division 09 for additional requirements.
- 5.1.1.4 Wall and floor surfaces are to be light in color, flat sheen to minimize light reflection.
- 5.1.2 IT-Infrastructure Network Room Counts:
 - 5.1.2.1 Dallas ISD-IT-Infrastructure is to be consulted any time a network distribution room is to be constructed that does not conform to the base configuration requirements listed in this document.
 - 5.1.2.2 Typical Room Counts by School Classification:
 - 5.1.2.2.1 Elementary School: One (1) MDF and three (3) IDFs.
 - 5.1.2.2.2 Middle School: One (1) MDF and four (4) IDFs.
 - 5.1.2.2.3 High School: One (1) MDF and nine (9) IDFs.
- 5.1.3 Dimensional Requirements:
 - 5.1.3.1 MDF and IDF rooms to be designed to accommodate wall space for access control panels. A minimum 4 foot by 8 foot area of wall space to be provided.
 - 5.1.3.2 Access control panels are not allowed to be places on front side wall of the post racks. Refer to Figures 29 05 00.3 and 4 for Typical IDF and MDF layouts and coordinate mounting locations with Dallas ISD-IT-Infrastructure.
 - 5.1.3.3 MDF and IDF room racks will be designed to accommodate space for security patch panels, switches, UPS's and server.
 - 5.1.3.4 New MDF Rooms:
 - 5.1.3.4.1 Minimum 10 feet x 20 feet clear of unobstructed floor area.
 - 5.1.3.4.2 Ceiling: 10 feet AFF.

- 5.1.3.4.3 Architect to obtain MDF layout approval from Dallas ISD IT – Infrastructure designated representative.
- 5.1.3.5 New IDF Rooms:
 - 5.1.3.5.1 Minimum 10 feet x16 feet clear of unobstructed floor area.
 - 5.1.3.5.2 10 foot ceilings, AFF.
 - 5.1.3.5.3 IDFs to be placed so that no drop cable length exceeds 285 feet (86 meters) for the permanent link; or 328 feet (100 meters) for the complete channel inclusive of all cross- connects.
- 5.1.4 Door Access Controls:
 - 5.1.4.1 Door locks to be Proxy Card compliant, network integrated and managed, and provide for keyed access.
 - 5.1.4.2 Electronic access control to be compatible with the specified Open Option system. The system requires the following components.
 - 5.1.4.2.1 Storeroom lock.
 - 5.1.4.2.2 Card reader.
 - 5.1.4.2.3 Door locking device.
 - 5.1.4.2.4 Door control panel.
 - 5.1.4.3 Typical installation with accessible wall and door frame (condition one): Provide a door position contact and electric strike.
 - 5.1.4.4 At solid wall construction or inaccessible walls and/or door frame (condition two): Provide the following:
 - 5.1.4.4.1 Surface mounted door position contact mounted on secure side of door.
 - 5.1.4.4.2 Surface mounted mag-lock.
 - 5.1.4.4.3 Surface mounted passive infrared reader.
 - 5.1.4.4.4 Surface mounted exit push button to release mag-lock.
 - 5.1.4.5 Architect to coordinate requirements on a project specific basis with Dallas ISD-IT-CSS and IT-Infrastructure and include all required components in the Contract Documents.
 - 5.1.4.6 Refer to Divisions 08 and 28 for additional requirements.
- 5.1.5 Climate Control:
 - 5.1.5.1 MDF and IDF rooms are to be provided with climate control system for cooling, heating, and humidity.

- 5.1.5.2 Systems are to be designed to meet the total climate control needs. The controls of the HVAC are to be programmed to run at appropriate settings at all times.
- 5.1.5.3 Power, including the climate system, for MDF/IDF rooms will only be shut-off for maintenance, repair, and construction improvement projects, but any shut down must be pre-approved in writing from Dallas ISD-IT-Infrastructure a minimum of 48 hours prior to activity.
- 5.1.5.4 Provide high heat room alert signal and call out. Confirm settings with Dallas ISD-IT-Infrastructure.
- 5.1.5.5 Computer lab(s) are to be provided with climate control system for cooling and heating.
- 5.1.5.6 Communications closet: HVAC unit is not to be located over or obstruct access to any rack lines.
- 5.1.5.7 Confirm acceptable temperature range for equipment review with Dallas ISD-IT-Infrastructure.

Heat Loads for Dallas ISD MDF and IDF Rooms		
Room Type	Minimum Load	Maximum Load
MDF	20,500 BTU/hr	41,000 BTU/hr.
IDF	3,500 BTU/hr	7,500 BTU/hr

- 5.1.5.8 Refer to Division 23 for additional requirements.
- 5.1.6 Lighting:
 - 5.1.6.1 MDF and IDF Rooms: Lighting is to consist of LED lighting and controls. Lighting levels must be to meet IES recommended and code required minimum light levels at all areas of the room.
 - 5.1.6.2 Refer to Division 26 for additional requirements.
- 5.1.7 Fiber Optic Backbone Cabling (MDF-to-IDF):
 - 5.1.7.1 Provide vertical/horizontal fiber optic backbone cabling to be 24 strands of fiber optic service. Refer to Figures 27 05 00-03 and 04 for typical MDF and IDF floor plan.
 - 5.1.7.2 Provide fiber optic patch panels at each end sized for the number of fibers to be installed. Typical: Terminate all 24 strands of fiber with Type “LC” connectors. Connect 12 strands to patch panels and leave balance coiled in or behind bulkhead with protective covers in place as spares.
 - 5.1.7.3 Renovations/Additions: Where new IDFs are added, install a new backbone from the MDF to each IDF consisting of 24 strands of fiber optic service. Refer to 27 05 00--03a and 04a for typical MDF and IDF floor plans.

5.1.8 Power:

5.1.8.1 Uninterruptible Power System (UPS) Design Criteria:

- 5.1.8.1.1 Individual UPS to be provided at each MDF/IDF closet. Eaton 9PX or Dallas ISD approved equal with Extended Battery Module (EBM) to meet continuous operation design criteria.
 - 5.1.8.1.1.1 Individual UPS to be mounted to the four-post rack in MDF/IDF closet.
 - 5.1.8.1.1.2 Additional UPS to be provided by Dallas ISD-IT-CSS and PA/Sound contracted vendor(s) within separate allocated racks to power security and sound equipment.
- 5.1.8.1.2 System is to provide 1 hour of continuous operation without degradation of the power supplying the MDF/IDFs or other areas requiring UPS.
- 5.1.8.1.3 UPS to include appropriate modules or cards to allow ethernet or fast ethernet connectivity to the Dallas ISD data network (ex: RJ45 connection(s)).
- 5.1.8.1.4 UPS to include statistical non-parametric mapping (SnPM) functionality for monitoring and remote access into the system.
- 5.1.8.1.5 UPS to support power to all racks and cabinets within the MDF/IDF but not convenience outlets.
- 5.1.8.1.6 Renovations/Additions: Centralized UPS systems are not supported by Dallas ISD-IT-Infrastructure. If an MDF/IDF is being renovated, relocated or added, Architect and Architect contracted Technology Consultant to coordinate with IT-Infrastructure to replace existing centralized UPS systems with individual UPS at the existing/new MDF/IDF.
- 5.1.8.1.7 Architect to include the following requirement at a minimum in the Contract Documents: UPS's provided by Dallas ISD-IT-Infrastructure are E-Rate equipment and may only be moved by IT-Infrastructure contracted vendor(s). General Contractor to coordinate with IT-Infrastructure for any UPS to be moved or relocated.
- 5.1.8.1.8 Use power requirements in table below as a guideline or starting point for UPS design, configuration and sizing requirements.
- 5.1.8.1.9 Refer to Division 26 for coordination with electrical requirements.

Typical ITS Network UPS Power Requirements by School Classification						
School Type	No. of Network Rooms	Estimated No. of Drops	Provide UPS as Required		Provide Feeders, Panels, Breakers & Outlets as Required	
			Minimum UPS Units (1 per closet)	KVA per UPS Unit	Min. Total KVA power from UPSs	Commercial Electrical Power Clusters
Elementary School	4	576	4	3	12	13
Middle School	5	960	5	3	15	16
High School	10	1920	10	3	30	31

Notes: This model assumes that switches in each power cluster offer 96 ports w/ full PoE support (or 60 PoE+ ports)

1. The architect and IT consultant to design at 80% of the power that a 3 KVA DISD IT Infrastructure specified UPS can support for 1 hour.
2. This design configuration is for a single UPS to support not more than one (1) switch chassis of 240 ports. Additional UPS will be required for a cable count of more than 240.
3. The architect and IT consultant must advise DISD It Infrastructure designated representative when an additional UPS is needed on any closet.
4. This model assumes that not all PoE ports will be in use simultaneously

5.1.8.2 Rack Requirements:

- 5.1.8.2.1 MDF to have one (1) open four-post rack and three (3) two-post racks with vertical wire managers (front and rear) at both ends and in between the racks.
- 5.1.8.2.2 IDFs to have one (1) open four-post rack and two (2) two post racks with vertical wire managers (front and rear) at both ends and in between the racks.
- 5.1.8.2.3 More than the number of racks indicated above may be required in a given room to support more drops than required in a base configuration. Architect and Architect contracted Technology Consultant to review rack counts, drop counts and room sizes with Dallas ISD-IT-Infrastructure during the Design Development phase and adjust the design as required on a project specific basis.

- 5.1.8.3 Power Cluster Requirements:
- 5.1.8.3.1 Typically, equipment for no more than 200 network drops is to be powered by any single power cluster. In situations where deviations from this general rule are required, Dallas ISD-IT-Infrastructure is to be consulted prior to finalizing room sizing and layout.
 - 5.1.8.3.2 If more than 500 data ports are planned, solution including total number of racks, power clusters, UPS count and room size to be coordinated with Dallas ISD-IT-Infrastructure.
 - 5.1.8.3.3 Provide a single power cluster per rack installed. Locate behind each rack, mounted at 7'-3" at the top of the horizontal ladder rack. Refer to Figures 27 05 00-03 and 4.
 - 5.1.8.3.4 All power clusters in MDF/IDF to be dedicated isolated ground circuits, labeled to identify "Technology" electrical panel and circuit.
 - 5.1.8.3.5 Power Clusters at MDF/IDF to Include:
 - 5.1.8.3.5.1 Two (2) L6-30 receptacle for UPS.
 - 5.1.8.3.5.2 Two (2) 208vac/20amp with L6-20 twist lock receptacles on two (2) commercially powered circuits.
 - 5.1.8.3.5.3 Two (2) 120vac/20amp quad 5P-20 receptacles on two (2) commercially powered circuits.
- 5.1.8.4 Refer to Division 26 for additional information.
- 5.1.9 Network Room (MDF/IDF) Equipment:
- 5.1.9.1 Refer to the following diagrams for typical MDF and IDF layouts:
 - 5.1.9.1.1 The following keynotes apply to Figures 27 05 00-3-4:

KEYED NOTES TO MDF, IDF OVERVIEW and Elevations Rev. Final 06.02.2021	
LEGEND	DESCRIPTION
1	4-POST RACK (OPEN) FOR UPS: Properly label MDF Rack 1
2	2-POST RACK: Properly label MDF Racks as Rack #1, #2, Rack #3, etc.
3	Vertical Cable wire management for front and back of racks
4	Infrastructure Support System: 12" wide ladder rack arranged around all room walls and near mid-span across room.
5	Labeled Power Cluster gang boxes installed behind each of the racks at the top of the ladder rack comprises dedicated circuits of

KEYED NOTES TO MDF, IDF OVERVIEW and Elevations Rev. Final 06.02.2021

LEGEND	DESCRIPTION
	<ul style="list-style-type: none"> • NEMA 2 X L6-30 • NEMA 2 X L6-20 • 2 QUADS
6	6 denotes ISP fiber provider termination box (UPN) 6A denotes horizontal fiber terminations (DISD)
7	4 Quantity of 4" HILTI speed CP653 conduit sleeves for horizontal cabling through wall placed at optimum location where ladder rack and cable tray meet.
8	Dedicated Air Conditioning: See TDGs for additional information.
9	9 (Preferred) freestanding cabinet: PA rack: M&F Sound Stage group 9A (Optional) Wall mounted
10	Access Control Panel (ACP): Campus Security Systems
11	Grounding busbar at 8'-0"A.F.F.
12	Any other wall mounted equipment devices
13	Preferred location of core drilled/ floor sleeve location for all IT trades. Quantity to be determined by IT Infrastructure and Design team based on function and cable pathway. Provide 2 Quantity 4" diameter for fiber to MDF from ISP fiber provider's street Demarc (UPN) point.
15	Drawing title applicable to specified network room.
16	Minimum clearance of 24" from back of the 4-post rack to the wall
17	Minimum clearance of 24" from side vertical wire management to wall
18	Minimum clearance of 36" from the front of all the racks to the front wall
19	NO EQUIPMENT ON FRONT SIDE WALL OF THE POST RACKS
20	Preferred Door Location
21	Electrical Conduits feeding power clusters run outside and above rack or ceiling
22	Fire rated plywood (3/4" AC Grade) installed on every wall from floor to 8'6" AFF, bottom at 6" above floor. For each board, leave fire grade stamp when painting
23	Mount any sprinkler heads in MDF/IDF per specs to wall (NOT SHOWN). No heads over equipment or panels on racks.

KEYED NOTES TO MDF, IDF OVERVIEW and Elevations Rev. Final 06.02.2021

LEGEND	DESCRIPTION
24	Standard 120V-20A convenience receptacle at +18" AFF spaced at 6 ft intervals
25	4-post rack mounted UPS system.
26	Minimum interior width, MDF=10ft, IDF=10 ft,
27	Minimum interior length, MDF=20 ft, IDF= 16 ft,
28	Ladder Rack Height 28A is fire rated ¾" AC grade plywood height
29	29 & 29A denote IT Infrastructure while 29B IT Security patch panels
30	30 & 30A denote IT Infrastructure Network Switches 30B IT Security Switches
31	Radius Transitions required to guide cable drop from ladder to vertical wire manager
32	6 AWG grounding wire run into a 2-hole ground lug secured with a bolt and nut onto a metal surface. Scrape paint to bond to metal
33	Provide electrically approved grounding wire to house ground/ steel I-beam system
34	Suspended ceiling height at 8'-6" minimum but prefer 9 feet clear height.
CR	Card Reader Access Control: Room must be secured at all times

5.1.9.1.2 Refer to Figure 27 05 00-3a for typical MDF plan layout.

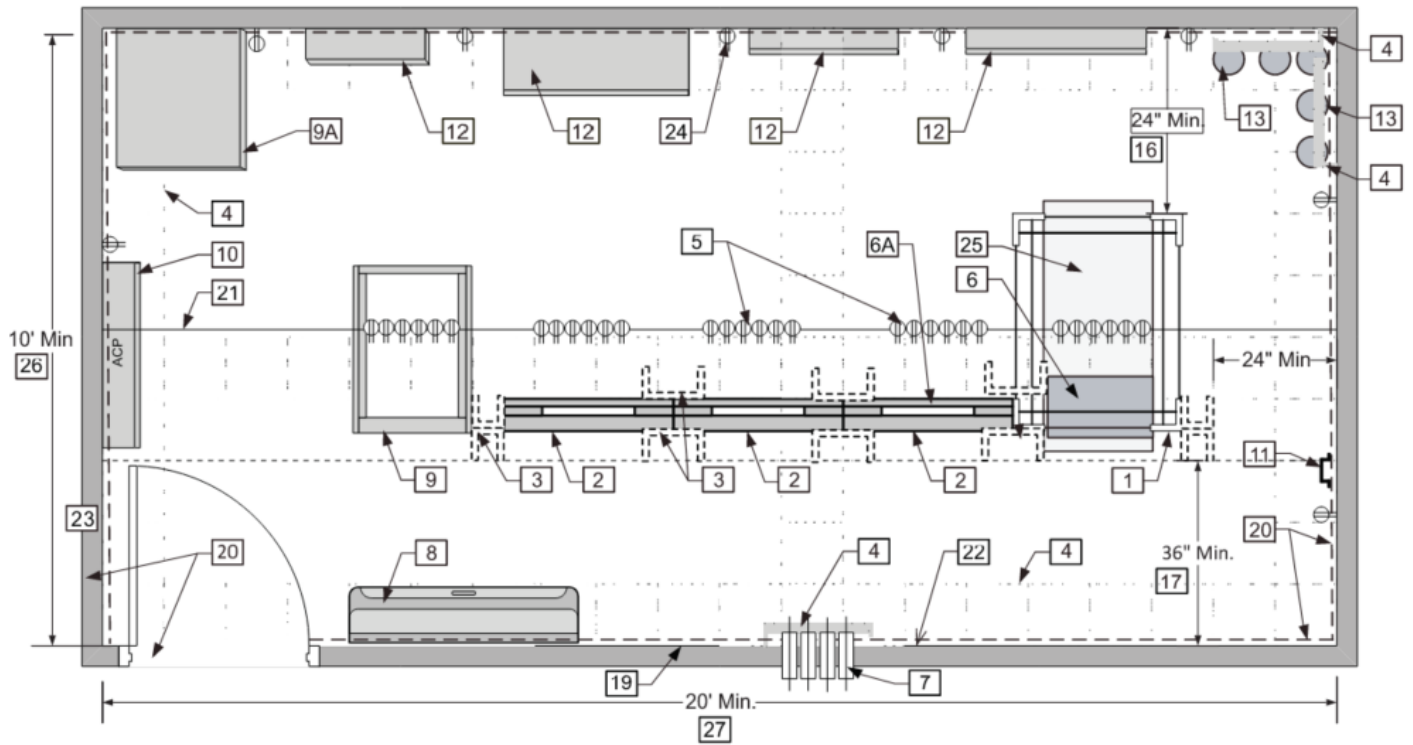


Figure 27 05 00-3a Typical MDF Plan Layout

5.1.9.1.3 Refer to Figure 27 05 00-3b for typical MDF front elevation.

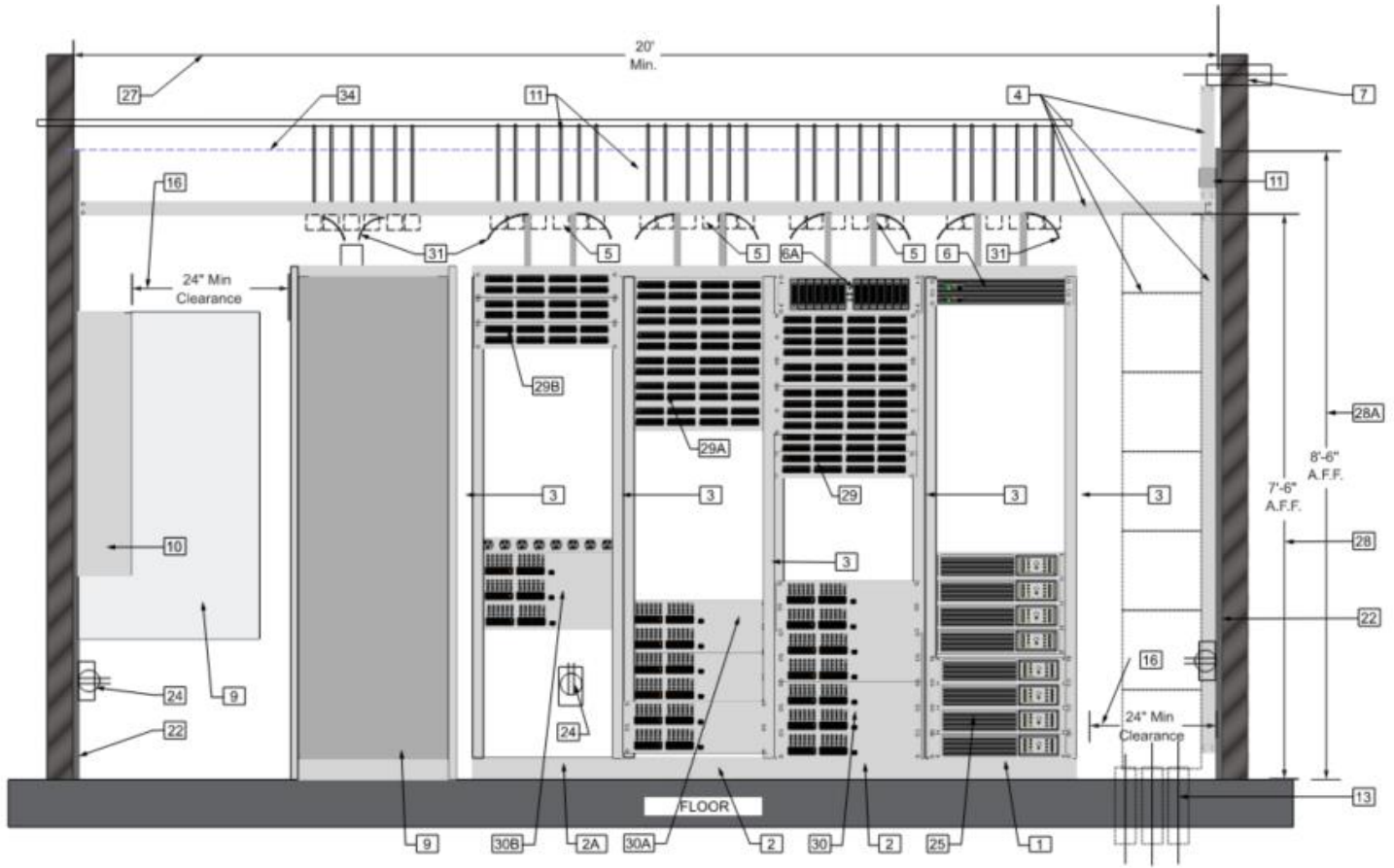


Figure 27 05 00-3b Typical MDF Front Elevation

5.1.9.1.4 Refer to Figure 27 05 00-3c for typical MDF/IDF side elevation.

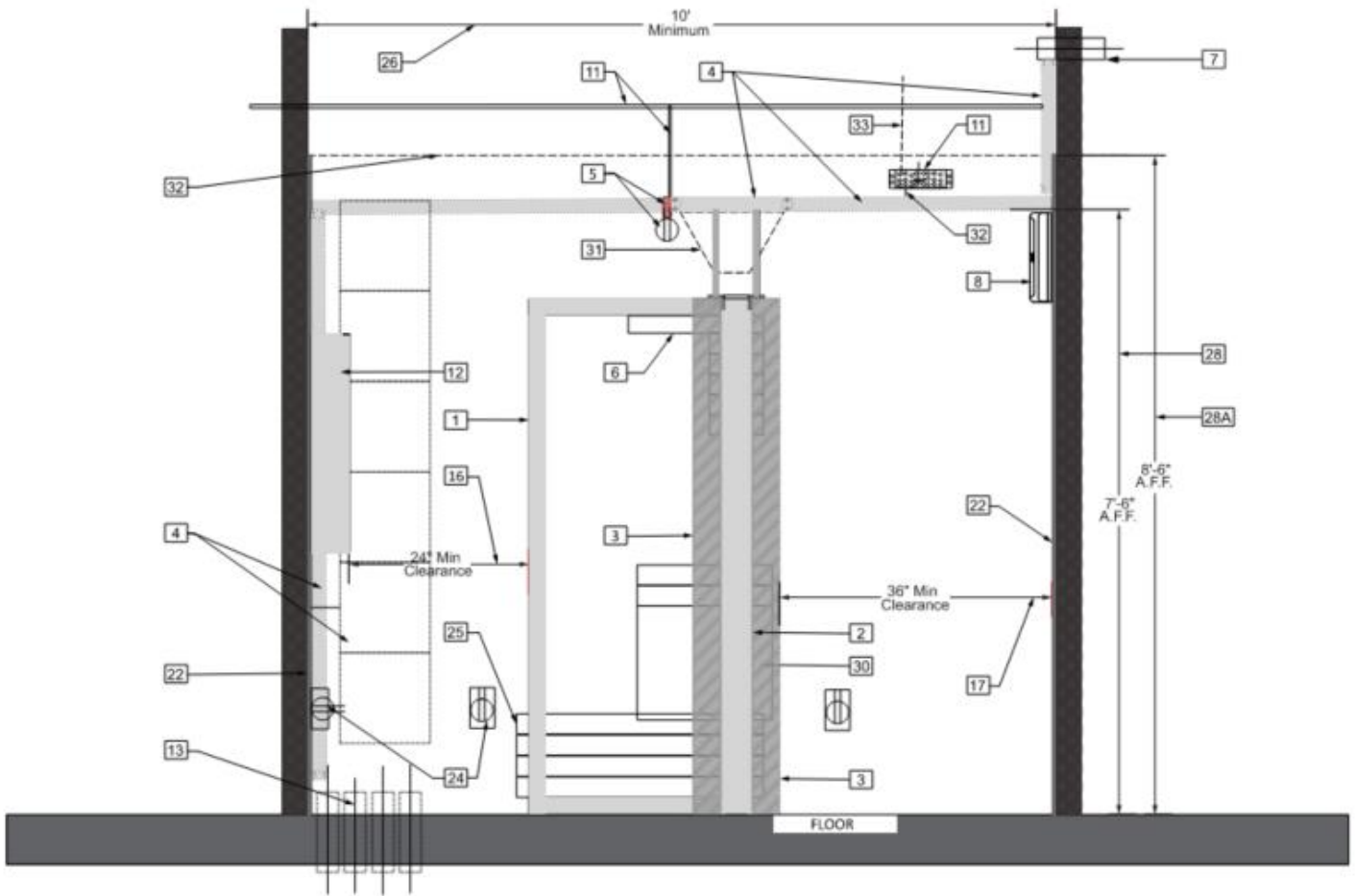


Figure 27 05 00-3c Typical MDF/IDF Side Elevation

5.1.9.1.5 Refer to Figure 27 05 00-4a for typical IDF plan layout.

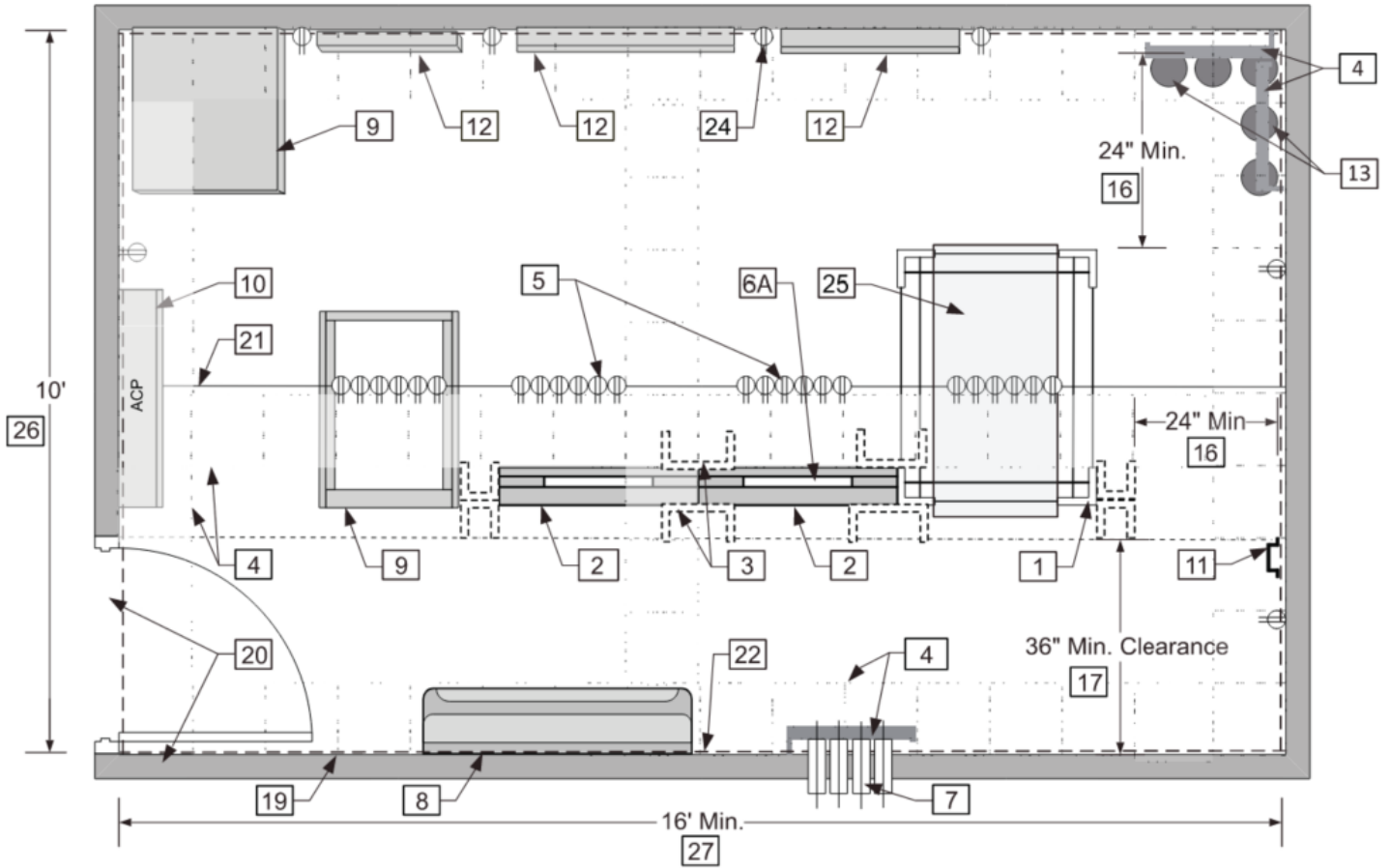


Figure 27 05 00-4a Typical IDF Plan Layout

5.1.9.1.6 Refer to Figure 27 05 00-4b for typical IDF front elevation.

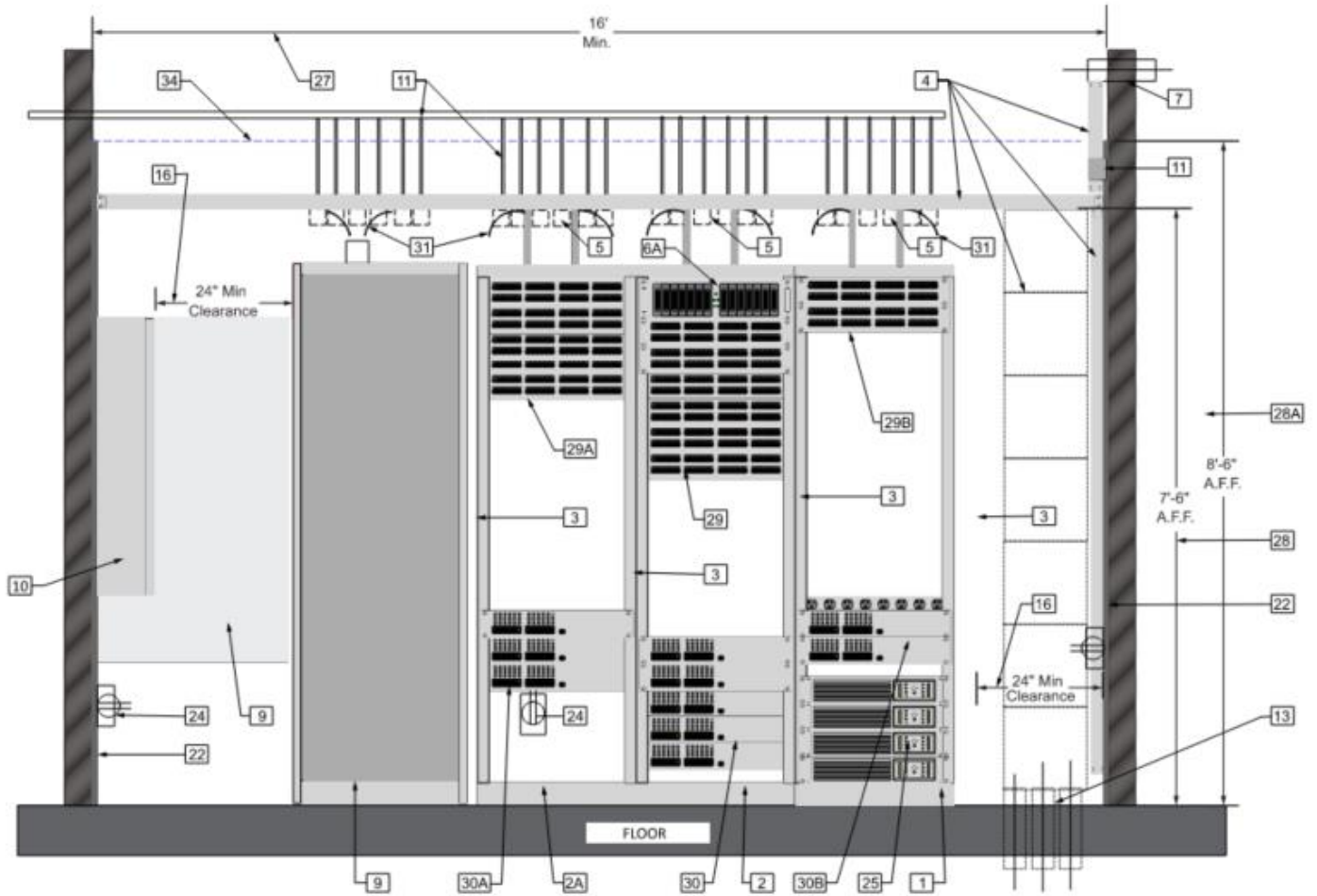


Figure 27 05 00-4b Typical IDF Front Elevation

- 5.1.9.2 Typical MDF rooms to include the following equipment:
- 5.1.9.2.1 Open frame racks with ladder rack cable tray installed from the rack to the wall for stability and cable support.
 - 5.1.9.2.2 Twenty-four (24) or forty-eight (48) port, Category 6 or newer angled patch panels for termination of the horizontal cable plant served from this room.
 - 5.1.9.2.3 Category 6 or newer patch cords provided by responsible vendor per Responsibility Matrix in Division 01. Patch cords, panel locations and associated cabling cannot be mixed between Dallas ISD-IT-Infrastructure, IT-CSS and PA/Sound.
 - 5.1.9.2.4 Fiber optic patch panels where fiber backbone from each Public Service provider, IDF and portable building are terminated.
 - 5.1.9.2.5 Fiber optic jumpers installed on patch panels are to be 5 meters in length, pending individual installation requirements.
 - 5.1.9.2.6 Dedicated security rack space for installation of surveillance servers and termination of camera cables.
 - 5.1.9.2.7 Space for a floor or wall-mounted Dallas ISD-IT-PA/Sound provided clock system rack for installation of the clock and programming systems, and the public address and intercom system.
 - 5.1.9.2.8 Provide fire rated plywood backboards (4 feet x 8 feet x 3/4 inch ACX) on all walls of MDF/IDF's for terminations and other auxiliary equipment. Plywood to be installed with the smooth good face exposed to the room. If painted, leave the fire rating identification type & class of plywood unpainted and legible.
 - 5.1.9.2.9 If plywood is not fire rated, paint on both sides and all edges with flame-retardant white or off-white paint. Smooth side exposed to the room. Use of non-fire treated plywood requires code compliance and is not recommended. Dallas ISD-IT-Infrastructure approval and construction oversight is required. General Contractor to provide cost adjustment if substitution is proposed after bidding.
 - 5.1.9.2.10 Security and Intrusion Detection System: Wall or rack mounted security system controller: Demarc Extensions. Telephone numbers for these systems to be coordinated with Dallas ISD-M&O to program the system. Testing of the system requires close coordination between M&O, IT-CSS contracted vendor(s), General Contractor, and Central Dispatch.
 - 5.1.9.2.11 Fire Alarm: Wall or rack mounted fire alarm system controller: Demarc Extensions. Telephone numbers for these systems to be coordinated with Dallas ISD M&O. M&O to program the system. Testing of the system to require close coordination between Dallas ISD-IT-Infrastructure, IT-Infrastructure contracted vendor(s), General Contractor, Central Dispatch, and local Emergency Services Providers.

- 5.1.9.2.12 Elevator cab emergency call-out: Call-out is to be wireless system. Testing of the system will require close coordination between IT – Infrastructure designated representative, wireless system installer, GC, and Dallas ISD Central Dispatch.
- 5.1.9.2.13 Rack mounted power strips.
- 5.1.9.2.14 Security for IT equipment in remodeled or existing schools, (e.g. sharing space with equipment storage closets or placing equipment in commons areas in the school): In these circumstances, network equipment is to be housed in lockable, free-standing equipment cabinets with enough room in them to allow for cable management to the sides of; rather than in front of or behind the equipment. This is to allow better cable management and improved air flow for the enclosed equipment.
- 5.1.9.2.15 New rack is to be mounted with a minimum of 24 inches clear from the side of the rack and 36 inches clear from the front. There are two different types and sizes of racks: four (4) post rack and two (2) post racks. Rear space to be 24 inches clear from the four (4) post rack. (See diagram)
- 5.1.9.2.16 Main grounding bus bar connected to the main building grounding system.
- 5.1.9.2.17 Rate Demarcation Point (RDP): RDP equipment for interface to the Public Switched Telephone Network or high speed data circuits. Typically, these services are arranged for and ordered by Dallas ISD IT Staff. They are cabled / installed from the property line to the facility Demarc by the various service providers. Dial tone (or data system connectivity) is provided / configured / tested by the various service providers. Contact Dallas ISD ITS early in the design phase to assure coordination of the work and schedule.
- 5.1.9.2.18 Cable runway system (ladder racks) to be installed above the racks in the MDF and IDFs to support and manage the backbone and horizontal cables entering the room to the racks and equipment within the room. Each rack is to be secured to the nearest wall. Use the proper termination and entrance equipment such as waterfalls, support, and bonding equipment.
- 5.1.9.2.19 Ladder racks to be a minimum of 12 inches wide.
- 5.1.9.2.20 General Contractor to install three (3) 4 inch cabling conduit runs from the MDF to a common handhole near the property line (provided by the General Contractor) at a point designated by the Architect in conjunction with the local Service Providers. Install the cabling conduit runs using a multi-channel innerduct system or standard 1-1/4 inch innerducts that also include a pull string in each channel. Acceptable Manufacturer: MaxCell or Dallas ISD approved equal.

5.1.9.2.21 Two (2) of the 4 inch cabling conduit runs from the MDF to the common handhole near the property line to be for use by Dallas ISD-IT contracted high speed internet vendor. All other services to use the third 4-inch conduit.

All service providers to provide their own conduits, pathways and or handhole from outside/within the property line needed to tie their service into the common handhole to be able to pull services to the MDF. Architect and General Contractor to be provided with services approach details and approve or reroute where conflict with other buried or surface services is determined.

5.1.9.2.22 Service provider(s) are to install cabling between property line and RDP Demarc and make arrangements to provide dial tone and/or data system connection services into the facility. Contact Dallas ISD-IT-Infrastructure early in the design phase to assure coordination of the work and schedule.

5.1.9.3 Typical IDF rooms to include the following equipment:

5.1.9.3.1 All proximal horizontal cabling, cross-connects, and network equipment to be housed either in the telecommunications room (TR) or IDF.

5.1.9.3.2 One (1) or more open frame rack(s) with horizontal and vertical cable management. When open floor mounted racks are used, install ladder rack cable tray from the rack to the wall for stability and cable support.

5.1.9.3.3 24 and/or 48 port, Category 6 or newer angled patch panels for termination of the horizontal cabling for that area.

5.1.9.3.4 Category 6 or newer patch cords for each service provided by the responsible vendor as defined by the Responsibility Matrix in Division 01.

5.1.9.3.5 Rack mounted fiber optic patch panel for termination of the fiber optic backbone.

5.1.9.3.6 Duplex fiber optic jumpers of a quantity to fully connect installed patch panels. 20% to be 3 feet (1 m) in length, 30% to be 6' feet (2 m) in length and 50% to be 9 feet (3 m) in length.

5.1.9.3.7 Back of ladder rack mounted power clusters.

5.2 Classrooms:

5.2.1 HVAC Cooling calculations for typical classroom to accommodate heat load for:

5.2.1.1 Five (5) computers for elementary schools and seven (7) for middle and high schools.

5.2.1.2 One (1) to two (2) printers.

5.2.1.3 One (1) interactive digital display or alternate display if required, (ex: LCD projector or interactive display).

5.2.1.3.1 HVAC: Refer to Division 23 for additional requirements.

- 5.2.1.3.2 New Construction / Additions: Library/Media, entry lobby, feature areas, conference rooms, specialty rooms, large teaching areas, et al: The interactive display requirements are to be evaluated and confirmed for each project and condition.
- 5.2.1.3.3 Renovations: Existing spaces are to be remodeled, are to be configured to have Teaching Wall Interactive Display with coordinated connectivity, (ex: HDMI connectivity). If existing conditions require, the alternate is to be reviewed with Dallas ISD-IT-Infrastructure for acceptance is the interactive short throw projectors standard projection-ready whiteboards and coordinated connectivity, (ex: HDMI connectivity).

5.2.2 Typical Cabling:

- 5.2.2.1 Three (3) Category 6 or newer data ports in each typical classroom (Figure 27 05 00-05 below). Locate data ports as follows:
 - 5.2.2.1.1 Two (2) Category 6A data port for WAP at the ceiling or wall.
 - 5.2.2.1.2 Teaching Wall:
 - 5.2.2.1.2.1 One (1) data port at 18 inches A.F.F.
 - 5.2.2.1.2.2 Two (2) HDMI connectors with one (1) on wall plate at 18 inches A.F.F. and the other at the wall plate under display mounting bracket.
 - 5.2.2.1.2.3 Three (3) HDMI cables with one (1) for the connected PC device plugged into wall at 18 inches A.F.F., one (1) inside the wall from connector to connector and one (1) from the wall plate under the display running into the interactive display mounted on the wall.
 - 5.2.2.1.2.4 Refer to Figure 27 05 00-06.
 - 5.2.2.1.3 Teacher's Desk (Station): One (1) dataport for computer and phone.
- 5.2.2.2 All Category 6 cables or newer, run to the nearest IDF and terminate on rack mounted modular patch panels.
- 5.2.2.3 Each dataport faceplate is to be paired with a quad electrical outlet (four (4) receptacles) to be located within 18 inches. Electrical receptacles to be installed as two (2) duplex-electrical outlets or one (1) quad-electrical outlet. One (1) duplex power behind the interactive display location.
- 5.2.2.4 Conference Rooms, Specialty Rooms, and Large Teaching Areas:
 - 5.2.2.4.1 Cabling is similar to classrooms.
 - 5.2.2.4.2 Requirements are to be evaluated and confirmed for each project and condition.
 - 5.2.2.4.3 Libraries: Number of drops to be adjusted based on size of room.

5.2.2.4.4 Conference Rooms: Confirm the user endpoint termination as it may be located under or in the conference room table or on the wall opposite the circulation side of the conference room table (away from the doorway).

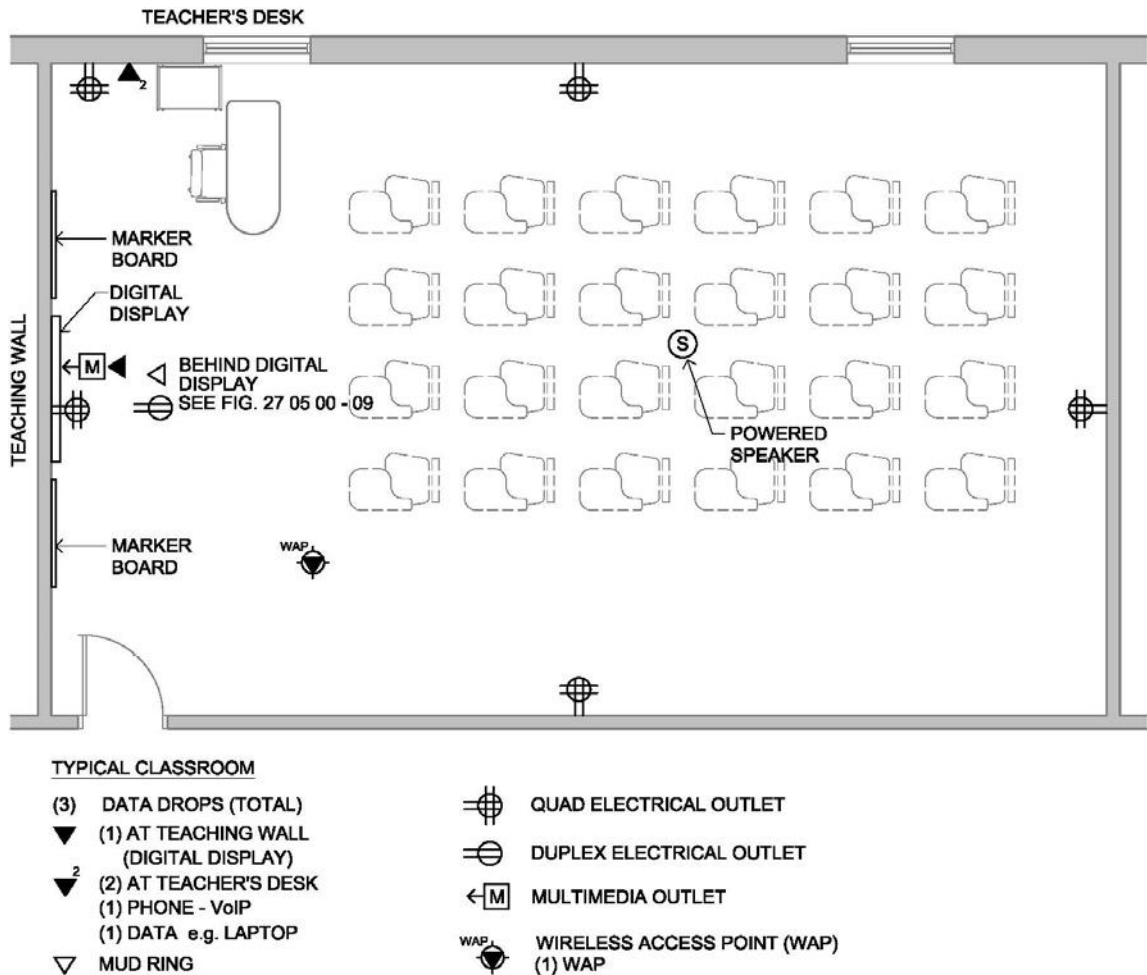


Figure 27 05 00-05 Typical Classroom Layout

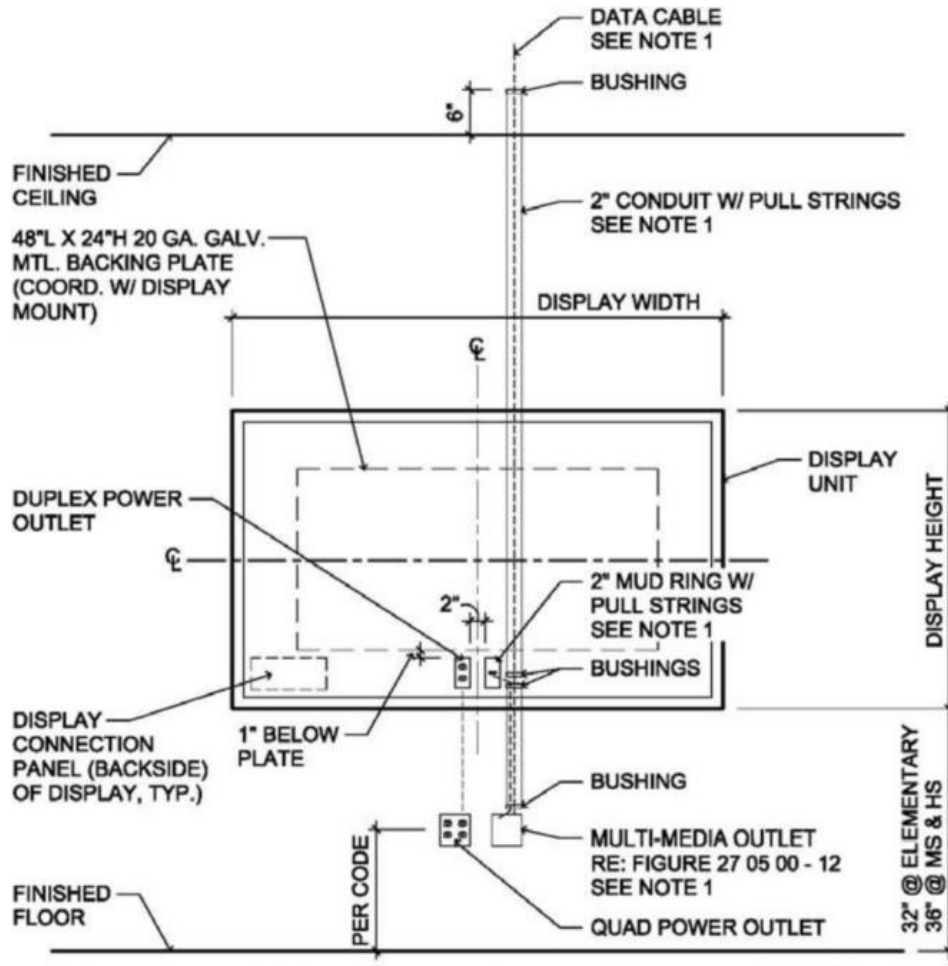
5.2.3 Interactive Displays:

5.2.3.1 Interactive Display system design standards are the default for new, existing and remodeled classrooms. Alternate systems or variance of 5% or more in the diagrams below to only be allowed if preapproval is obtained from the Dallas ISD-IT-Infrastructure.

5.2.3.2 Diagrams provide placement information for the interactive display (Figure 27 05 00-05). Multimedia Outlet Detail is shown in Figure 27 05 00-01.

5.2.3.3 General Contractor required to provide installation of all conduits, boxes, mud rings, bushings, pathways, pull strings, et al. Refer to the Responsibility Matrix in Division 01 for additional information.

- 5.2.3.4 Infrastructure Requirements (behind display):
 - 5.2.3.4.1 One (1) Duplex-electrical outlet, centered behind Interactive display.
 - 5.2.3.4.2 One (1) HDMI connector on wall plate and one (1) HDMI cable in the wall to wall plate below at 18 inches AFF. Coordinate with IT Infrastructure if Category 6 data cable is needed for the wall plate to be mounted on mud ring adjacent to electrical outlet.
 - 5.2.3.4.3 Blocking: 48 inches x 24 inches x 20 ga. galvanized sheet metal secured to metal stud assembly.
- 5.2.3.5 Infrastructure Requirements (below display):
 - 5.2.3.5.1 One (1) quad outlet, centered with Interactive display.
 - 5.2.3.5.2 One (1) Multi-media outlet: see diagram for types.
- 5.2.3.6 Wall Rough-In: Power, data, conduits, boxes, bushings, mud ring, pull strings, et al. Refer to Figure 27 05 00-06.



NOTE 1:
 CABLING AND
 TERMINATIONS
 BY DESIGNATED
 TECHNOLOGY
 INSTALLER

Figure 27 05 00-06 Teaching Wall Display

5.3 Typical Computer Lab:

5.3.1 Provide Category 6 or newer dataports as follow:

5.3.1.1 Student Computers: Thirty (30).

5.3.1.2 Teacher Station: One (1).

5.3.1.3 Teaching Wall: Two (2).

5.3.1.4 Printer Locations: Two (2).

5.3.2 All Category 6 or newer cables run to the nearest IDF and terminate on dedicated rack mounted modular patch panels, one (1) each lab. Each lab is to have its own dedicated patch panel leaving eight (8) ports for growth and in support of separate virtual LANs within the network switch configuration.

5.3.3 Dataports are to be paired, within 18 inches, with two (2) electrical outlets. Electrical outlets to be installed as duplex-electrical outlets or quad-electrical outlets.

5.3.4 Cooling calculations to accommodate heat load of:

5.3.4.1 Up to 33 computers.

5.3.4.2 Four (4) printers typically, but the drop count must be verified with IT – Graphics' designed representative and the drop locations coordinate with IT – Infrastructure's designated representative.

5.3.4.3 Interactive Display: Confirm requirements with IT – Infrastructure designated representative.

5.4 Testing Lab/Room:

5.4.1 Requirements similar to computer lab, but confirm requirements with Dallas ISD-IT.

5.5 Typical Administrative Workstation Cabling:

5.5.1 Typical administrative workstation requires two (2) Category 6 dataports and a quad electrical outlet. The data cables are to terminate on patch panels mounted in racks or cabinets located in the nearest IDF or MDF.

5.5.2 Offices require two (2) Category 6 dataports, the data ports located to allow the phone (VoIP) and computer (data) to be placed on the desk and/or the credenza with the cabling passing through the desk return. In the administrative reception area, a secretary and receptionist are to have their computer stations located on desks away from the reception counter.

5.5.3 Cooling system is to accommodate a computer, printer and TV per office space.

5.5.4 Wall and ceiling-mounted projector, conference room and auditorium locations (Includes HDMI cabling). Verify with the IT – AV designated representative.

5.6 JROTC:

5.6.1 Provide five (5) to ten (10) LAN drops at conference table. Coordinate with Dallas ISD designated representative.

- 5.6.2 Provide ten (10) LAN drops at JROTC supply storage room.
 - 5.6.3 Provide ten (10) LAN drops along side wall at range.
 - 5.6.4 JROTC WAP's to accommodate 40-50 devices per WAP.
 - 5.6.5 Coordinate requirements with Dallas ISD designated representative on project specific basis.
- 5.7 Library:
- 5.7.1 Provide data jack at circulation desk.
 - 5.7.2 Provide four (4) data drops at each power outlet.
 - 5.7.3 Coordinate exact locations with Dallas ISD Media Services.
- 5.8 Storm Shelter: Refer to Division 13.
6. Contract Document Requirements:
- 6.1 Technology Symbols: Use standardized symbols provided within this section.
 - 6.2 Technology Drawings Sheet Numbering: To follow the following format:
 - T-001 Notes, Symbols & Index of Drawings
 - T-101 Site Plan - Telecom
 - T-201 Overall Floor Plan - Level 01 - Telecom
 - T-202 Overall Floor Plan - Level 02 - Telecom
 - T-211 Floor Plan - Level 01 - Area 'A' - Telecom
 - T-212 Floor Plan - Level 01 - Area 'B' - Telecom
 - T-221 Floor Plan - Level 02 - Area 'A' - Telecom
 - T-222 Floor Plan - Level 02 - Area 'B' - Telecom
 - T-301 Telecom Riser Diagrams
 - T-401 Telecom Equipment Room Details
 - T-501 Telecom Details
 - 6.3 General:
 - 6.3.1 Architect to place the Responsibility Matrix on the T-series drawings.
 - 6.3.2 The Architect is to assign room numbers, with the assistance of Dallas ISD, to the Construction Drawings. These room numbers are to be used throughout the project in submittals, for the labeling of cabling, for assignment of telephone numbers, and on as-built schedules and drawings. Refer to Division 01 of the TDGs for room numbering requirements.
 - 6.3.3 Label all cabling based on the room number system for the facility.
 - 6.3.4 For existing locations where additional cabling and data drops are being added, all existing data ports are to be surveyed and included on design drawings with a unique symbol thereby providing complete documentation of the room.
 - 6.3.5 The Contract Documents are to require the Contractor developing the submittals for the technology infrastructure to have an employee on staff who is a BICSI certified RCDD to produce the Design Documents.

- 6.4 Site Plan to Show:
 - 6.4.1 Building's footprint, MDF, and areas for future expansion.
 - 6.4.2 Fiber Optic service route.
 - 6.4.3 Existing or new telephone service lines, high speed internet service, electrical services and the proposed underground routing of conduits and duct banks.

- 6.5 Floor plans and associated sheets to meet the following requirements and include the following information:
 - 6.5.1 MDF & IDF locations:
 - 6.5.1.1 Cable run lengths to not exceed 250 feet to any area of the building.
 - 6.5.1.2 Locations in the center portions of building.
 - 6.5.2 Cable Routing:
 - 6.5.2.1 Coordinated with structure and mechanical infrastructure.
 - 6.5.2.2 Cable tray locations.
 - 6.5.2.3 Penetrations to rooms from cable trays: Provide two (2) penetration points in large rooms with raceways.
 - 6.5.2.4 Raceway locations with drop locations & power.
 - 6.5.2.5 Provisions for future expansion to be determined with IT – Infrastructure designated representative.
 - 6.5.3 Enlarged Plans with Furniture Layouts:
 - 6.5.3.1 Typical classroom.
 - 6.5.3.2 Science labs.
 - 6.5.3.3 Computer labs.
 - 6.5.3.4 Offices.
 - 6.5.3.5 Libraries: Coordinate with bookshelves.
 - 6.5.3.6 Other specialty rooms.
 - 6.5.4 Enlarged Plans to Coordinate:
 - 6.5.4.1 HVAC.
 - 6.5.4.2 Electrical: Dimension electrical drops to critical equipment.
 - 6.5.4.3 Data Drops: Dimension data drops to critical equipment. Include spacing of outlets in computer lab or science lab and heights above floor for outlets.

- 6.5.4.4 Computers.
- 6.5.4.5 Printers and scanners.
- 6.5.4.6 TVs.
- 6.5.4.7 Interactive Displays and any Projectors.
- 6.5.4.8 Interactive White Boards (IWBs) – Marker boards.
- 6.5.4.9 Doors and windows including effect of sun light on view of equipment.
- 6.5.4.10 Address control measures of sun light in the plans.
- 6.5.5 Auditoriums, Libraries, and Multipurpose Rooms:
 - 6.5.5.1 Coordinate locations of ceiling mounted projectors and support of equipment.
 - 6.5.5.2 Refer separate section of TDG for more details on this equipment.

27 15 01 Premise IT Infrastructure

1. Architect to include the following requirements at a minimum in the Contract Documents:
 - 1.1 Included into this section are all materials, labor, and services to provide a complete and functioning infrastructure for the data and telephone. See Responsibility Matrix in Division 01 for additional information. This includes, but is not necessarily limited to:
 - 1.1.1 Raceway, boxes, and cable tray.
 - 1.1.2 Optical fiber cable pathway from demarc into building.
 - 1.1.3 Telecommunications outlets.
 - 1.1.4 Multimedia Systems in:
 - 1.1.4.1 Classrooms.
 - 1.1.4.2 Conference Rooms, Libraries, Multimedia Rooms.
 - 1.1.4.3 Large Teaching/Assembly Spaces such as Auditoria, Cafeteria and Gymnasias.
 - 1.1.5 Terminal blocks/cross-connect systems.
 - 1.1.6 Equipment racks and cabinets.
 - 1.1.7 Documentation and submissions.
 - 1.2 Shop Drawings: Submit the following:
 - 1.2.1 Room construction diagrams including floor plans, sections and rack elevations of all rooms showing all components (e.g. fiber termination bulkheads, vertical and horizontal cable managers, overhead ladder racking, entry conduits and sleeves, power outlets, fire and security panels, backboards, door position and swing, etc.) for review and approval by Dallas ISD IT Staff prior to procuring and installing any room-mounted equipment. Submittals to be provided in electronic drawing format. (PDFs, AutoCAD, Visio, etc. to be approved by Owner).

- 1.2.2 Backbone (riser) diagrams including location identity in electronic drawing format. (PDFs, AutoCAD, Visio, etc. to be approved by Owner).
- 1.2.3 System block diagram, indicating interconnection between system components and subsystems in drawing format with floor separation in electronic drawing format. (PDFs, AutoCAD, Visio, etc. to be approved by Owner).
- 1.2.4 Fabrication drawings for custom-built equipment in drawing format.
- 1.3 Product Data: Provide via hardcopy and scanned or OEM PDFs catalog cut sheets highlighting or circle the actual part number and information for all metallic and nonmetallic raceways, including surface raceways, outlet boxes, and fittings.
- 1.4 Record Drawings:
 - 1.4.1 All electronic drawings are to be submitted in either MS Visio or AutoCAD provided on a flash drive.
 - 1.4.2 All T series (Technology) drawing sheets/files are to be formatted for legible printing on 11 inches x 17 inches paper or smaller including technology installation notes.
 - 1.4.3 AutoCAD files are to be complete and fully functional at all layers with complete binding and editable functionality.
 - 1.4.4 Final drawings and submittal package documents are to become the property and responsibility of Dallas ISD at project closure.
 - 1.4.5 Each sheet of the submittal package is to be stamped or labeled with "As Built" and the associated date.
 - 1.4.6 Each sheet is to include a directional indicator to North.
 - 1.4.7 Each sheet is to include a drawing scale. Filenames are to use the following format:
 - 1.4.7.1 Example of file naming standard:

Site Drawing #	Description	Revision#	Date
245 T01	MDF Rack1	R02	123011
 - 1.4.7.2 Example of filename: 245-T01-MDF-Rack1-R02-123011.dwg
 - 1.4.8 An index of all drawings and files is to be included in the submittal package.
 - 1.4.8.1 Index is to be submitted in MS Excel format with the following fields a minimum:
 - 1.4.8.2 Site identification.
 - 1.4.8.3 Campus name.
 - 1.4.8.4 Descriptive Sheet Title.
 - 1.4.8.5 Floor (when applicable).
 - 1.4.8.6 Area location (when applicable).

- 1.4.8.7 Room numbers.
 - 1.4.8.8 Sheet number.
 - 1.4.8.9 Revision.
 - 1.4.8.10 File name.
 - 1.4.8.11 Submittal and approval date record.
- 1.4.9 Record Drawing Set is to include Plan Drawings indicating locations and identification of work area outlets, nodes, all telecommunications rooms (MDFs and IDF), and backbone (riser) cable runs. For existing locations where additional cabling and data ports are being added, all existing dataports are to be included with a unique symbol thereby providing complete documentation of the network infrastructure.
- 1.4.9.1 Site drawing with any underground cabling showing actual route, depth and end points. Include GPS coordinates and dimensions.
 - 1.4.9.2 Warranty documents (Warranty registration form are not to be accepted as the required Warranty Certificate).
 - 1.4.9.3 Copper certification test result printouts and electronic files.
 - 1.4.9.4 Optical fiber test result printout and electronic files.
 - 1.4.9.5 Grounding test result printout and electronic files.
 - 1.4.9.6 Original WAP Site Survey documentation.
 - 1.4.9.7 Final as built WAP design with campus coverage mapping.
 - 1.4.9.8 Digital Pictures of each MDF and IDF after completion of the project. Pictures are to be labeled with campus, location and date. Label is to be a part of the picture within the image. The filename of these files is to use the following format:
 - 1.4.9.8.1 Example of file naming standard:

Site	Location	Description	Date
245	MDF Rack1	Patch Panel A	123009

Example of filename: 245-MDF-Rack1-PatchPanelA-123009.gif
 - 1.4.9.9 Directory of all Technology Contractor companies that participated on the project with project managers' names, email addresses and phone numbers.
 - 1.4.9.10 Equipment Deliverables Lists verified and signed by Dallas ISD staff member.
 - 1.4.9.11 Include in the technology submittal package for information only all related and supporting electrical power drawings from the campus design set.

- 1.4.10 Submit hardcopy project records and drawings bound in a three (3) ring binder with a cover and spine label indicating the name of the school and year. Install printed dividers into this binder. This binder is to be submitted at conclusion of the project. The as-built information in the submittal package is to include:
- 1.4.11 Submitted electronic files are to be provided. Three (3) copies are to be provided with the submittal. All submittals are to be labeled with the following:
 - 1.4.11.1 Site identification (TEA #).
 - 1.4.11.2 Bid package #.
 - 1.4.11.3 Campus name.
 - 1.4.11.4 Title.
 - 1.4.11.5 Firm name and contact information.
 - 1.4.11.6 Version.
 - 1.4.11.7 Disk number x of y.
 - 1.4.11.8 Date.

2. Warranty:

- 2.1 A 25 year system warranty is to apply to all premises wiring projects within Dallas ISD. The warranty registration documents are to be submitted within 10 working days of project acceptance. All warranty certificates are to be submitted directly from manufacturer to Dallas ISD. Warranty registration form is not to be accepted as the required warranty certificate. Final payment is not to be made until system warranty is approved by manufacturer.
- 2.2 Transfer any other manufacturer's warranties to the Owner in addition to the General System Guarantee and the above mentioned system warranty. Submit these warranties on each item in list form with shop drawings. Detail specific parts within equipment that are subject to separate conditional warranty. Warranty proprietary equipment and systems involved in this contract during the guarantee period.
- 2.3 Effect replacement or substitutions of warranted equipment are to occur within 24 hours of first notification. Complete warranty repairs to equipment are to be performed within 72 hours. If repairs cannot be completed during this time period, or if ordering of parts is required, forward to the owner every 72 hours, documentation of progress of repairs. This repair capability is mandatory. Include costs anticipated to comply with this requirement in the bid.

3. Products:

- 3.1 Products included in this section are meant to establish a level of quality, performance and consistency within Dallas ISD. To establish this consistent level of quality and performance, Dallas ISD has selected certain products by manufacturer and part number. To change would defeat the effort of consistency and would cost Dallas ISD. Dallas ISD stocks a level of replacement parts and to change would increase the cost of stocking additional parts. Where specific parts are mentioned Contractor is to supply that part. If the words "or equal" are mentioned then Contractor is to submit a product specification that substantiates that the product is of equal performance. If the words "or approved equal" are stated, Contractor is not to substitute without prior approval. If there are no manufacturers or part numbers mentioned, then that part is generic in nature and a Contractor-submitted product is to be approved as part of the product-selection process.
- 3.2 Cabling and optic fiber product requirements to be communicated to the Dallas ISD-IT-Infrastructure contracted vendor directly by Dallas ISD-IT-Infrastructure and are included in the TDG for reference only.

- 3.3 Manufacturers:
 - 3.3.1 Provide products of manufacturers named in this document. No exceptions without written approval from Dallas ISD ITS Department. Any requested substitutions are to be documented at time of project bid/proposal. Requests made after that time are subject to negotiation of cost to Dallas ISD.
 - 3.3.2 Substitution products that are procured and/or installed without prior written approval from Dallas ISD ITS Department to be rejected out-of-hand. Removal and disposal of rejected items is to be at the expense of the Contractor.
 - 3.3.3 Where no manufacturer is specified, provide products of manufacturers in compliance with specified requirements.
- 3.4 Fabrication: Fabricate custom-made equipment with careful consideration given to aesthetic, technical, and functional aspects of equipment and its installation.
- 3.5 Suitability: Provide products that are suitable for the intended use, including, but not limited to considerations regarding environmental, regulatory, and electrical suitability.
 - 3.5.1 Data: Multimode 50/125 μm diameter premise distribution loose tube plenum-rated armored OM4 optical fiber, with mechanical and transmission performance specifications that meet or exceed ANSI/TIA-568-C.3 Standards. All fiber optic cables installed within buildings are to be plenum rated cables with plenum armored jacket.

For installations exceeding 300 meters, other cable options such as using OM4 Multimode or OS1 Singlemode cable to be considered. Consult with Dallas ISD IT – Infrastructure designed representative before ordering, procuring or installing cables.

- 3.5.1.1 Acceptable Manufacturer: Superior Essex ArmorTek Series GIGAlite-10, GIGAlite 10XB or Dallas ISD approved equal.

- 3.6 Indoor voice/data backbone cable:
 - 3.6.1 Voice: Solid copper, 24 AWG, 100 Ω balanced twisted-pair (UTP), Category 3 backbone cable, in sizes as indicated on the drawings, with mechanical and transmission performance specifications that meet or exceed ANSI/TIA-568-C.2. Note: Listed Type CMP, and/or MPP (as required in latest NEC code) for inside cable.
 - 3.6.1.1 Acceptable Manufacturer: Superior Essex or Dallas ISD approved equal.
 - 3.6.2 Data: Multimode 50/125 μm diameter premise distribution loose tube plenum-rated armored OM4 optical fiber, with mechanical and transmission performance specifications that meet or exceed ANSI/TIA-568-C.3 Standards. All fiber optic cables installed within buildings are to be plenum rated cables with plenum armored jacket. For installations exceeding 300 meters, other cable options such as using OM4 Multimode or OS1 Singlemode cable to be considered. Consult with Dallas ISD IT – Infrastructure before ordering, procuring or installing cables.
 - 3.6.2.1 Acceptable Manufacturer: Superior Essex ArmorTek Series GIGAlite-10 or Dallas ISD approved equal.

3.7 Outdoor voice/data backbone fiber optic cable:

- 3.7.1 Data: Multimode 50/125 µm diameter indoor/outdoor loose tube plenum-rated OM4 optical fiber, with mechanical and transmission performance specifications that meet or exceed ANSI/TIA-568-C.3 Standards. All fiber optic cables installed within buildings are to be plenum rated cables with plenum armored jacket. Use armored indoor/outdoor plenum-rated cabling for installation within an underground duct.

For installations exceeding 300 meters, other cable options such as using OM4 Multimode or OS1 Singlemode cable to be considered. Consult with Dallas ISD IT – Infrastructure designed representative before ordering, procuring or installing cables.

- 3.7.1.1 Acceptable Manufacturer: Superior Essex ArmorTek Series GIGAlite-10, GIGAlite-10XB or Dallas ISD approved equal.

- 3.7.2 Multimode 50/125 µm diameter outdoor OM4 optical fiber, with number of usable fibers as shown on drawings, which meet or exceed the mechanical and transmission performance specifications listed in ANSI/TIA-568-C.3 and ANSI/TIA-758(A) Standards.

In some cases, non-armored fiber optic cabling to be used. Check with Dallas ISD IT – Infrastructure designated representative for specific information.

For installations exceeding 300 meters, other cable options such as using OM4 Multimode or OS1 Singlemode cable to be considered. Consult with Dallas ISD IT – Infrastructure designated representative before ordering, procuring or installing cables.

- 3.7.2.1 Acceptable Manufacturer: Superior Essex Adventum Series GIGAlite-10, GIGAlite-10XB or Dallas ISD approved equal.

3.8 Teaching Wall Multi Media Workstation:

- 3.8.1 Typical teaching wall multimedia outlet locations is to consist of a multimedia outlet box, located beneath the lower corner of the teaching wall opposite entry to classroom. When a ceiling mounted projector is used (non-classroom areas only), there is no need for a box on the ceiling and conduits are not desired between the projector location and the required multimedia outlet box. Each cable type used in multimedia installations is to be plenum-rated.

- 3.8.2 Multimedia Outlet: Single HDMI 1.3 Modular Connector.

- 3.8.2.1 Acceptable Manufacturer: Ortronics or Dallas ISD approved equal.

- 3.8.3 Cable bundle (non-GC scope) at ceiling location near ceiling mounted projector (non-classroom areas only) – one (1) Duplex-Electrical Outlet and one (1) HDMI 1.3 Modular Connector.

- 3.8.3.1 Acceptable Manufacturer: Legrand|Ortronics or Dallas ISD approved equal.

3.9 Voice/Data Outlets:

- 3.9.1 Single-gang mounting plate containing the following devices: Dataports – two (2) or four (4) dataport outlets 8-pin modular, Category 5e/6, un-keyed jacks, pinned to the T568B standards. Install blank inserts for any unused opening. Run discrete Category 5e/6 cables from the outlets to the nearest IDF.

- 3.9.1.1 Acceptable Manufacturer: Ortronics Series II or Dallas ISD approved equal.

3.10 Termination Blocks:

- 3.10.1 Provide termination punch blocks for termination of voice station cables and for backbone termination only. Supply 110 style punch block frames (100 Pair, 300 Pair, or 900 pair).
 - 3.10.1.1 Acceptable Manufacturer: Ortronics 110 Cross Connect System or Dallas ISD approved equal.
- 3.10.2 Provide horizontal and vertical wiring troughs between MDF frame sections.
 - 3.10.2.1 Acceptable Manufacturer: Ortronics 110 Cross Connect System or Dallas ISD approved equal.

3.11 Voice and Data Patch Panels:

- 3.11.1 Use 19 inches rack mountable, Angled-face 24-or 48port patch panels with 8-pin modular inserts with insulation displacement connectors (IDC) meeting Category 5e/6 performance standards, and pinned to the TIA568B pin arrangement standard. Use only 48-port panels in new racks. Only use 24-port panels to balance with 48 port switches in existing MDF/IDFs.
 - 3.11.1.1 Acceptable Manufacturer: Ortronics or Dallas ISD approved equal.

3.12 Copper Patch Cords:

- 3.12.1 Dallas ISD-IT-Infrastructure contracted vendor to provide and install copper patch cords (including UTP patch cords connected at patch panels and workstations) and to test and certify end-to-end channel integrity. Refer to Responsibility Matrix in Division 01.
- 3.12.2 Patch cords to be manufactured by the device manufacturer to ensure warranty coverage. Match the patch cords to the Category rating of the cabling being installed. Provide cables of an adequate length with no more slack than is necessary to provide a neat and orderly installation.
 - 3.12.2.1 Workstation End: Provide 40% at 7 feet lengths and 60% at 15 feet lengths.
 - 3.12.2.2 Cross-Connect End: Provide varied lengths from 3 feet to 9 feet.
 - 3.12.2.3 Portable Buildings (small cabinets) and Computer Labs: Provide 12 inch to 24 inch lengths.
- 3.12.3 Acceptable Manufacturer: Legrand|Ortronics. Clarity cables or Dallas ISD approved equal.

PATCH CORD COLOR SCHEME CHART		
Patch Panel to Network Switch	Color	Category Rating
Computers or other	Yellow	6
Computers or other	White	5e
Security Cameras	Pink	5e / 6
Wireless AP's – Non-Erate	Blue	5e / 6
Wireless AP's - Erate	Green	5e / 6

- 3.13 Wall Mounted Optical Fiber Patch Panels: Use wall-mounted optical fiber termination panels with 24-strand capacity, hinged door, cable strain relief, slack storage, and LC duplex adapter panels with and provisions for two (2) splice trays. Include adequate amount of duplex LC adapter panels for termination of all installed fiber strands plus 10% for growth.
 - 3.13.1 Acceptable Manufacturer: Ortronics or Dallas ISD approved equal.
- 3.14 Rack Mounted Optical Fiber Termination Panel:
 - 3.14.1 At the MDF use one (1) or more 72-port rack-mounted optical fiber termination panels with cable strain relief, grounding lugs, slack storage and the appropriate number of LC duplex connector panels. Multiple distribution boxes needed, depending on the number of fiber backbones needed to serve the site. Populate with the appropriate number of adapter panels for Duplex LC, multimode or single. Use only duplex LC adapter panels in new installations. (Installations in existing facilities to require SC adapter panels.)
 - 3.14.1.1 Acceptable Manufacturer: Ortronics or Dallas ISD approved equal.
 - 3.14.2 At the IDF use a 19 inches space rack mountable cabinet with the appropriate number of fiber termination panels, cable strain relief, grounding lugs, slack storage and duplex LC adapter panels. Populate with the appropriate adapter panels for Duplex LC multimode or single-mode backbone cabling. Use only duplex LC adapter panels for new backbones.
 - 3.14.2.1 Acceptable Manufacturer: Ortronics or Dallas ISD approved equal.
 - 3.14.3 Install the appropriate number and type of adapter panels at each patch panel. Use only duplex LC adapter panels.
 - 3.14.3.1 Acceptable Manufacturer: Ortronics or Dallas ISD approved equal.
- 3.15 Fiber Optic Termination Case: If needed, use termination case sized for single-mode and multimode fibers, nonmetallic with clear plastic cover, 12-fiber capacity and compatible with termination case and termination methods. Install in the appropriate termination case. Use only above ground and within a weather-tight enclosure.
 - 3.15.1 Acceptable Manufacturer: Coyote Preformed or Dallas ISD approved equal.
 - 3.15.2 Coyote Series Wall- or Structure-Mount LCC, PUP, RUNT or Single Terminal Closure with shelves as required (depending on strand counts, branches and conditions).
- 3.16 Optical Fiber Connectors: Use field installable LC connectors, which meet or exceed the performance specifications in ANSI/TIA-568-C.3
 - 3.16.1 Acceptable Manufacturer: Ortronics or Dallas ISD approved equal.
- 3.17 Optical Fiber Jumpers: In some scenarios, optical fiber jumpers are to be provided and installed by Equipment Racking (Rack & Stack) Contractor and not the Cabling Contractor. In most situations (especially in new construction), the Cabling Contractor, working under the GC is to be responsible for procuring and installing optical fiber jumpers. Contractor is also responsible for testing and certifying end-to-end channel integrity – including FOC patch cords connected at patch panels in the various IT rooms.
 - 3.17.1 Duplex 50/125- μ m OM3/4 (and/or single-mode) optical fiber jumper cable, 1 - 3 m long with 3.0 mm duplex LC optical fiber connectors on each end. Type A-A and A-B, as required.
 - 3.17.1.1 Acceptable Manufacturer: Ortronics or Dallas ISD approved equal.

3.17.2 Duplex 50/125- μ m OM3/4 (and/or single-mode) optical fiber jumper cable, 1 - 3 m long with SC optical fiber connectors on one end and GBIC-compatible connector on the other end. (For GBIC with LC connectors).

3.17.2.1 These jumper types to be required for installation with already-existing cable plants.

3.17.2.2 Acceptable Manufacturer: Ortronics or Dallas ISD approved equal.

3.18 Open Frame Equipment Rack:

3.18.1 Use open frame, 19 inches space equipment rack, 7 feet overall height with flange base, mounting rails drilled front and back and tapped to EIA-310-D Standards.

Provide dual channel front and back vertical wire management between each racks and at both ends of the racks array. The outer vertical wire managers not be less than 6" wide and 6" deep and the mid areas vertical wire managers to be not less than 10" wide and 6" deep front and back. Rear vertical wire managers can be flip retainers. Front wire managers must have single door.

3.18.1.1.1 Acceptable Manufacturers:

3.18.1.1.1.1 CPI.

3.18.1.1.1.2 Damac.

3.18.1.1.1.3 Hoffman.

3.18.1.1.1.4 Middle Atlantic Legrand|Ortronics.

3.18.1.2 Color: Black for new construction or match existing.

3.18.2 For all 4-post racks, where UPS equipment is to be supported, General Contractor to use the 4-post open frame equipment racks. UPS to be installed Eaton 9RK 4-post rack kit with slide rails to provide additional support and stability.

General Contractor shall not mix different approved manufacturers' 2-post and 4-post frame racks. These are to be 19 inches wide, 7 feet overall height with flange base and mounting rails drilled front and back and tapped to EIA-310-D standards.

3.18.2.1 Acceptable Manufacturer: Hoffman or Dallas ISD approved equal.

3.18.3 In newly constructed Data Centers or WAN Hub/Network Switching Facilities, where significant numbers of networking, routing and switching chassis are used that have side-discharge cooling fans and where temperature control is an issue; consideration to be given to using an open racking, air-vectoring system with appropriate vertical cable-management designed for this purpose. System is to be deployed only as needed and in consultation with IT – Infrastructure designated representative.

3.18.3.1 Acceptable Manufacturer: Legrand|Ortronics or Dallas ISD approved equal.

- 3.19 Wall Mounted Cabinets:
 - 3.19.1 Provide wall mounted cabinets in every portable building or otherwise specified locations approved by Dallas ISD ITS Department. When wall mounted cabinets are installed in an area where students are present, they are to be installed high enough to be out of reach of students, and of the totally enclosed and lockable type. Cabinets are to be sized for the application.
 - 3.19.2 Wall mount cabinets are to have smoked plexiglas front door with 18AWG steel frame with 24 inches cabinet depth. Two (2) adjustable mounting rails with #12-24 tapped holes adjust every 1inch front to rear. Front rail factory mounted 3.5 inches from frame face.
 - 3.19.3 Acceptable Manufacturer: Ortronics or Dallas ISD approved equal.
- 3.20 Power strips: Provide power strips in every full size cabinet. Power strips are to have two (2) convenience outlets on the front and eight (8) on the back. There is to be an integral circuit interrupter, surge suppression, and a shielded on/off switch. The switch is to be manufactured with a guard so as to prevent accidental powering off. Provide a 15 feet connecting cord.
 - 3.20.1 Acceptable Manufacturers: Hoffman or Dallas ISD approved equal.
- 3.21 Wire management: When not included with the rack, provide vertical wire management in every open rack and cabinet for management of patch cables and horizontal cabling. Units are to be provided in a quantity of two (2) per cabinet.
 - 3.21.1 Acceptable Manufacturer: Hoffman, Legrand|Ortronics, or Dallas ISD approved equal.
 - 3.21.2 When using angle-faced patching panels for the Cat6 UTP cable system, cable managers are required only for support of FOC patching cables in the fiber field portion of the rack. Support of UTP patching cables is not required in that these are relatively stiff and can be run from their respective modular outlets on patch panels directly to the vertical wire managers along the sides of the rack where slack loops are draped/stored and the other ends of the cables are run directly to switch ports located in the same rack.
 - 3.21.3 Under this scenario, extra wide, full-depth vertical cable managers with combing fingers on both sides are to be used to route, comb and store patch cables. Vertical managers between racks are to be wider than those mounted on the ends of the rack rows so as to manage patching cables from both sides.
 - 3.21.3.1 Acceptable Manufacturers: Legrand|Ortronics or Dallas ISD approved equal.
- 3.22 Infrastructure Support System:

All cable is to be properly supported. The infrastructure support system is to be comprised of three (3) types of support.

 - 3.22.1 Cable Runway Systems (Ladder Racking) to be used within the MDF and IDF.
 - 3.22.1.1 Acceptable Manufacturers:
 - 3.22.1.1.1 CPI.
 - 3.22.1.1.2 DMAC.
 - 3.22.1.1.3 Hoffman.
 - 3.22.1.1.4 Legrand|Ortronics.

3.22.1.2 Supply the appropriate accessories, support brackets, and connecting kits for the specific application. Use appropriate bonding parts or couplers that are listed for the purpose.

3.22.2 Cable basket tray systems to be used for the main cable paths in the hallways. Only to be used in new spaces.

3.22.2.1 Acceptable Manufacturer: Cablofil or Dallas ISD approved equal.

3.22.2.2 Design the cable tray system to the specific school/location and size so as not to exceed a 50% fill ratio. Use all manufacturer-recommended parts for assembly and for electrical bonding. Use center hung j-hook hanger brackets, trapeze hangers, and/or wall mounted brackets. Support every 5 feet along the length of the tray. Use appropriate firestopping transitions through fire rated walls.

3.22.3 Cable Hangers:

3.22.3.1 Application:

3.22.3.1.1 New Construction: When the cables leave the cable tray.

3.22.3.1.2 Renovations: Where cable tray does not exist.

3.22.3.2 Type: J-hook hangers or bridle strap assemblies with rounded edges that are sized and approved for data cable installation. Bridle rings are not allowed.

3.22.3.3 Installation:

3.22.3.3.1 Hangers to be spaced no more than 60 inches apart.

3.22.3.3.2 Cabling installed between hangers to have no more than a 9 inch drape at the midpoint.

3.22.3.3.3 Do not exceed the recommended fill.

3.22.3.4 Acceptable Manufacturers:

3.22.3.4.1 Hilti.

3.22.3.4.2 Erico.

3.22.3.4.3 Caddy.

3.22.3.4.4 B-Line.

3.23 Raceways/Conduits:

Install the raceways in accordance with the National Electrical Code and the ANSI/TIA 569 Standards. Pay particular attention to fill, bend radius, and number of 90 degree elbows between access points and junction boxes.

3.23.1 Use the following where applicable:

3.23.1.1 Underground: Schedule 40/80 PVC.

3.23.1.2 Exterior Above Grade: IMC steel conduit.

3.23.1.3 Interior: EMT.

3.23.1.4 Classrooms: Dual channel metal raceway.

3.23.2 In Computer labs, when required, use Wiremold pre-wired, two channel model and all appropriate fittings.

3.23.3 Acceptable Manufacturer: Legrand|Ortronics or Dallas ISD approved equal.

3.24 Firestopping:

3.24.1 Approved firestopping systems are to be installed in all locations where cabling system penetrate rated walls. These firestopping systems should be permanently installed, but are to be able to be easily reentered in the event new or additional cables need to be added at a future date. All systems are to be approved in advance by the Project Engineer.

3.24.2 Acceptable manufacturers:

3.24.2.1 Hilti CP 653 2 inches/4 inches Speed Sleeve, CP 658T 2 inches/4 inches Firestop Plug, 675T Firestop Board, CP 620 Fire Foam, CP 618 Firestop Putty Stick.

3.24.2.2 Wiremold Flamestopper Thru-Wall/Floor Fitting Systems for New & Retrofit Applications.

3.24.2.3 STI EZ-Path System.

3.25 Surface Raceways:

3.25.1 Wall surface-applied enclosed metal raceways (ex.: Legrand|Ortronics or Dallas ISD approved equal) are to be considered for electrical and low-voltage cabling but its application is to be limited due to cost. These systems are only to be provided within existing building installations, where wall penetration is not possible. Electrical/cable raceways cast into the concrete floor system and raised flooring systems are not to be used due to the cost. All raceways are to be installed so as to be as discrete as possible with little or no disturbance to classroom functionality or aesthetics.

3.25.2 Classrooms:

Legrand|Ortronics V2400D raceway or Dallas ISD approved equal is to be installed in classrooms where access to wall cavity is not possible to each outlet location. The V2400D dual channel raceway is to accommodate the installation of quad isolated ground electrical outlets utilizing the V2444D-2A "over the raceway" 2-gang device box, and a V2444D "over the raceway" 2 gang device box for the installation of two (2) Category 5e/6 outlets with an Ortronics Series II Faceplate and Category 5e/6 inserts. Installer is responsible for all fittings to install required number of outlets in each classroom when installing this raceway.

3.25.2.1 Acceptable Manufacturer: Legrand|Ortronics or Dallas ISD approved equal.

3.25.3 Computer Labs:

When required, computer lab raceway is to be Wiremold Series AL4300 pre-wired metal dual channel raceway with the LPB3S2 bezels supporting the proper attachment of jacks. Raceway is to accommodate twenty (20) technology work area outlets and ten (10) quad isolated ground electrical outlets. Raceway system is to be installed so that an outlet can be accessed from any wall in the computer lab. Installer is responsible for all fittings to install required number of outlets in each classroom when installing this raceway.

3.25.3.1 Acceptable Manufacturer: Legrand|Ortronics or Dallas ISD approved equal.

3.26 Listed Building Entrance Protectors:

3.26.1 Protect all copper cables run between buildings with approved over-current protection. Use the protector module with IDC type input and output terminals, 100-pair capacity and female mounting base, equipped with 230 volt gas protector modules. Provide sufficient protector modules to completely populate all building entrance terminals.

(Note: Both ends of cables to be equipped with entrance protection systems)

3.26.1.1 Acceptable Manufacturer: Circa or Dallas ISD approved equal.

3.27 Splice Housing:

3.27.1 Encapsulated or re-enterable splice housing, sized as required with bonding straps, accessories, end caps and encapsulate as required.

3.27.2 Splice modules (such as 710 series or MS2) for use within splice housing.

3.27.3 The splice closures for the portable buildings are to be of the cabinet type that can house enough splice bays for the particular installation. Splice tray are to accommodate at least twelve (12) mechanical or fusion splices.

3.28 Projector to Multimedia Outlet Cables: One (1) HDMI 1.3 compliant cable between the HDMI modular connectors. A pre-manufactured cable is preferred in this application: Acceptable Manufacturer: Belden or Dallas ISD approved equal.

3.29 Wireless Access Points:

3.29.1 Surface mounted device box for single Category 5e/6 insert installed adjacent to wireless access point: Acceptable Manufacturer: Wiremold or Dallas ISD approved equal.

3.29.2 Category 5e/6 insert and faceplate to be installed in surface-mounted box: Acceptable Manufacturer: Ortronics Product Line.

3.29.3 Protective cover for high potential for damage areas: Acceptable Manufacturer: Hoffman DU606030P or Dallas ISD approved equal.

3.30 Portable Building Connectivity:

Note: excludes construction swing space

3.30.1 Outdoor Enclosure and Cable:

3.30.1.1 Acceptable Manufacturer and Part Number:

3.30.1.1.1 Coyote.

- 3.30.1.1.2 Century ESTC-144S Outdoor Cabinet.
- 3.30.1.1.3 Century OST-103F 12-Strand Fusion Splice Tray Cable.
- 3.30.1.1.4 24-strand Triple Jacket Double Armor OSP MM 50µm Fiber.

3.30.2 Indoor Cabinet and Cable within Portable Buildings:

3.30.2.1 Acceptable Manufacturer and Part Number:

- 3.30.2.1.1 Ortronics OR-401045284 – Series II patch panels for copper multimedia Ortronics OR-S22600 – Jacks.
- 3.30.2.1.2 OR-625MMC-12PD1RB – Fiber cabinet, 6-SC multimode duplex (for 12 fibers) OR-625MMC-24PD1RB – Fiber cabinet, 12-SC multimode duplex (for 24 fibers) Ortronics OR-60900343 – SC adapter panel.
- 3.30.2.1.3 Ortronics OR-62100040 – 6 strand housing Ortronics OR-62100048 – 6 strand MM adapter.
- 3.30.2.1.4 Ortronics OR-626PF9FR-FZ001M – simplex pigtail MM 50u 1m (2 required) OR-P1DF2LRFZFZxxxM – SC Duplex, x=length.
- 3.30.2.1.5 Century C10100 – Fusion Splice Holder.
- 3.30.2.1.6 Superior Essex 1C006AG01 – 6 strand triple jacket double armor OSP MM 50u fiber Legrand|Ortronics Product Line – LTP006EB3010/25 6 strands OM3.

3.31 Bio Clock:

3.31.1 Acceptable Manufacturer and Part Numbers:

- 3.31.1.1 Timeware Primetime Bio Clock BS-1040 JLB-Series LCD Panel/Touchscreen.
- 3.31.1.2 Timeware Bio Clock Mounting Bracket.

3.31.2 Category 6 data cable provided with IEEE 803.3af Power Over Ethernet (PoE).

3.31.3 Conduit and single-gang backbox.

3.31.4 Flush-mount with conduit/backbox/cabling inside wall, where practical. Surface mount on solid and CMU walls using 2 inches x 6 inches or 2 inches x 8 inches stand-off block (See details sheets Figure 2.3A-D).

3.31.5 Bio Clock to be mounted in compliance with ADA requirements.

3.31.6 Contact: Network Services ITS Bond Project Manager. 972-925-5670

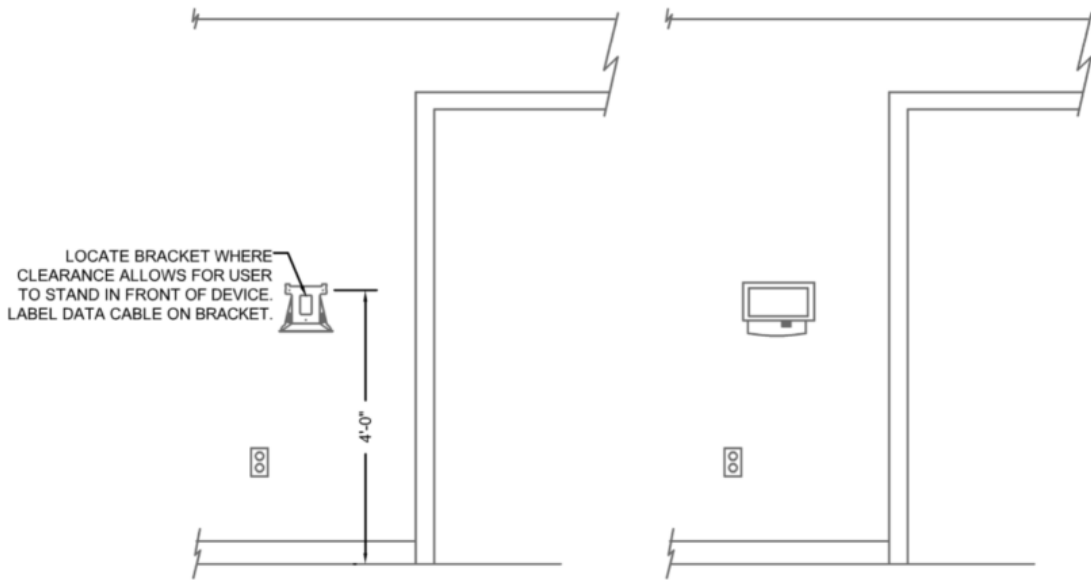


Figure 27 15 00-02 Bio Clock Mounting Detail

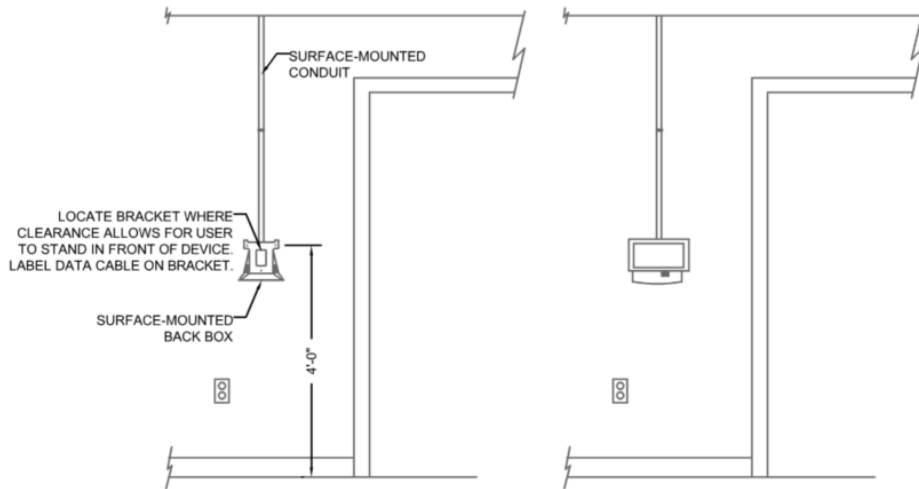


Figure 27 15 00-03 Bio Clock Mounting Detail – Surface Mount

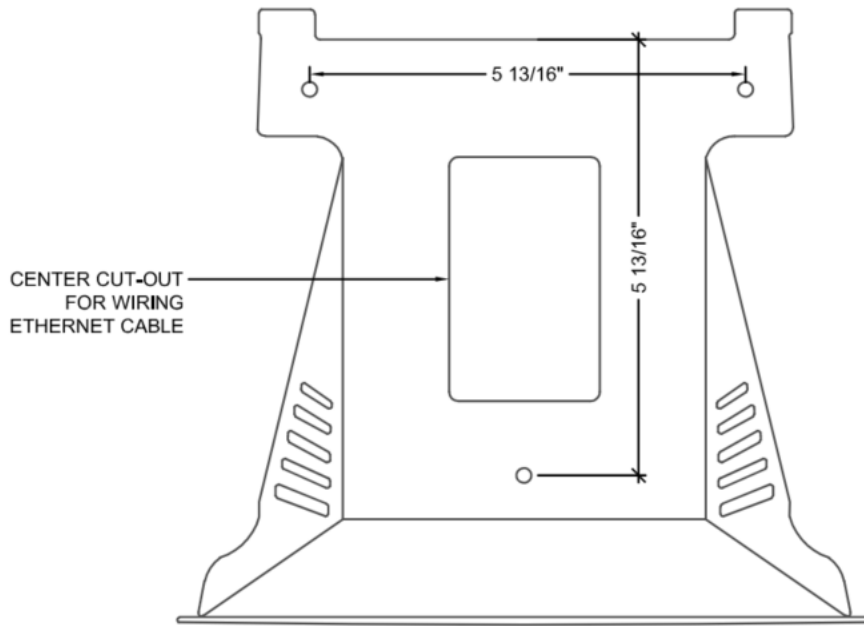


Figure 27 15 00-04 Bio Clock Mounting Bracket

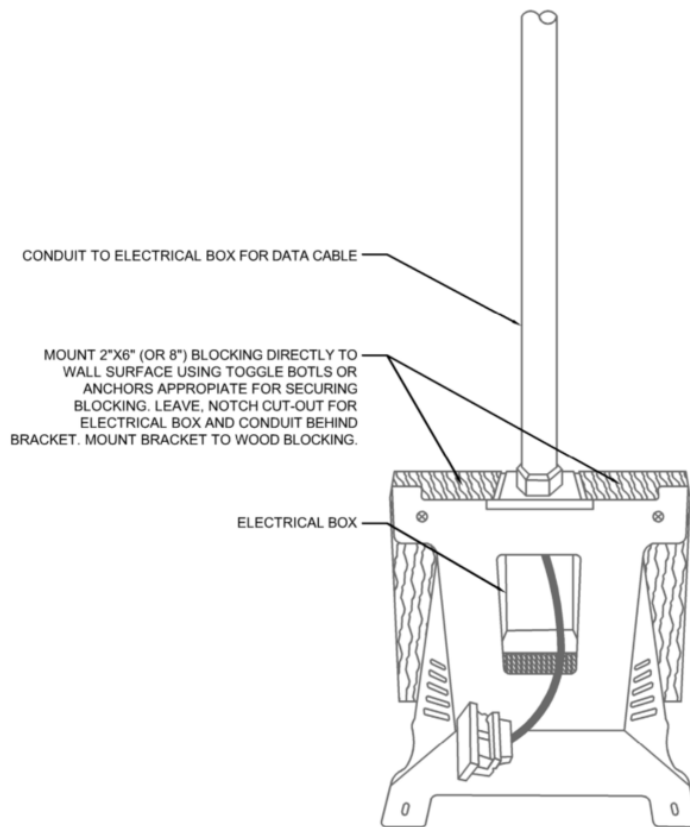


Figure 27 15 00-05 Bio Clock Mounting Detail – Blocking

27 51 00 Distributed Audio-Video Communications Systems

1. A sound system is to be provided in the auditoriums, multi-purpose rooms and gymnasiums. These systems are in addition to the school-wide public address system. These local sound systems are to be connected and integrated with the administrative control and media distribution systems. This integration allows for the distribution of audio and video from these assembly areas to rooms throughout the school.
2. Public address systems: The basis of design is to be a "Rauland-Borg" Communication System in a standing upright Cabinet. Any substitutions need to be approved by the Owner (Dallas ISD) prior to bidding, but match or exceed the performance requirements of the basis of design system.
3. Provide UPS backup for PA/Sound system.
4. High School Auditorium Sound:
 - 4.1 All equipment to be designed by an approved Acoustician and/or Theatrical Consultant for any performance space at the request of the Dallas ISD.
 - 4.2 System to be a distributed speaker system with network based digital mixing and processing utilizing both analog and wireless microphone systems.
 - 4.3 Provide complete system required junction boxes and conduit:
 - 4.3.1 From/to FOH control booth:
 - 4.3.1.1 Sound control mixer.
 - 4.3.1.2 Equalizers.
 - 4.3.1.3 Processors.
 - 4.3.1.4 Intercom system.
 - 4.3.1.5 Monitor system.
 - 4.3.1.6 Patch board.
 - 4.3.1.7 Other equipment as directed.
 - 4.3.2 Choral microphones over apron and acting areas.
 - 4.3.3 Provide crowd microphones.
 - 4.3.4 Provide wired microphone inputs at the following locations:
 - 4.3.4.1 Stage wings.
 - 4.3.4.2 Stage thrust floor boxes.
 - 4.3.4.3 Orchestra pit (if applicable).
 - 4.3.4.4 Directors location (if applicable).
 - 4.3.5 Provide monitor outputs at the following locations:
 - 4.3.5.1 Stage wings.
 - 4.3.5.2 Stage thrust floor boxes.

- 4.3.5.3 Orchestra pit (if applicable).
- 4.3.5.4 Overhead on-stage.
- 4.3.6 Provide two channels minimum of house effects.
- 4.3.7 Provide wired intercom at the following locations:
 - 4.3.7.1 Stage wings.
 - 4.3.7.2 Stage managers location.
 - 4.3.7.3 Orchestra pit (if applicable).
 - 4.3.7.4 Directors location (if applicable).
 - 4.3.7.5 Front of house control locations.
 - 4.3.7.6 Follow spot locations.
 - 4.3.7.7 House managers location (if applicable).
 - 4.3.7.8 House catwalk (if applicable).
 - 4.3.7.9 Dressing rooms.
 - 4.3.7.10 Shops and other supporting spaces.

5. Dressing rooms (high schools with theater and dance programs):

- 5.1 Provide required equipment connections:
 - 5.1.1 Monitor speakers to stage.
 - 5.1.2 Stage intercom system.

6. Sound System for Elementary/Middle School Auditoriums

6.1 General:

- 6.1.1 Specify a production quality sound system to cover the entire seating of the auditorium that meets the requirements of this section.
- 6.1.2 Section consists of furnishing and installing all equipment, cabling, labor, supervision, and services necessary of a complete and operating auditorium sound system.

6.2 Scope of Work:

- 6.2.1 Install Middle Atlantic SR or DWR series rack or equal in a location behind the stage so the operator can see the performers but not be seen by the audience in the front rows. Install the cabinet at such a height that the support roller is setting on the floor and supports the cabinet when it is opened.
- 6.2.2 House mixer to be installed in a lockable roll-top desk.
- 6.2.3 Install wireless microphone receivers, media player and media recorder in lockable equipment rack adjacent to rolltop desk.

- 6.2.4 Install amplifiers in a dedicated equipment rack located in a dedicated equipment rack located in a dedicated space near stage.
- 6.2.5 Install assisted listening system in a dedicated equipment rack located in a dedicated space near stage.
- 6.2.6 Install digital signal processor in a dedicated equipment rack located in a dedicated space near stage.
- 6.2.7 Install main loudspeakers suspended from ceiling structure down stage of the proscenium wall. If required, install delay speakers of matching manufacturer suspended from the ceiling down stage of house catwalk.
- 6.2.8 Provide portable stage audio monitors.
- 6.2.9 The sound system is to be balanced across all house speaker systems to obtain a uniform level across the seating area.
- 6.2.10 Architect to include the following requirements at a minimum in the Contract Documents:
 - 6.2.10.1 Copper certification test result printouts and electronic files.
 - 6.2.10.2 Optical fiber test result printout and electronic files.
 - 6.2.10.3 Grounding test result printout and electronic files.
- 6.2.11 Audio Paging/Program Amplifiers:
 - 6.2.11.1 Power amplifier(s) are to provide a minimum of 2 watts of power to all paging speakers, and 15 watts of power to all paging horns.
 - 6.2.11.2 The maximum load on the paging/program amplifiers is to be 80% of the rated maximum output of the amplifiers.
- 6.2.12 Normal/Emergency Call Switch – Rauland Dual Level Call In Switch:
 - 6.2.12.1 Normal/Emergency call switches indicated on the drawings are to provide the following functions and features:
 - 6.2.12.1.1 One (1) “Normal” call switch that is to activate a distinctive “NORM” level call from single button activation. The button is to be clearly marked “NORM” and routes the call-in to any one (1) or more administrative telephones and/or marquee displays for quick and easy response from an administrative telephone.
 - 6.2.12.1.2 One (1) “Emergency” call switch that is to activate a distinctive “EMERGENCY” level call from single button activation. The button is to be red in color and is to be clearly marked “EMERGENCY” and will route the call-in to any one (1) or more administrative telephones and/or displays for quick and easy response from an administrative telephone.
 - 6.2.12.1.3 Call switch is to be mounted next to white board left or right by the teacher’s desk.

6.2.12.2 Furnish Rauland ACC 1300 Wall Mount Attenuator in administrative areas and office as shown on project plans.

6.2.13 Indoor Voice/Data Backbone Cable:

6.2.13.1 Voice: Solid copper, 24 AWG, 100 Ω balanced twisted-pair (UTP), Category 3 backbone cable, in sizes as indicated on the drawings, with mechanical and transmission performance specifications that meet or exceed ANSI/TIA-568-C.2. Note: Listed Type CMP, and/or MPP (as required in latest NEC code) for inside cable.

6.2.13.1.1 Acceptable Manufacturer: Superior Essex Product Line or Dallas ISD approved equal.

6.2.13.1.2 Part Number: 10032111 25-pair Plenum-rated.

27 51 23 IP Integrated Electric Communications Network

1. General:

1.1 For IP-based equipment (ex: clocks, and digital signage equipment, etc.) requiring network drops, drop counts and locations to be identified by the Architect for inclusion in the scope of the installation. Dallas ISD-M&O to be notified immediately if additional network drops are required. Refer to Responsibility Matrix in Division 01 for procurement, installation and configuration of this type of equipment.

1.2 Summary:

1.2.1 Provide a complete turnkey Emergency Communications Interface integrated with the existing Dallas ISD District-Wide Emergency Communication System.

1.2.2 This section includes a fully operational IP platform for district-wide internal and school communications system incorporating school safety notifications and general communications including but not limited to the following:

1.2.2.1 The platform is to provide complete internal communications and employing state of the art IP Technology including the minimum functions listed.

1.2.2.1.1 Two-way internal intercommunications between staff locations and classrooms.

1.2.2.1.2 Scheduled bell events.

1.2.2.1.3 Emergency announcement that is to override any pre-programmed zones assuring that all emergency/lockdown etc., are heard at each and every speaker location.

1.2.2.1.4 Capability of prerecording emergency announcements that can simply be activated by a simple Soft Key or via a dedicated push button.

1.2.2.1.5 Atomic time synchronization with class change tones utilizing multiple, programmable schedules for each zone.

1.2.2.1.6 District-wide, emergency, group, all school and zone live voice paging

1.2.2.1.7 District-wide, emergency, group, all school and zone paging for pre-recorded audio – tones, music and voice.

- 1.2.2.1.8 Web-based user interface.
- 1.2.2.2 The system is to support a minimum of 1000 level priorities which are to be user definable, allowing each end point to place a minimum of 5 different priority calls at the same time.
- 1.2.2.3 Any authorized administrator is to be able to call from outside the school into any classroom, zone or entire school directly via Dallas ISD supplied SIP enabled telephone network. 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).
- 1.2.2.4 Authorized system users are to be able to create a minimum of twenty (20) automated sequences with emergency instructions, tones, and emails and be able to relay activations and replay them.
- 1.2.2.5 Automated message strings are to be manually initiated from a single-button access on the console, on a SIP connected telephone, a panic button, from the web interface or via interface with third party systems.
- 1.2.2.6 Paging and two-way intercom features are to be accessible from any system console or SIP connected telephone for each campus.
- 1.2.2.7 The platform is to synchronize its system time to the network timeserver or a web-based time server.
- 1.2.2.8 Each single campus installation is to be locally survivable for intercom, paging, bells, and emergencies such as lockdown, even when Dallas ISD connection is unavailable.
- 1.2.2.9 This specification establishes a minimum level of quality, features, and performance for individual components as well as the integrated system.

2. System requirements:

- 2.1 The platform is to 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 and paging, and program distribution. The system is to be easy to learn and operate. All standard programming is to be web based and user friendly to allow the system administrator the ability to easily program system features.
- 2.2 Provide complete and satisfactorily operating district/school communications and district/school safety 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.
- 2.3 The platform is to be a single electronic system consisting of a minimum of 10 intercom channels for each campus, (classroom) IP speaker modules and calls 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.
- 2.4 Each Classroom is to be provided with an IP speaker module interface and up to 5 different call-in switches, each with their own annunciation path and priority.

- 2.5 Call-ins to automatically annunciate (display of priority and location) to administrative consoles, SIP enabled phones, and outside phones.
 - 2.6 Call-ins are to be programmed to automatically change priority and annunciation route based on age of call-in and original priority.
 - 2.7 Call-ins to have priority (and annunciation route) changed by user action from a console or SIP enabled phone.
 - 2.8 Call-in annunciation route is to include playing pre-recorded audio over speakers, sending a pre-configured email, and activating relays.
 - 2.9 The platform is to lend itself to expansion by simple addition of hardware modules.
 - 2.10 The platform is to 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.
 - 2.11 The platform is to 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.
 - 2.12 The platform is to 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 to be hands free and not require any interaction by the classroom user.
 - 2.13 The platform to provide classroom users the ability to confirm that they have safely secured their classrooms during lockdown with a single button press.
 - 2.14 IP-addressable and POE powered speaker modules for individual rooms are to be system programmable and to be assigned any two, three, four, five or six digit number as well as name and description. Any extension to be reassigned at any time.
 - 2.15 IP-enabled two-way voice communication is to be available from any provided telephone or administrative console through any speaker in a campus. This is to allow hands-free communication to any classroom or any individual loudspeaker unit. A programmable pre-announce tone is to sound immediately before the intercom path is opened and a supervisory tone is to continue to sound at regular intervals when speaker monitoring is active, complying fully with all privacy legislation. Pre announce tone and supervisory tones are to be disabled during designated emergencies automatically.
 - 2.16 The platform is to allow users to configure multiple schedules per school, with a minimum of 500 unique events per schedule, and automatic Daylight Savings time correction. A minimum of 5 schedules to be active on any given day for each campus. User is to 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 are to include relay actions, email notifications, paging exclusions as system configuration changes. The platform is to 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 remotely be created, changed, stored and assigned to calendar days for the local school by an authorized user from a browser-based interface.
3. Equipment and Material:
- 3.1 Server Software:
 - 3.1.1 Provides district wide paging, bell event scheduling, emergency notification and configuration for entire district.
 - 3.1.2 Ability to configure system and initiate system features, per school and district-wide via web based interface.

- 3.1.3 The software has the ability to sync system time to the atomic clock signal or to the school's or districts network time server.
 - 3.1.4 The software is to 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 is to be capable of automatically notifying district personnel via the WAN of an alarm condition.
 - 3.1.5 The software is to automatically broadcast page 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 is to provide redundant alarm annunciation over intercom/paging speakers and is not meant to replace primary fire alarm or security systems.
 - 3.1.6 The software is to be installed in cloud, virtual or physical server environments.
 - 3.1.7 The web-based user interface is to support secure HTTP browsing.
 - 3.1.8 The server software is to support encryption to ensure secure access.
 - 3.1.9 The software is to support any combination of VoIP Telecenter campus controllers and Telecenter page modules for a minimum of 1000 facilities.
 - 3.1.10 The software is to support a minimum of 50,000 IP speaker modules, district wide.
- 3.2 VoIP Single Campus Controller: Completely integrated system with the following features and capabilities:
- 3.2.1 Provides call routing for paging and intercom for a single facility.
 - 3.2.2 System is to connect to the district provided telephone network via a SIP connection.
 - 3.2.3 Support a flexible numbering plan allowing two, three, four, five, or six digit extensions.
 - 3.2.4 SIP interface to a district provided telephone network is to be capable of allowing connected phones to display classroom call-ins, answer internal intercom call-ins, make pages and change priorities of call-ins in progress.
 - 3.2.5 Direct dialing, two-way amplified voice intercom between any provided telephone or admin console and speaker without the use of a press-to-talk or talk-listen switch.
 - 3.2.6 Ability to place two (2) levels of call-in from any call in switch.
 - 3.2.7 The ability to answer intercom call-ins registered at administrative consoles and pre-selected telephones.
 - 3.2.8 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.
 - 3.2.9 The ability to manually upgrade an intercom call-in to an alternate telephone or group of telephones.
 - 3.2.10 The ability for classrooms to "check-in" via push button when they have successfully secured their location during emergency.

- 3.2.11 Administrative console is to display locations that have not checked in to confirm their secured location and provide hands-free audio monitoring and communication to unsecured locations.
- 3.2.12 The controller is not to need direct connection to any classroom via home run or distributed wiring. It is to communicate solely through the IP network.
- 3.2.13 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 telephone are to have priority over all regular system functions.
- 3.2.14 Ability for administrative consoles and connected phones to selectively monitor audio at any two way speaker during an emergency.
- 3.2.15 Stores a minimum of 48 hours' worth of bell event schedules, all emergency notification sequences as well as facility wide configuration.
- 3.2.16 System has the ability to sync system time to the Atomic Clock Signal or to the school's or districts network time server.
- 3.2.17 System's SIP Interface is to provide:
 - 3.2.17.1 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.
 - 3.2.17.2 Ability to answer a call-in directed to that SIP extension.
 - 3.2.17.3 Ability to upgrade a call-in directed to that SIP extension.
 - 3.2.17.4 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 are to be provided. Alarm signals originating from any assigned administrative telephone are to have priority over all regular system functions.
 - 3.2.17.5 Ability to initiate a school-wide emergency including lockdown and evacuate sequences.
- 3.2.18 The system to have the ability to utilize a web-browser and a 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 the district. The system to be capable of automatically notifying district personnel via the WAN of an alarm condition.
- 3.2.19 The system is to automatically broadcast page 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 is to provide redundant alarm annunciation over intercom/paging speakers and is not meant to replace primary fire alarm or security systems.
- 3.3 IP addressable Modules:
 - 3.3.1 System is to provide multiple IP addressable modules for intercom, paging and relay activation.

- 3.3.1.1 All modules are POE 802.3af compliant.
- 3.3.1.2 All modules support DHCP.
- 3.3.1.3 All modules connect to network with a single RJ45 connector.
- 3.3.2 IP addressable speaker module is to interface to school's data network, a speaker, and multiple call switches.
 - 3.3.2.1 A minimum of 5 levels of call-in can be placed from an IP Speaker Module. The call-ins route to a designated administrative console and select SIP connected telephones and can only be cleared from the system once answered. If a call-in is not answered within a preprogrammed time the call-in to reroute to other telephones and consoles, and announce over selected or all speakers.
 - 3.3.2.2 An option for privacy call-in switches is supported. When the privacy switch is activated it prevents administrative or classroom telephones from monitoring the specific classroom/location intercom speaker.
 - 3.3.2.3 The ability to belong to one (1) or more of a minimum of 100 independent zones for zone paging, program/music distribution zones and class change tone reception; this assignment is a programmable function, changeable by time of day. Each IP speaker module's location is to be programmed in software to belong to any combination of software zones. IP speaker modules are to be designed to mount near ceiling and wall speakers and in the plenum space.
- 3.3.3 IP-addressable Zone Paging Module:
 - 3.3.3.1 Zone paging module is to connect multiple speakers for district all page, all page, zone paging, bells, audio events and, emergency notification.
 - 3.3.3.2 Zone paging modules are to be rack and wall mountable.
 - 3.3.3.3 Zone paging modules are to be able to belong to one (1) or more of 100 independent zones for live paging, bells, pre-recorded audio and emergency notification.
- 3.3.4 IP Addressable Aux I/O Module:
 - 3.3.4.1 Aux I/O module is to have two (2) input contacts and two (2) output contacts.
 - 3.3.4.2 Input and output contacts are individually addressable.
 - 3.3.4.3 Aux I/O module is to be wall and rack mountable.
 - 3.3.4.4 User can program relays to be activated manually, through an event/bell schedule and during emergency notification.
- 3.4 IP Addressable Administrative Console:
 - 3.4.1 A full color screen with 64 soft keys, 3 line select, volume control, push to talk, speakerphone mode and left/right and up/down scrolling.

- 3.4.2 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.
 - 3.4.3 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 are to be provided. Alarm signals originating from any assigned administrative telephone are to have priority over all regular system functions.
 - 3.4.4 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 is to provide redundant alarm annunciation over intercom/paging speakers and is not meant to replace primary fire alarm or security systems.
 - 3.4.5 Ability to perform intercom to any single IP addressable speaker module.
 - 3.4.6 Ability to display 3 call-ins at a time on the screen, with unlimited number of call-ins annunciating and the ability to scroll to view all call-ins.
 - 3.4.7 Ability to upgrade a call-in via soft key.
 - 3.4.8 Programmable soft key access from any console for activating relays, campus wide.
 - 3.4.9 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.
- 3.5 Indoor Loudspeakers – Tile Replacement:
- 3.5.1 Rauland BAFKIT Flush Ceiling Loudspeaker:
 - 3.5.1.1 No visible hardware after installation.
 - 3.5.1.2 Acoustically-correct baffle design blends with ceiling tiles.
 - 3.5.1.3 Mar-proof baked white epoxy finish.
 - 3.5.1.4 Can be installed before ceiling tile installation.
 - 3.5.1.5 Speaker tap selector control mounted on backbox.
 - 3.5.1.6 Speaker Type: 8 inches (20.3 cm) permanent magnet.
 - 3.5.1.7 Power Rating: 8 watts RMS.
 - 3.5.1.8 Sensitivity: 93 dB @ 1 meter with 1 watt input.
 - 3.5.1.9 Frequency Response: 65 to 17,000 Hertz.
 - 3.5.1.10 Magnet: 5 oz. (141.7 g) PM.
 - 3.5.1.11 Voice Coil Impedance: 8 ohms.
 - 3.5.1.12 Voice Coil Diameter: 0.75 inch (1.9 cm).

- 3.5.1.13 Transformer: 25V; taps at 0.25, 0.5, 1, 2 and 4 watts.
- 3.5.1.14 Baffle: White, 22-gauge cold-rolled steel.
- 3.5.1.15 Baffle Size: Width: 23-3/4 inches (60.3 cm) p.
- 3.5.1.16 Length: 11-3/4 inches (29.8 cm).
- 3.5.1.17 Depth: 3-3/8 inches (8.6 cm).
- 3.5.1.18 Weight: 4 lbs. 14 oz. (2.2 kg).

3.6 Indoor Ceiling Loudspeakers – Hard Ceiling:

3.6.1 Rauland ACC1400 (USO188) 8 inches 5oz speaker assembly with round white baffle, ACC1101 speaker backbox, ACC1104 T-Bar Support.

- 3.6.1.1 8 inches cone.
- 3.6.1.2 Frequency Response: 65 to 17,000 Hz.
- 3.6.1.3 Power Rated: 8 watts.
- 3.6.1.4 Magnet: 5 oz.
- 3.6.1.5 Axial Sensitivity: 93 dB at 4 feet with 1 watt input.
- 3.6.1.6 25 watt variable tap transformer.
- 3.6.1.7 Surface mounted speaker housings in areas so designated.
- 3.6.1.8 Bi directional.
- 3.6.1.9 Wall or ceiling mount.
- 3.6.1.10 Accommodates 8 inches speakers.
- 3.6.1.11 Provide ceiling tile bridge and backbox.

3.7 Exterior Loudspeakers:

3.7.1 Rauland 3607 flush mounted horn, ACC1411 vandal proof baffle, ACC1105 flush backbox.

3.7.1.1 The horn loudspeaker is to be a Rauland Model 3607 or approved equal, virtually impervious to weather or vandalism. It is to be of the double reentrant type with a power rating of 15 watts at full range. Frequency range is to be 480 to 14,000 Hz; dispersion angle is to be 180°; sound pressure level is to be 106dB at 1 watt at 1 meter.

3.7.2 The loudspeaker is to have impedance selection of 5000/2500/1300/666/333/89/45 ohms. Power taps are to be 1.0/2.0/3.8/7.5/15 watts for 70 volt line and .90/1.9/7.0/14 watts for 25 volt line.

3.7.3 The unit is to be weatherproof, constructed of treated heavy-gauge aluminum, with all exposed parts plated and sealed driver, line transformer and selector switch are to be mounted within the housing.

- 3.7.4 Wiring terminals are to be fully enclosed. A cork rubber gasket between speaker flange and mounting surface is to be provided. Finish is to be gray baked enamel.
- 3.7.5 Furnish a Rauland ACC1412 surface back-box for surface or retrofit applications.

4. Main Office Control Equipment:

4.1 Rauland Program Control Console:

- 4.1.1 Located in main office for remote program activation.
- 4.1.2 Middle Atlantic Slim 2 Series 19 inches Sloped Desktop Racks.
- 4.1.3 EIA compliant slim desktop turret rack is to be Middle Atlantic Products model # 2-6M. Desktop turret rack is to offer 6 rack spaces.
- 4.1.4 Rack is to be constructed of 5/8 inch furniture grade MDF board with a black wood grain laminate finish. Rubber feet are to be included with rack.
- 4.1.5 Pre-installed front and rear rack rail is to be 10-32 threaded and constructed of 11-gauge steel. Bottom trim panel is to be 16-gauge steel with a durable black powder coat finish.
- 4.1.6 Rack is to be warrantied to be free from defects in material or workmanship under normal use and conditions for a period of seven (7) years.
- 4.1.7 Rauland BPx Blank Panels, charcoal gray, to complete console panel spaces.

4.2 Denon-DN 300Z CD/Media Player. Substitutions are not allowed.

4.3 Rauland TCC2055 Program Line Input Module and TCC2099 Universal Rack Mounting Kit:

- 4.3.1 Encodes analog audio signals to digital, IP-based data.
- 4.3.2 Accepts stereo or mono line level audio.
- 4.3.3 Equipped with 3.5 mm socket for enhanced compatibility.
- 4.3.4 Connection status indicator LED.
- 4.3.5 Mounts in rack or desktop.
- 4.3.6 Digital encryption of control signals for excellent security.
- 4.3.7 Compliant with IEEE 802.3af Power Over Ethernet (PoE) Standard.
- 4.3.8 UL listed for enhanced code compliance.

5. Equipment Racks (if required):

- 5.1 All equipment racks are to provide 44 spaces (77 inches) minimum for mounted system equipment.
- 5.2 All equipment racks are to be multi-rack format ("gangable") style, bolted together, and open cavity.
- 5.3 Provide all equipment racks with lockable rear doors.
- 5.4 Locate equipment rack(s) in climate-controlled areas/rooms as shown on drawings.
- 5.5 All head-end, distribution, and source equipment, including data and power, are to be located in racks configured as approved by the Engineer.

- 5.6 Rack-mounted equipment is to be accessible from front and rear.
- 5.7 All unused rack spaces are to be covered with appropriate blank/vent panels.
- 6. Wireless Clock System:
 - 6.1 Provide complete and satisfactorily operating NTP synchronized wireless clock system with analog and/or digital secondary clocks as described herein, using materials and equipment of types, sizes, ratings, and performances as indicated.
 - 6.2 (NTP) Network Time Protocol is a network standard protocol that assures accurate synchronization to the millisecond of computer clock times in a network of computers. Based on UTC, NTP synchronizes client workstation clocks to the U.S. Naval Observatory Master Clocks in Washington, DC and Colorado Springs, CO. running as a continuous background client program on a computer, NTP sends periodic time requests to servers, obtaining server time stamps and using them to adjust computer clocks.
 - 6.3 The system is to be easy to learn and operate. All standard system programming is to be user friendly to allow the system administrator the ability to easily program system features.
 - 6.3.1 Use materials and equipment that comply with referenced standards and manufacturers' standard design and construction, in accordance with published product information.
 - 6.4 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.
 - 6.5 The NTP Synchronized Wireless System consists of a master transmitter located on the inside of the building, and a NTP receiver connected to a time server. An unlimited number of wireless analog and digital clocks are synchronized to the NTP time. System is to synchronize all clocks to each other. System is to utilize NTP technology to provide atomic time to components.
 - 6.6 System components to be hard wired. Battery operated clocks are not allowed.
 - 6.7 Hallway clocks to be digital with red LED display.
 - 6.8 Classroom clock are allowed to be digital or analog.
 - 6.9 Analog Clocks are to synchronize to +/- 1 second of the transmitter displayed time.
 - 6.10 Clocks are to automatically adjust for Daylight Saving per settings on the transmitter.
 - 6.11 The system is to have an internal clock that is continually updated by the NTP receiver. If a NTP failure were to occur, the clocks are to continue to be synchronized to the internal clock and not deviate from each other. Once NTP time is restored, all clocks are to once again be synchronized to the NTP time.
 - 6.12 The system is to have a fail-safe design so that if a power interruption were to occur, the clocks continue to operate. If a synch signal is not received by the analog clocks for 48 hours, the second hand is to double pulse to indicate this condition. Upon restoration of power, the transmitter is to once again communicate with the clocks and normal operation resumes.
 - 6.13 System is to be 100% programmable from the front operational panel with lights that indicate power status and NTP reception. Panel programming is to also include Time Zone, Frequency, 12 or 24 hour operation and DST on/off.
 - 6.14 The wireless backbone is to support expansion of the system to include wireless alphanumeric displays for emergency crisis communications for district-wide communications.
 - 6.15 The system to be modified to use GPS instead of NTP as the time source without the need to replace the transmitter. A GPS receiver would need to be added with access to the outside of the building.
 - 6.16 The system is to lend itself to expansion by simple addition of wireless secondary clocks and their required power source.

6.17 Equipment and materials:

6.17.1 Wireless transmitter:

- 6.17.1.1 FCC Part 90 Approved, 467.2125-467.4375 MHz frequency range.
- 6.17.1.2 Radio Technology (Narrowband FM, 12.5 KHz bandwidth).
- 6.17.1.3 Ten (10) selectively available channels.
- 6.17.1.4 5 watt transmitter.
- 6.17.1.5 Daylight Savings Time pre-programmed.
- 6.17.1.6 Time zone pre-set.
- 6.17.1.7 Non-volatile memory.
- 6.17.1.8 LCD display for time, date, year, power, time zone and signal reception.
- 6.17.1.9 Operating Range (32 degrees F to 158 degrees F).
- 6.17.1.10 Rack or shelf mount.
- 6.17.1.11 Power Supply Input: 120-volt AC, Output: 12-volt DC, 3 Amps.
- 6.17.1.12 7 inches rear mounted antenna.
- 6.17.1.13 Dimensions: 12 inches L x 6 inches W x 1.75 inches H Weight: 2 lbs.
- 6.17.1.14 NTP Receiver.
- 6.17.1.15 Optional external antenna for use in large campus applications. Up to 2 mile radius.

6.17.2 Secondary 13 inch analog clock:

- 6.17.2.1 13 inch analog clock.
- 6.17.2.2 Maintenance free.
- 6.17.2.3 Five year manufacturer's warranty.
- 6.17.2.4 Microprocessor based with built-in wireless receiver.
- 6.17.2.5 Heavy duty construction.
- 6.17.2.6 Durable ABS casing.
- 6.17.2.7 Clock numbering graphics are to be Standard Arabic Format (12HR-60 Minute).
- 6.17.2.8 Face of clock is white.
- 6.17.2.9 Hour and minute hands are to be black. Second hand is red.

- 6.17.2.10 The clock lens is to use a shatterproof polycarbonate material with no visible molding marks. Glass and/or visible molding marks are unacceptable.
 - 6.17.2.11 The clock to have a low-profile, semi-flush design.
 - 6.17.2.12 Wire guard model in areas where protection is required as indicated on drawings or by Owner.
- 6.17.3 Secondary dual face 13 inch analog clock:
- 6.17.3.1 13 inch analog clock.
 - 6.17.3.2 Wall or ceiling mount is to be determined by drawings or Owner.
 - 6.17.3.3 Maintenance free.
 - 6.17.3.4 Five (5) year manufacturer's warranty.
 - 6.17.3.5 Microprocessor based with built-in wireless receiver.
 - 6.17.3.6 Heavy duty construction.
 - 6.17.3.7 Durable ABS casing.
 - 6.17.3.8 Clock numbering graphics are to be Standard Arabic Format (12HR-60 Minute).
 - 6.17.3.9 Face of clock is white.
 - 6.17.3.10 Hour and minute hands are to be black. Second hand is red.
 - 6.17.3.11 The clock lens is to use a shatterproof polycarbonate material with no visible molding marks. Glass and/or visible molding marks are unacceptable.
- 6.17.4 Secondary 16 inch Analog Clock:
- 6.17.4.1 16 inch analog clock (Battery powered using 2"D" cell batteries).
 - 6.17.4.2 Maintenance free.
 - 6.17.4.3 Five year manufacturer's warranty.
 - 6.17.4.4 Microprocessor based with built-in wireless receiver.
 - 6.17.4.5 Heavy duty construction.
 - 6.17.4.6 Durable ABS casing.
 - 6.17.4.7 Clock numbering graphics are to be Standard Arabic Format (12HR-60 Minute).
 - 6.17.4.8 Face of clock is white.
 - 6.17.4.9 Hour and minute hands are to be black. Second hand is red.

- 6.17.4.10 The clock lens is to use a shatterproof polycarbonate material with no visible molding marks. Glass and/or visible molding marks are unacceptable.
 - 6.17.4.11 Wire guard in areas where protection is required as indicated on drawings or by Owner.
 - 6.17.4.12 The clock is to have a low-profile, semi-flush design.
- 6.17.5 Secondary 2.5 inch digital clock:
- 6.17.5.1 2.5 inch digital clock (AC powered 24V or 120V).
 - 6.17.5.2 4 digit (hours/minutes).
 - 6.17.5.3 Built-in countdown/count-up timer.
 - 6.17.5.4 Maintenance free.
 - 6.17.5.5 Five year manufacturer's warranty.
 - 6.17.5.6 Microprocessor based with built-in wireless receiver.
 - 6.17.5.7 Heavy duty construction.
 - 6.17.5.8 12/24 hour display format.
 - 6.17.5.9 Clear anti-glare LED display.
 - 6.17.5.10 Adjustable brightness.
 - 6.17.5.11 AM/PM indicator.
 - 6.17.5.12 Wire guard in areas where protection is required as indicated on drawings or by owner.
 - 6.17.5.13 Bright red or white LED digit.
- 6.17.6 Secondary 4 inch digital clock:
- 6.17.6.1 4 inch digital clock (AC powered 24V or 120V).
 - 6.17.6.2 4 digit (hours/minutes).
 - 6.17.6.3 Built-in countdown/count-up timer.
 - 6.17.6.4 Maintenance free.
 - 6.17.6.5 Five year manufacturer's warranty.
 - 6.17.6.6 Microprocessor based with built-in wireless receiver.
 - 6.17.6.7 Heavy duty construction.
 - 6.17.6.8 12/24 hour display format.

- 6.17.6.9 Clear anti-glare LED display.
 - 6.17.6.10 Adjustable brightness.
 - 6.17.6.11 AM/PM indicator.
 - 6.17.6.12 Wire guard model in areas where protection is required as indicated on drawings or by Owner.
 - 6.17.6.13 Bright red or white LED digit.
- 6.17.7 Secondary 2.5 inch dual sided digital clock:
- 6.17.7.1 2.5 inch digital clock (AC powered 24V or 120V).
 - 6.17.7.2 Four (4) digit (hours/minutes).
 - 6.17.7.3 Built-in countdown/count-up timer.
 - 6.17.7.4 Maintenance free.
 - 6.17.7.5 Five (5) year manufacturer's warranty.
 - 6.17.7.6 Microprocessor based with built-in wireless receiver.
 - 6.17.7.7 Heavy duty construction.
 - 6.17.7.8 12/24 hour display format.
 - 6.17.7.9 Clear anti-glare LED display.
 - 6.17.7.10 Adjustable brightness.
 - 6.17.7.11 AM/PM indicator.
 - 6.17.7.12 Bright red or white LED digit.
- 6.17.8 Secondary 4 inch dual sided digital clock:
- 6.17.8.1 4 inch digital clock (AC powered 24V or 120V).
 - 6.17.8.2 4 digit (hours/minutes).
 - 6.17.8.3 Built-in countdown/count-up timer.
 - 6.17.8.4 Maintenance free.
 - 6.17.8.5 Five (5) year manufacturer's warranty.
 - 6.17.8.6 Microprocessor based with built-in wireless receiver.
 - 6.17.8.7 Heavy duty construction.
 - 6.17.8.8 12/24 hour display format.

- 6.17.8.9 Clear anti-glare LED display.
- 6.17.8.10 Adjustable brightness.
- 6.17.8.11 AM/PM indicator.
- 6.17.8.12 Bright red or white LED digit.

- 7. Data station cable A. Solid copper, 24 AWG, 100 Ω balanced twisted-pair (UTP) Category 5e/6 cable with four (4) individually twisted-pairs, which meet or exceed the mechanical and transmission performance specifications in ANSI/TIA-568-C.2 up to 100 MHz for Category 5e: Product Description: Data Gain Category 6+ UTP, Plenum, Cable- Yellow Part Numbers: 66-240-6B.
 - 7.1 Data Outlets: Approved Manufacturer: Ortronics Series II Product Line Part Numbers: (1) OR-40300158 Series II Faceplate(1) OR-S22600 Series II, 2 Cat6 modules (2) OR-40300164 Series II, Blanking Module.
 - 7.2 Patch Panels:
 - 7.2.1 Approved Manufacturer: Ortronics Product Line Part Number: OR-PHA66U48 OR-PHA66U2.
 - 7.2.2 Examine conditions, with the Installer present, for compliance with requirements and other conditions affecting the performance of the School Communications and School Safety Network.
 - 7.2.3 Do not proceed until unsatisfactory conditions have been corrected.
 - 7.3 Installation:
 - 7.3.1 General: Install system in accordance with NFPA 70 and other applicable codes. Install equipment in accordance with manufacturer's written instructions.
 - 7.3.2 Furnish and install all material, devices, components and equipment for a complete operational system.
 - 7.3.3 Impedance and Level Matching: Carefully match input and output impedance's and signal levels at signal interfaces. Provide matching networks where required.
 - 7.3.4 Control Circuit Wiring: Install control circuits in accordance with NFPA 70 and as indicated. Provide number of conductors as recommended by system manufacturer to provide control functions indicated or specified.
 - 7.3.5 All housings are to be located as indicated.
 - 7.3.6 The Contractor is to 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 is to be as recommended by the equipment supplier and referenced to earth ground.
 - 7.3.7 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.

- 7.3.8 Provide physical isolation from speaker-microphone, telephone, line-level wiring, and power wiring. Run in separate raceways, or where exposed or in same enclosure, provide 12 inch minimum separation between conductors to speaker-microphones, telephone wiring and adjacent parallel power. Provide physical separation as recommended by equipment manufacturer for other system conductors.
 - 7.3.9 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.
 - 7.3.10 Weatherproofing: Provide weatherproof enclosures for items to be mounted outdoors or exposed to weather.
- 7.4 Grounding:
- 7.4.1 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.
 - 7.4.2 Ground equipment, conductor, and cable shields to eliminate shock hazard and to minimize to the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments. Provide 5-ohm ground at main equipment location. Measure, record, and report ground resistance.
 - 7.4.3 Provide all necessary transient protection on the AC power feed and on all copper station lines leaving or entering the building. Note in system drawings, the type and location of these protection devices as well as all wiring information.
- 7.5 Field Quality Control:
- 7.5.1 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.
 - 7.5.2 Inspection: Make observations to verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Provide a list of final tap settings of paging speaker line matching transformers.
 - 7.5.3 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.
- 7.6 Final Acceptance Testing:
- 7.6.1 The final acceptance testing to be provided to the Owner or the Owners designated representative only. Final acceptance testing to any other trade or service provider for the project does not comply with the requirements of this section.
 - 7.6.2 The Contractor is to 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 is not to commence until the final acceptance test is completed.
 - 7.6.3 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.

- 7.7 Commissioning:
 - 7.7.1 The Contractor is to train the Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventative maintenance of the system. This training is to be in accordance with the training as outlined in Section 1.6, paragraphs 3, 5 & 6 of these specifications. In addition to the training materials provided, the Contractor is to also furnish operators manuals and users guides at the time of this training.
 - 7.7.2 Schedule training with Owner through the Owners representative, with at least seven days advance notice.
- 7.8 Occupancy Adjustments: The Contractor is to provide occupancy adjustments in accordance with Section 1.6, paragraph 9 of these specifications. A response scenario amenable to both the Owner and the Contractor is to be established and followed for the first year of service.
- 7.9 Cleaning And Protection: Prior to final acceptance, the Contractor is to vacuum and clean all system components and protect them from damage and deterioration. All blank spaces in equipment cabinets are to be covered with blank panels. Top and side panels, and all cabinet doors are to be installed. All general areas within and around all equipment rack/cabinets in the facility are to be swept, vacuumed, and cleaned up. No cabinets are to be left unlocked and all cabinet keys are to be turned over to the Owner or designated Owner's representative.

8. Submittals:

- 8.1 Product data for each component.
- 8.2 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.
 - 8.2.1 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. Include a single-line diagram showing cabling interconnection of components and levels throughout system and impedances.
 - 8.2.2 Artwork drawings and lists indicating proposed nameplate nomenclature and arrangements for control panels and plug panels prior to fabrication reflecting equipment used.
 - 8.2.3 Each drawing is to have a descriptive title and all sub-parts of each drawing are to be labeled. All drawings are to have the name and locations of the project, and Systems Contractor's name in the title block.
 - 8.2.4 Details and descriptions of any other aspect of the system, which is to differ from the Contract Documents due to field conditions or equipment, furnished.
- 8.3 FCC Approval: The system is to be approved for direct interconnection to the telephone utility under Part 68 of FCC rules and regulations. Systems, which are not FCC approved or utilize an intermediary device for connection, are not to be considered. Provide the FCC registration number of the system being proposed as part of the submittal process.
- 8.4 Product Certificates: Signed by manufacturers of equipment certifying that products furnished comply with specified requirements.
- 8.5 Installer Certificates: Signed by manufacturer certifying that installers comply with requirements.
- 8.6 Manufacturer Certificates: Signed by manufacturers certifying that they comply with requirements.

- 8.7 Field Test Reports: Indicate and interpret test results for compliance with performance requirements. Include record of final matching transformer-tap settings, and signal ground-resistance measurement certified by Installer.
- 8.8 Maintenance Data: For equipment to be included in maintenance manuals.
- 8.8.1 Record of Owners equipment-programming option decisions.
 - 8.8.2 All instructions necessary for proper operation and manufacturer's instructions.
 - 8.8.3 "Proof of Performance" information.
 - 8.8.4 Manufacturer's maintenance information.
 - 8.8.5 Copies of non-proprietary computer programs and system set up disks documenting all programmable features of the installed system.
- 8.9 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 are to be used during "Final Acceptance Testing".
- 8.10 System Training: Submit the following information describing the training programs and system trainers as outlined in paragraph 1.6 of this specification and in accordance with Division 1 specifications.
- 8.10.1 Include with the submittal a preliminary staff development training program in outline form for review and approval by the Owner's representative.
 - 8.10.2 Include with the submittal 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.
 - 8.10.3 Include with the submittal a current copy of trainer's need's assessment form which is to be reviewed with the Owner's designated representative for the system's preliminary system programming and configuration.
 - 8.10.4 Include with the submittal copies of all documentation used to identify for the Owner those participants attending and completing the training programs.
- 8.11 A copy of the manufacturer's standard statement of warranty proving all equipment provided for the school communications network is covered with the required **five-year** warranty is to be included with the project submittal. This statement of warranty is to be provided on the manufacturer's stationary.
9. Quality assurance:
- 9.1 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 within thirty (30) days after notification to proceed:
- 9.1.1 Provide a list of installations that the Installer has specifically installed for verification by the Owner. Random installations from other vendors and/or Installers are not to be accepted. The Installer, not its employees, is to meet these qualifications.
 - 9.1.2 The Installer is to be bondable.
 - 9.1.3 The Installer is to demonstrate to the satisfaction of the Owner or his representative that he has:

- 9.1.3.1 Adequate plan and equipment to pursue the work properly and expeditiously.
 - 9.1.3.2 Adequate staff and technical experience to implement the work.
 - 9.1.3.3 Suitable financial status to meet the obligations of the work.
 - 9.1.3.4 Technically capable and factory trained service personnel at a local service facility to provide routine and emergency service for all products used in this project.
- 9.2 Any Contractor, who intends to bid on this work and does not meet the requirements of the “Quality Assurance” paragraph(s), is to employ the services of an “Installer” who does meet the requirements and who is to provide the equipment, make all connections and continuously supervise the installation. A Sub-Contractor so employed as the “Installer” is to be acceptable to the Architect/ Engineer. The “Installer” is to be identified within thirty (30) days of notification to proceed for acceptance by the Architect/Engineer
- 9.3 Because the life expectancy of this type of communications structure normally exceeds 10 years, the Owner expects continuity from the service provider. If the installing/servicing company has not been an authorized provider of the manufacturers product for at least 20 years, the following is required:
- 9.3.1 A list of two (2) systems manufacturers of which they currently are authorized service providers where the relationship exceeds 10 years.
 - 9.3.2 A letter from the manufacturer outlining the details of changes in service providers over the last 20 years and what actions they will take to ensure continuity of service to the customer.
- 9.4 Each major component of equipment is to have the manufacturers name, address and model number on a plate securely affixed in a conspicuous place. NEMA code ratings, UL Label, or other data that is die-stamped into the surface of the equipment is to be easily visible.
- 9.5 Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- 9.6 Comply with NFPA 70.
- 9.7 Comply with NEMA Standard SB-40 for Emergency Communications in K-12 schools.
- 9.8 Comply with UL 60950.
10. In-service training
- 10.1 The Contractor is to provide and implement a complete and comprehensive staff training program for all administrators, facility staff members, and teachers. This mandatory training program is to provide school staff a complete understanding of how to utilize and properly operate all functions.
 - 10.2 The training program is to be implemented by a staff member/trainer employed by the Contractor. The trainer is to be factory certified to provide training on their product.
 - 10.3 All staff development training is to be coordinated through the owner’s designated representative. As training sessions are completed, the trainer is to provide the school’s administrative staff and school district’s staff a document listing all of the staff and faculty members who attended, received, and completed the training program.
11. Warranty:
- 11.1 Provide a **manufacturer’s five-year warranty** of the school communications network equipment against defects in material and workmanship. This warranty is to cover all electronic equipment, as well as analog clocks, speakers, and call-in switches. If any defects are found within the warranty period, the defective equipment is to be replaced at no cost (equipment only); a one (1) year warranty is to be provided for labor.

- 11.2 A copy of the manufacturer's standard statement of warranty proving all equipment provided for the school communications network is covered with the required five-year warranty is to be included with the project submittal. This statement of warranty is to be provided on the manufacturer's stationary. The standard five- year warranty is an important 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 normal published warranty are not to be accepted.
- 11.3 Contractor is to respond, excluding weekends and holidays, within 24 hours to any warranty service calls. If equipment cannot be repaired within 24 hours of service visit, the Contractor is to provide "loaner" equipment to the facility at no charge.
- 11.4 Make available a service contract offering continuing factory authorized service of the system after the initial warranty period.

27 53 00 Distributed Systems

Provide master clock capable of synchronization via radio frequency. Provide a wireless master/satellite time system for the facility, in order to accomplish this coordination.

- 1. Locate wireless master transmitter within the MDF room. Depending on equipment capabilities, large facilities need for additional transmitter(s).
- 2. Locate associated GPS receiver on the roof or in a window without low-E glass.
- 3. Master clock system to interface with the public address or bell system, in order to provide tone generation (ring bells).
- 4. Provide for a PC, monitor, and associated wiring for programming the system for class bell changes.
- 5. All clocks provided as part of this wireless master/satellite time system are to be located at 8'-0" AFF to the center of the device, unless otherwise approved by Dallas ISD.
- 6. Clocks to be provided in the following building areas:
 - 6.1 Administration (reception area).
 - 6.2 Auditorium.
 - 6.3 Cafeteria.
 - 6.4 Classrooms (includes all teaching spaces).
 - 6.5 Conference rooms.
 - 6.6 Corridors (100 foot maximum distance apart).
 - 6.7 Gymnasium.
 - 6.8 Library/media center.
 - 6.9 Break rooms and workrooms.
- 7. Clocks: The power is to be hard wired. Battery operated clocks are not acceptable, their use requires Owner's approval.
- 8. Provide master clock system for all new schools and existing facility additions.
- 9. Addition projects, locate the new clock system within the new MDF room to serve clocks within the new addition area only.
- 10. Addition projects receiving a new public address system (due to functionality or expansion issues), provide the tone generator to integrate the new wireless master/satellite time system with the existing public address system.

11. Any remaining addition projects, at a later date, Dallas ISD to provide similar clocks within the existing building, remove the existing master clock system and devices and integrate the new wireless master/satellite time system with the existing public address system. There is to be no scope of work regarding a new wireless master/satellite time system within the renovation projects.

END OF DIVISION 27



Division 28 – Electronic Safety and Security

28 05 00 General Requirements

1. Refer to the Responsibility Matrix in Division 01 for division of scope. Architect, Architect contracted technology consultant, Dallas ISD IT-Infrastructure, IT-CSS, Police-EM, and Dallas ISD designated representative for the project are required to coordinate during all phases of the project. All parties are to meet prior to project commencement. Any changes or deviations to the system from these requirements must be approved by IT-CSS and Police-EM.
2. Systems include video intercom, access control (card readers and keypads), intrusion detection (motion sensors), surveillance (security camera) systems, and addressable fire alarms.
3. Site and Foundation:
 - 3.1 New Construction: Provide sleeved conduits through the foundation system and crawl space as required to allow for installation of electronic safety and security systems.
 - 3.2 Renovations: Approval from Dallas ISD designated representative and Structural Engineer is required for any modification to the foundation system. Verify existing conditions prior to proposing approach and method for approval.

28 13 00 Video Intercom and Access Control

1. Architect to coordinate the locations, provide power to, and support the installation of the following:
 - 1.1 Network video door station at the main entry door and other logical frequently used entrances. Locations to be coordinated with Dallas ISD-IT-CSS, and Police-EM and Dallas ISD-IT-CSS contracted security vendor(s).
 - 1.2 Master station to be located at the main office and additional locations as directed by Dallas ISD-Police.
 - 1.3 Dual reader interface sub controllers and electronic strikes at all entrances and secured areas inside the facility (MDF, IDF, and electrical rooms). Include any entrance that received an AXIS Network video door station.
2. Keypads - Locations:
 - 2.1 Coordinate locations with Dallas ISD-IT-CSS and Police-EM.
 - 2.2 Typical locations include but are not limited to:
 - 2.2.1 Main entrance door.
 - 2.2.2 Main staff entry/exit.
 - 2.2.3 Administration area.
 - 2.2.4 Food services receiving area.
 - 2.3 Middle Schools and High Schools: Special use areas such as:
 - 2.3.1 Gymnasiums.
 - 2.3.2 Libraries with outside access.
 - 2.3.3 JROTC rooms.
 - 2.3.4 Band halls.

- 2.4 Review requirements for stand-alone systems in youth and family centers (Y&FC) with Dallas ISD designated representative.
- 3. New Construction: New security system to be provided. Refer to the Responsibility Matrix in Division 01 for division of scope.
- 4. Additions/Renovations: Expansion of existing system to be provided when there is an existing compliant system, including cabling and devices. New system to be provided when the existing system is non-compliant. Refer to the Responsibility Matrix in Division 01 for division of scope.
- 5. Secure Vestibule: Architect to coordinate the locations, provide power to, and support the installation of the following:
 - 5.1 IP intercom at exterior of main exterior door(s).
 - 5.2 Release button at vestibule side at entry to school hallway.
 - 5.3 Release button at vestibule side at entry to reception/administration (button to be able to be activated / deactivated).
- 6. Special Conditions: Campuses that include two distinct school programs in the same building (ES/MS or MS/HS), may require card readers, cameras, and IP intercom at doors separate the programs. Control locations to be coordinated with this special condition. Confirm the intent and requirements during the design phase.

28 20 00 Electronic Video Surveillance

- 1. Include proposed camera locations for interior and exterior cameras in the Contract Documents for review and coordination with Dallas ISD-IT-CSS, IT-Infrastructure and Police-EM.
- 2. Coordinate project specific requirements in the Responsibility Matrix in Division 01 with Dallas ISD-IT-CSS, IT-Infrastructure and Police-EM.

28 31 00 Electronic Intrusion Detection System

- 1. Architect to confirm system monitoring program requirements with Dallas ISD-IT-CSS, Central Dispatch, and M&O.
- 2. Intrusion Detection System:
 - 2.1 Intrusion detection systems are monitored by an AES-Multinet receiver at Dallas ISD’s central monitoring system. Intrusion Detection systems are to report to central monitoring system via an AES 7007 Burglary Subscribers IntelliNet 2.0 or Dallas ISD approved equal. If central monitoring system is not available, signal is to be sent to Southwest Dispatch or as directed by Dallas ISD designated representative. Provide twelve months of monitoring service required as part of the install.
 - 2.2 Acceptable Systems:
 - 2.2.1 Up to 96 zones: NAPCO Gemini GEM-P9600 (<https://www.napcosecurity.com/products/gemp9600/>).
 - 2.2.2 High schools requiring 96-255 zones: NAPCO Gemini X-255 (<https://www.napcosecurity.com/products/gemx255/>)
- 3. New Construction: Intrusion detection systems to be provided at all facilities including elementary, middle, and high schools.
- 4. Additions:
 - 4.1 Connect new devices to existing system. In the event that there is not adequate capacity, the existing panel is to be increased in capacity or replaced.
 - 4.2 If replacement of the existing system is required, existing intrusion detection devices and cabling are also to be replaced.

- 4.3 Communication System: AES 7007 Burglary Subscribers IntelliNet 2.0 or Dallas ISD approved equal.
- 5. Renovations:
 - 5.1 Electronic safety and security are in the scope:
 - 5.1.1 New intrusion detection system, including cabling and devices to be provided to replace all existing.
 - 5.1.2 Existing cabling and devices to be removed. Reuse of existing cabling and devices is not allowed.
 - 5.2 Electronic safety and security are not in the scope:
 - 5.2.1 Confirm status of system prior to construction activities and report findings in the pre-construction audit report.
 - 5.2.2 Any impacted or disturbed devices to be reinstalled and system tested at the conclusion of the project.
- 6. Motion Detectors:
 - 6.1 Locations: Exact locations to be determined by Dallas ISD-IT-CSS contracted security vendor.
 - 6.1.1 Facing each exterior door.
 - 6.1.2 All high-security areas, such as computer labs, libraries/media centers, and administration areas.
 - 6.1.3 Spaces with exterior doors.
 - 6.1.4 Stairwells.
 - 6.2 Narrow beam, long-range, ceiling-mounted detectors in corridors on each floor, mounted halfway down the corridor, back-to-back, facing opposite directions. Verify range with manufacturer's specifications.
 - 6.3 360-degree motion detectors at first floor (grade level) perimeter including classrooms with windows or door access, gymnasiums, and classrooms on other floors if there is roof access through doors or windows.
 - 6.4 Wiring for each motion detector to be a home run back to the intrusion detection panel for the facility or to the expansion module.
- 7. Roof Beam Detection:
 - 7.1 Locations: On roofs with HVAC equipment.
 - 7.2 Consider aesthetics and potential vandalism.
 - 7.3 Penetration of roof membrane or flashing by devices, mounting, or conduits is not allowed.
 - 7.4 Confirm the extent of each campus roof beam detection system with Dallas ISD-M&O.
 - 7.4.1 Roof beam detection is typically limited to the first roof level.
 - 7.4.2 Possible Exceptions: Where there is ladder access to/from another level or other campus specific concern.
- 8. Expansion Modules:
 - 8.1 Location: Locate module and power supply inside enclosure and install near electrical outlet within offices or closets throughout the building for ease of installation.
 - 8.2 All expansion modules to be tied into the main intrusion detection panel.
 - 8.3 Provide external power supply with each expansion module.

9. Door contacts are not allowed, except as required at MDF/IDF rooms. Refer to Division 27 for MDF/IDF requirements.
10. Window contacts and glass-break detectors are not allowed.

28 46 21 Addressable Fire Alarm Systems

1. Architect to confirm system monitoring program requirements with Dallas ISD-IT-CSS, Central Dispatch, and M&O.
 - 1.1 Fire alarm systems are monitored by an AES-Multinet receiver at Dallas ISD's central monitoring system. Fire alarm systems are to report to central monitoring system via an AES 7788F/7744F series fire subscriber and AES 7794 AES-IntelliPro Fire or Dallas ISD approved equal. If central monitoring system is not available, signal is to be sent to Southwest Dispatch or as directed by Dallas ISD designated representative. Provide twelve months of monitoring service required as part of the install.
 - 1.2 Notifier NFS2-3030 are the preferred systems. Proposed alternate systems to be pre-approved by Dallas ISD designated representative, and Dallas ISD-M&O.
 - 1.3 Existing Systems: Architect to confirm status with Dallas ISD-IT-CSS, Central Dispatch, and M&O.
 - 1.4 When expanding an existing system, architect to confirm status, capacity, and requirements with Dallas ISD-M&O and also field verify.
2. System to comply with all applicable codes. Any conflicts between requirements listed in these Technical Design Guidelines and applicable codes to be immediately brought to the attention of the Dallas ISD designated representative, who will also review with Dallas ISD-M&O.
 - 2.1 General Requirements:
 - 2.1.1 Fire alarm systems are to be addressable.
 - 2.1.2 Fire alarm panels are to have internal dialers.
 - 2.1.3 Door holders are to be electromagnetic and connected to the building fire alarm system. Electromechanical devices are not acceptable. Magnetic door holders are to be powered by 24-volt DC only.
 - 2.1.4 Fire alarm system is to have surge protection at each location the signaling line circuit leaves the main building or returns to the building from portables.
 - 2.1.5 Fire alarm system to have integral mass notification.
 - 2.1.6 Ceiling-mounted audio/visual devices are preferred.
 - 2.1.7 Pull station protectors with integral horn are required for all manual pull stations in gymnasium.
 - 2.1.8 HVAC duct detectors to be powered by the fire alarm system. Duct detectors on fire alarm control panel (FACP) are not to be powered by HVAC.
 - 2.1.9 All buildings on a campus to be connected to the main fire alarm control panel (FACP).
 - 2.1.10 Copy of the fire alarm control panel program to be provided and placed in the document cabinets located at the fire alarm control panel (FACP).
 - 2.1.11 All existing panels, devices, and wiring to be removed upon installation of new systems.
 - 2.1.12 All remote power supply and amp cabinet locations are to be provided and placed in locked document cabinets located at the fire alarm control panel (FACP).
 - 2.1.13 Fire alarm control panels (FACP) to be located in the main administrative office.
 - 2.1.14 All fire alarm AC breakers to have lock-on devices installed per NEC 70 electrical code.

- 2.1.15 Fire alarm to be zoned separately for auditoriums and black box theatres for use of haze, fog or other atmospheric in performance. Coordinate with theatre consultant and Dallas ISD Fine Arts.
3. Architect is to include the following requirements at a minimum in the Contract Documents:
- 3.1 Contractor is responsible for coordinating with Dallas ISD-IT-CSS and IT-Infrastructure to provide any dedicated phone lines that are required. Typically only required in remote locations that cannot use the AES system.
 - 3.2 Licensed fire alarm installer to coordinate any proposed system expansion with Dallas ISD-M&O prior to submittal and installation.
 - 3.3 Licensed fire alarm contractor to provide system submittal with all zone information. Contractor to coordinate system monitoring program requirements with Dallas ISD-IT-CSS and Central Dispatch.
 - 3.4 Install locking document box at the fire alarm control panel (FACP). Place completed as-built drawings, upon completion, in locked document box.
 - 3.5 Installation identifying sticker to be placed inside the fire alarm control panel (FACP).
 - 3.6 Salvaged items: All existing fire alarm control panels and remote power supplies to be removed with care and returned to Dallas ISD designated representative, who will provide to Dallas ISD-M&O.
 - 3.7 Attic stock of like manufacture to be provided to Dallas ISD designated representative, who will provide to Dallas ISD-M&O upon completion of installation in the following quantities. 10% of field devices, one SLC (signaling line circuit) Loop Card, one CPU (central processing unit), one ACM-24AT control module, if used, and one remote power supply.

END OF DIVISION 28



Division 31 – Earthwork

31 05 00 General Requirements

1. Storm sewer lines are not allowed to run under building structures.
2. Establish top elevations of manhole covers and cleanouts flush with pavements and in grass areas at an elevation allowing unobstructed mowing and assuring good positive drainage. Top of rim elevation to be minimum 4 inches, maximum 6 inches above grade.
3. When natural drainage is interrupted by drives or paved areas other than walks, water to be diverted by swale, re-grading, or piped drainage as determined by cost comparison, value and analysis. Civil Engineer to determine size of piping, flow velocities of swales, or adequacy of re-grading in all site work. Drainage design to comply with City of Dallas Drainage Design Criteria or other applicable jurisdictional code.
4. Grading to be designed to flow away from structures into collection systems. Civil Engineer to provide an overflow path away from structures with the assumption that inlets are clogged. Finish grade elevations not in accessible pathways to start 6 inches below finish floor elevation.
5. If an addition creates enclosed courtyards, provide a drainage analysis, and provide for primary and overflow drainage.
6. Lime Treated Base Courses: Refer to the latest edition of the Standard Specification for Public Works Improvements published by the North Central Texas Council of Governments (NCTOG) for guidelines/requirements.
7. Drilled Piers:
 - 7.1 Specifications to be reviewed and edited by the Civil Engineer, Structural Engineer, and Architect for project specific language regarding drilling, casings, and methods.
 - 7.2 Architect is to include the following requirements at a minimum in the Contract Documents.
 - 7.2.1 General Contractor is to provide a Drilled Pier Reconciliation Log comparing actual pier lengths (and castings) with bids documented for the purpose of determining credits to the owner.
 - 7.2.2 Unit cost for pier depth to be included in bid.
8. Renovations/Additions: Existing sites to be reviewed for accessibility compliance per TAS. Include existing signage, pathways, parking, etc. Project scope to adhere to TAS requirements on implementation of accessible improvements based on construction cost.

31 30 00 Termite Control

1. New Schools/Additions: Provide termite control in the following locations:
 - 1.1 Under slabs-on-grade.
 - 1.2 Under mud slabs in crawl spaces.
 - 1.3 Both sides of foundation surface.
 - 1.4 Soil within 10 feet of building perimeter for a depth of 4 feet under slabs.
2. Architect to include the following requirements at a minimum in the Contract Documents:
 - 2.1 Manufacturer must certify that products/materials comply with U.S. Environmental Protection Agency (EPA) and applicable state and local codes.

- 2.2 Installer Qualifications:
 - 2.2.1 Licensed and specialized in termite control.
 - 2.2.2 Minimum five (5) years documented experience.
 - 2.2.3 Approved by the manufacturer of submitted materials.
- 2.3 Application:
 - 2.3.1 Apply immediately prior to vapor/air barrier installation.
 - 2.3.2 At foundation walls apply toxicant immediately prior to finish grading work outside foundations.
 - 2.3.3 Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.
- 2.4 Warranty:
 - 2.4.1 Five (5) years from date of Substantial Completion:
 - 2.4.1.1 Against invasion or propagation of subterranean termites.
 - 2.4.1.2 Damages to any structure caused by termites.
 - 2.4.2 Coverage to Include:
 - 2.4.2.1 Repairs to structure and contents damaged as a result of termites.
 - 2.4.2.2 Costs incurred to re-treat and re-warrant.
 - 2.4.3 Contractor is to inspect annually and report in writing to Dallas ISD-M&O for the five (5) years following Substantial Completion.

END OF DIVISION 31



Division 32 – Exterior Improvements

32 05 00 General Requirements

1. High Traffic and Congregation Areas:
 - 1.1 Acceptable Materials: Concrete, concrete pavers, brick pavers and stained concrete.
 - 1.2 Bollards to be used to limit vehicular access where necessary.
2. Site plans to be review/approved by Dallas ISD designated representative and Dallas ISD-M&O.
 - 2.1 During pre-design/scope-to-budget (STB) phase, Architect to meet with Dallas ISD-M&O for review of site conditions and to obtain consensus on site approach. Documentation of this meeting will be required to obtain design approval.
 - 2.2 During 50% CD phase, plans and specifications to be forwarded to these representatives for final approval prior to starting the procurement process.

32 10 00 Bases, Ballasts and Paving

1. Bases:
 - 1.1 Base design to be based on geotechnical report recommendations.
 - 1.2 Design at service areas to comply with jurisdictional code requirements.
2. Paving:
 - 2.1 Pavement design to be based on geotechnical report recommendations.
 - 2.2 Site work paving must be portland cement reinforced concrete.
 - 2.3 Circulation patterns to be simplified to the greatest practical extent.
 - 2.4 Fire Lanes: Provide concrete paved access fire lane around new facilities per jurisdictional code.
 - 2.5 Service Drives: Provide heavy-duty reinforced concrete apron at transition with street per jurisdictional code.

32 30 00 Site Improvements

1. Architect to identify size, layout and locations of the following on master site plan:
 - 1.1 Portable Buildings:
 - 1.1.1 Indicate locations and sizes of new and proposed portable buildings.
 - 1.1.2 Approved Types:
 - 1.1.2.1 Single Classroom: 24 feet wide x 32 feet deep.
 - 1.1.2.2 Double Classroom: 24 feet wide x 64 feet deep.
 - 1.1.2.3 Toilet Rooms: 12 feet wide x 30 feet deep.

- 1.1.3 Minimum Provisions for New Schools:
 - 1.1.3.1 Elementary Schools: 8 single classroom portable buildings.
 - 1.1.3.2 Middle Schools: 12 single classroom portable buildings.
 - 1.1.3.3 High Schools: 16 single classroom portable buildings.
- 1.2 Future Construction:
 - 1.2.1 Additions.
 - 1.2.2 Parking.
 - 1.2.3 Paving: ADA / TAS compliant paved walkways from school building / locker rooms to outdoor athletics facilities.
 - 1.2.4 Geothermal well fields.
 - 1.2.5 Utilities and connections.
 - 1.2.6 Other planned facility expansion as proposed by Architect.
- 1.3 Minimum Provisions for New Schools:
 - 1.3.1 Elementary Schools: 12 classroom addition sized based on existing building height.
 - 1.3.2 Middle Schools: 16 classroom addition sized based on existing building height.
 - 1.3.3 High Schools: 20 classroom addition sized based on existing building height.
- 2. Parking Areas:
 - 2.1 Provide parking in accordance with jurisdictional requirements and standards for space and aisle dimensions.
 - 2.2 Minimum Provisions for All Schools:
 - 2.2.1 Three (3) spaces per net program area (as defined in the Educational Specifications).
 - 2.2.2 Ten (10) for volunteers.
 - 2.2.3 Four (4) located in the service court, two (2) for maintenance trucks and two (2) for delivery trucks.
 - 2.2.4 Parking for custodial staff located near building.
 - 2.3 Additional Parking Requirements by School Classification:
 - 2.3.1 Elementary Schools: Ten (10) for cafeteria staff.
 - 2.3.2 K-8 and Middle Schools: 15 for cafeteria staff.
 - 2.3.3 High Schools: Parking for 25% of student capacity, 20 for cafeteria staff.

- 3. Dumpsters/Compactors:
 - 3.1 General:
 - 3.1.1 Location to be close to kitchen dock area with appropriate service drive.
 - 3.1.2 Must be out of view of the cafeteria or visually shielded from diners.
 - 3.1.3 Dumpsters /compactors to be screened, fenced and gated. Screens to comply with jurisdictional code. Where dumpster screening is not required by code, provide a minimum 6 foot high chain link enclosure and gate(s) with vinyl inserts.
 - 3.2 Dumpster Enclosure Requirements:
 - 3.2.1 Sizes:
 - 3.2.1.1 Single (8 yard): 12 feet wide x 12 feet deep.
 - 3.2.1.2 Double (2x 8 yard): 24 feet wide x 12 feet deep.
 - 3.2.1.3 Triple (3x 8 yard): 36 feet wide x 12 feet deep.
 - 3.2.2 Structure:
 - 3.2.2.1 Slabs to be thickened and reinforced. Heavy-duty pavement design based on geotechnical report recommendations.
 - 3.2.2.2 Piers are not allowed unless recommended by the geotechnical report and approved by Dallas ISD.
 - 3.2.3 Gates:
 - 3.2.3.1 All gates to allow minimum opening of 10 feet.
 - 3.2.3.2 Hinges to be heavy-duty welded.
 - 3.2.3.3 Wheels to be hard rubber or urethane.
 - 3.2.4 Provide concrete filled metal bollards at perimeter of slab inside of screen.
 - 3.2.5 Provide heavy-duty concrete apron in front of dumpster: Apron to be 8 inch thickness, 36 feet x width of enclosure.
 - 3.2.6 Refer to Figure 32 30 00-01 for typical enclosure layout.

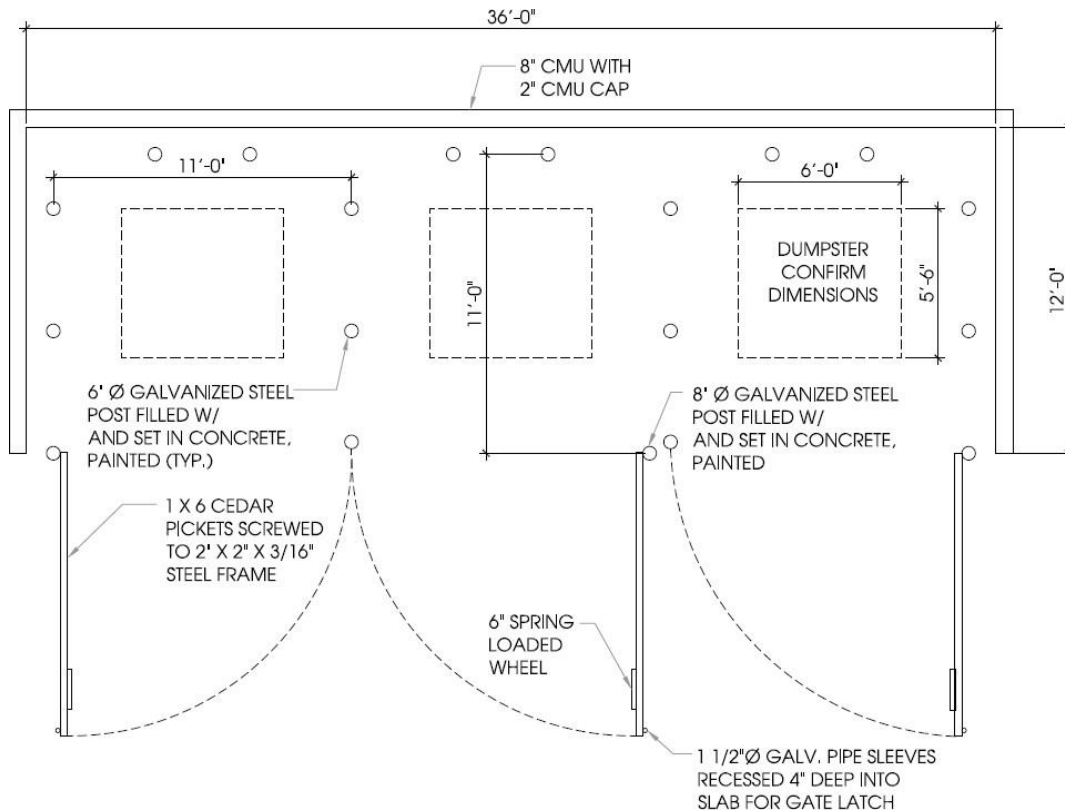


Figure 32 30 00-01: Typical Dumpster Enclosure Layout

- 3.3 New Construction: Triple enclosure required.
- 3.4 Renovations: Architect to submit a preliminary study/analysis of the dumpster existing area and proposed renovations to the Dallas ISD designated representative for approval. Study to include turning movement analysis based on verified vehicle type, logistics for quantity and inclusion of compactor, construction materials, existing conditions, apron suggestions, number of enclosures and other overall requirements.
- 4. Sports Fields / Play Areas:
 - 4.1 General:
 - 4.1.1 Refer to Division 11 for playfield equipment and structures.
 - 4.1.2 Sports Fields: Use University Interscholastic League (UIL) and National Federation of State High School Associations (NFHS) standards for court / field layouts. Confirm layouts with Dallas ISD-Athletics on a project specific basis.
 - 4.1.3 Paved / non-paved play areas to be separated from vehicular traffic by distance or an effective barrier.
 - 4.1.4 Provide field drainage system including 10 inch, 12 inch and 15 inch HDPE N-12 perforated pipe tied into storm sewer system.
 - 4.1.5 New football / soccer, baseball and softball fields are to use synthetic turf.
 - 4.1.6 Where grassed football / soccer, baseball and softball fields are existing or proposed by Dallas ISD:

4.1.6.1 Grass: Latitude 36 bermudagrass.

4.1.6.2 Provide irrigation. Layout and head design to be reviewed by Dallas ISD-M&O and Dallas ISD-Athletics prior to Construction Document phase.

4.1.7 Refer to Division 22 for hose bibb requirements.

4.1.8 Sport Fields and Play Area Requirements: Provide the following:

	Hard Surface Outdoor Play Area	Informal Play Area	Baseball	Softball	Track /Field	Football/ Soccer	Tennis
Elementary	1	1					
Middle	1	1	1	1		1	2
High	2		2	2	1	2	4

4.2 Hard Surface Outdoor Play Area (at elementary schools only):

4.2.1 Size: 60 feet x 100 feet minimum.

4.2.2 Playing Surface: Concrete.

4.2.3 Include full size (50 feet x 84 feet) basketball / volleyball court with striping for both, and two (2) basketball goals.

4.2.4 Refer to Figure 32 30 00-02 for layout.

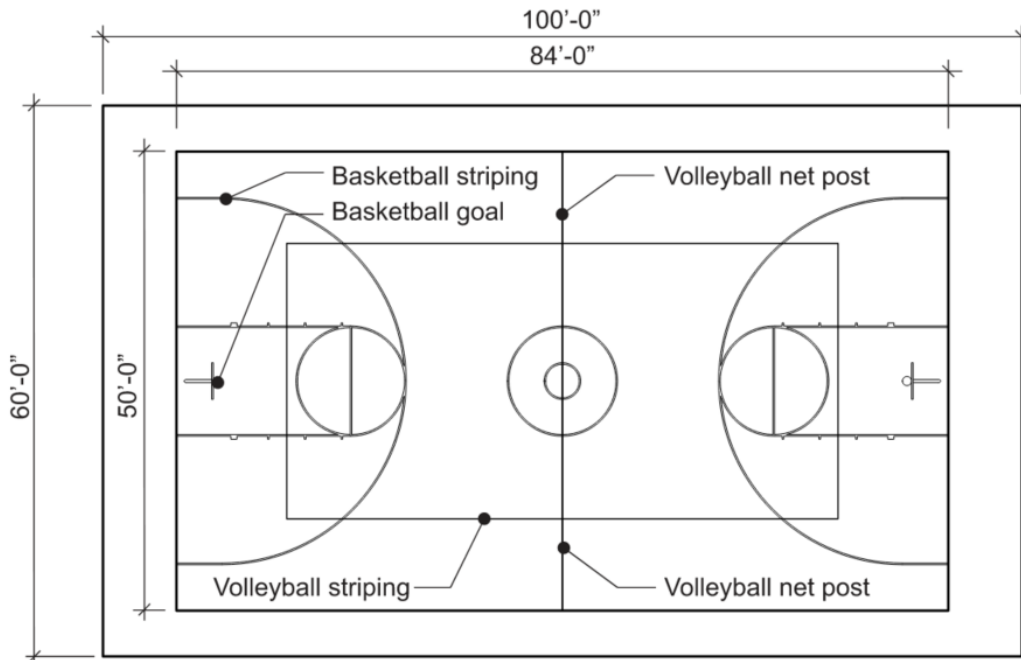


Figure 32 30 00-02: Typical Basketball / Volleyball Layout

- 4.3 Informal Play Area (at elementary schools only):
 - 4.3.1 Size: 150 feet x 240 feet minimum.
 - 4.3.2 Playing Surface: Latitude 36 bermudagrass.
 - 4.3.3 Include a combined football/soccer field with stripping and goals for both.
 - 4.3.4 Refer to Figure 32 30 00-03 for layout.

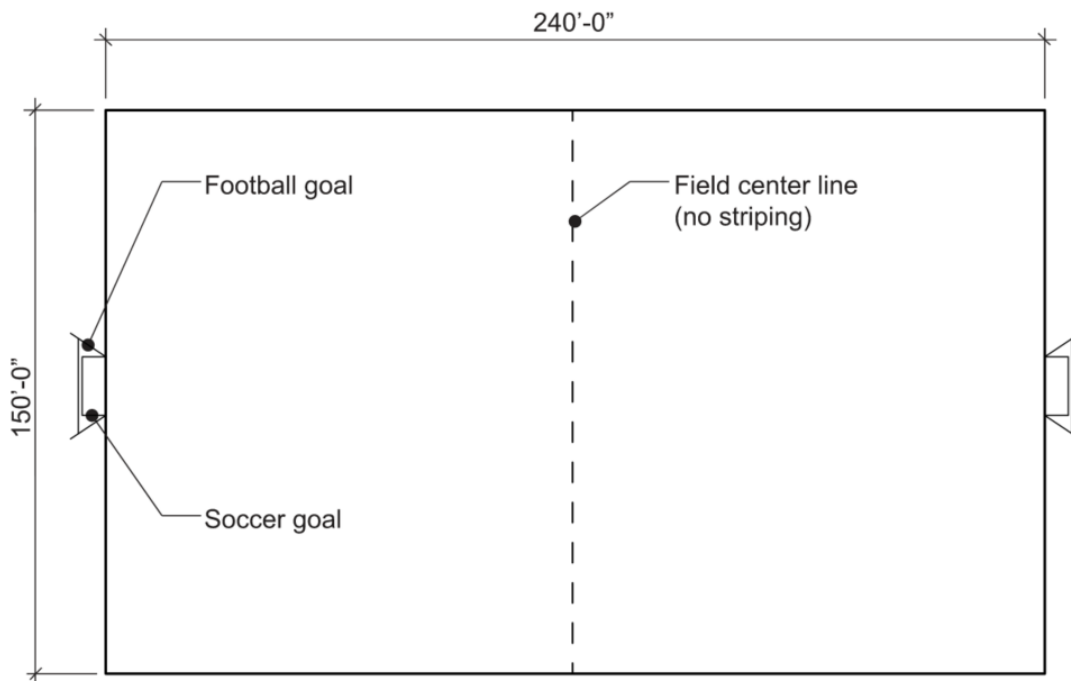


Figure 32 30 00-03: Typical Football / Soccer Layout

- 4.4 Running Track:
 - 4.4.1 Provide new four (4) lane regulation track. Refer to University Interscholastic League (UIL) standards for layout.
 - 4.4.2 Design field events per UIL layout guidelines at inside curves. Include new long jump pits for boys and girls.
 - 4.4.3 Provide a full pour rubberized running track surface, red in color with full striping for a 400-meter track (or size of current track, with 42 inch lanes).
 - 4.4.4 Track surface to meet the following characteristics:
 - 4.4.4.1 Full-Pour System: Minimum 10 mm in depth.
 - 4.4.4.2 Polyurethane base layer with SBR or EPDM granules with topcoat of pigmented polyurethane and embedded/pigmented EPDM rubber granules and over-sprayed with a UV stable protective coating. Specifications to include layout, track lines and event markings.

- 4.4.5 Infield Surround Surface:
 - 4.4.5.1 New Construction: Synthetic turf.
 - 4.4.5.2 Renovations or as proposed by Dallas ISD: Latitude 36 bermudagrass.
- 4.4.6 Provide 6 inch wide concrete curb around perimeter of track.
- 4.4.7 Renovations: Include removal of existing grade and track surfaces and disposal.
- 4.4.8 Architect to include the following requirements at a minimum in the Contract Documents:
 - 4.4.8.1 Site excavation and surface grading to be included in bid.
 - 4.4.8.2 Submit shop drawings and product data for approval.
 - 4.4.8.3 Identify all utilities prior to commencement of work.
 - 4.4.8.4 Install new stone base.
- 4.5 Football / Soccer Fields:
 - 4.5.1 Locate football / soccer field within running track.
 - 4.5.2 Refer to the National Federation of State High School Associations (NFHS) Court and Field Diagram Guide for layout.
 - 4.5.3 Playing Surface:
 - 4.5.3.1 New Construction: Synthetic turf.
 - 4.5.3.2 Renovations or as proposed by Dallas ISD: Latitude 36 bermudagrass.
 - 4.5.4 Provide 12 inch x 12 inch, continuously reinforced, concrete curb at perimeter of field.
 - 4.5.5 Provide new goal posts at all new schools and renovations where outside sports fields are identified in the project scope.
 - 4.5.6 Include school logo at center of field and school name in colored letters at both end zones. Confirm with Dallas ISD-Athletics on a project specific basis.
- 4.6 Baseball and Softball Fields:
 - 4.6.1 Batting Cages: Coordinate exact requirements with Dallas ISD-Athletics on a project specific basis.
 - 4.6.1.1 Size: 40 feet x 80 feet.
 - 4.6.1.2 Three (3) batting tunnels, minimum.
 - 4.6.1.3 12 foot high chain link fence walls with lockable gates on both ends.
 - 4.6.1.4 Provide R-panel metal roof, gabled.
 - 4.6.1.5 Concrete slab foundation with synthetic turf.

- 4.6.1.6 Provide power for pitching machines, and multiple power outlets.
- 4.6.1.7 Provide lighting.
- 4.6.1.8 Provide appropriate netting.
- 4.6.2 Baseball and Softball fields to include a scorer's stand and appropriate safety netting behind home plate and to match the design of dug-outs.
- 4.6.3 Grassed Area:
 - 4.6.3.1 New Construction: Synthetic turf.
 - 4.6.3.2 Renovations or as proposed by Dallas ISD: Latitude 36 bermudagrass.
- 4.6.4 Baseball and Softball Field Clay:
 - 4.6.4.1 Firm traction.
 - 4.6.4.2 Good drainage.
 - 4.6.4.3 Adequate moisture retention to ensure pliable surface texture.
 - 4.6.4.4 Mixture to provide adequate compaction while allowing for ease during regular maintenance.
 - 4.6.4.5 Be quick drying and absorbent.
 - 4.6.4.6 Mixture Makeup:
 - 4.6.4.6.1 Natural ingredients.
 - 4.6.4.6.2 Free of stones, sticks, roots and debris.
 - 4.6.4.6.3 Reddish brown in color with no segregation of ingredients.
 - 4.6.4.6.4 Screens through 1/4 inch screen.
 - 4.6.4.7 Conform to ASTM Standards on Infield Dirt F2107-08. Clay Silt / Sand Ratio to be 35% / 65%.
- 4.6.5 In-Field:
 - 4.6.5.1 Good Drainage. Should generally conform with ASTM F2107-08.
 - 4.6.5.2 Adequate moisture retention.
 - 4.6.5.3 All natural material to be quick drying and absorbent.
 - 4.6.5.4 Material: Anchor Sports I, Inc. Anglea Turf Infield Conditioner, Deluxe (crimson red) or Dallas ISD approved equal. Anchor Sports of Richardson, Texas '*Crimson Red Deluxe Blend Infield Conditioner*':
 - 4.6.5.4.1 Liquid Limit: 26%.

4.6.5.4.2 Plastic Limit: 16%.

4.6.5.4.3 Plasticity Index: 10%.

4.6.6 Out-Field:

4.6.6.1 Chain link fence along wing fences with wind screens.

4.6.6.2 Outfield Wall: 8 foot high R-panel metal fence with cap.

4.6.6.3 Locate outlet in wall, location to be determined based on location of scoreboard on a project specific basis.

4.6.7 Warning Track: Anchor Sports I, Inc. Anglea Turf Infield Conditioner Warning Track (crimson red) or Dallas ISD approved equal.

4.7 Bullpen Mounds:

4.7.1 Provide double bullpen mounds on home side and visitor side.

4.7.2 Size: 16 feet wide x 13 feet long, 10 inch height, with proper slopes.

4.7.3 Homeplate to be identified 60'-6" away from the each pitching rubber.

4.8 Backstops:

4.8.1 30 inch high, concrete structure with brick veneer exterior finish material.

4.8.2 50 foot high nylon safety netting.

4.8.3 Backstop to run from dugout to dugout.

4.9 Dugouts:

4.9.1 Provide brick wall on three (3) sides, 8 foot high, minimum.

4.9.2 Size: 30 feet long x 10 feet wide, minimum.

4.9.3 Metal roof, shed.

4.9.4 4 foot chain link protection fence in front of dugout.

4.9.5 Provide lighting..

4.9.6 Not to be 'sunken' in design.

4.9.7 Anchor aluminum players' benches at concrete floor.

4.9.8 Provide electrical receptacles around the backstop and near both sides of the dugouts for announcer's/scorer's table/set-up. Confirm requirements with Dallas ISD-Athletics.

4.10 Tennis Courts:

4.10.1 Court layout and markings to meet International Tennis Federation (ITF) and UIL guidelines.

4.10.2 Provide with the following equipment:

- 4.10.2.1 Tennis nets.
- 4.10.2.2 Two (2) benches with shelf. Refer to Division 12 for specification.
- 4.10.2.3 Official's stand.
- 4.10.2.4 Hitting wall.

5. Fencing:

5.1 All fences to have a 12 foot gate strategically located for maintenance access.

5.2 Fencing Heights:

- 5.2.1 Perimeter fencing to be 4 feet in height, unless required otherwise by code.
- 5.2.2 A minimum fence height of 6 feet to be provided at parking areas and detention ponds
- 5.2.3 Dallas ISD approval is required for taller fencing if necessary.

5.3 Gates:

- 5.3.1 Gate Post Footings: 36 inches deep x 9 inch diameter minimum, concrete.
- 5.3.2 Swinging pedestrian gates to have weld on hinges and automatic locking latch.
- 5.3.3 Entry Driveway Gates:
 - 5.3.3.1 V-track rolling gates.
 - 5.3.3.2 Provide a dedicated 1 inch conduit from the gate to IDF/ MDF room for audio/video cables.
 - 5.3.3.3 Provide a dedicated 20 amp 120 volt electrical circuit at the location where the automatic opener will be placed.

5.4 Provide mow strip under all fencing.

5.5 Chain Link Fencing:

- 5.5.1 All fencing and wire ties to be 9 gauge, commercial grade galvanized steel. Aluminum wire is not allowed.
- 5.5.2 Line Posts: 2-3/8 inch schedule 40 galvanized steel.
- 5.5.3 Top Rails: 1-5/8 inch schedule 40 galvanized steel.
- 5.5.4 Wire Ties:
 - 5.5.4.1 Three (3) ties at line posts for 4 foot high fence, spaced evenly.
 - 5.5.4.2 Five (5) ties at line posts for 6 foot high fence, spaced evenly.
 - 5.5.4.3 Installed 12 inches apart on top rail.
 - 5.5.4.4 Line Wire at Bottom of Fabric: 18 inch max using pig rings or approved substitute.
- 5.5.5 All miscellaneous components and accessories to be galvanized steel.

- 5.5.6 Line Post Footing Holes: 36 inches deep x 12 inch diameter, concrete.
- 5.5.7 Chain Link Gates:
 - 5.5.7.1 Single Gate Posts: 4 inch post in 36 inch deep x 12 inch diameter, concrete footing.
 - 5.5.7.2 Double Gate Posts: 6-5/8 inch post in 36 inch deep x 18 inch diameter, concrete footing.
- 5.6 Wrought Iron Fencing: Provide around turf fields and practice tracks.
 - 5.6.1 Line Posts: 3 inch x 3 inch, 14 gauge.
 - 5.6.2 Rails: 1-1/2 inch x 1-1/2 inch, 14 gauge.
 - 5.6.3 Pickets: 3/4 inch x 3/4 inch, 14 gauge. Type (spears, flat or other) to be selected by Dallas ISD on a project specific basis.
 - 5.6.4 Line Post Footings: 30 inches deep x 9 inch diameter, concrete.
 - 5.6.5 All wrought iron to be welded in place. Prefabricated panels are not allowed.
 - 5.6.6 All wrought iron to be painted in place with gloss black rust resistant paint.
 - 5.6.7 Wrought Iron Gates:
 - 5.6.7.1 Gate locations to be coordinated with campus and Dallas ISD-Athletics.
 - 5.6.7.2 Frames: 2 inch x 2 inch, 14 gauge.
 - 5.6.7.3 Gate Posts: 4 inch x 4 inch, 11 gauge.

32 52 00 Synthetic Turf

1. General Requirements:
 - 1.1 Provide sport-specific (football / soccer or baseball / softball) synthetic turf system per manufacturers specifications.
 - 1.2 All field markings and game lines to be inlaid.
2. Architect to include the following requirements at a minimum in the Contract Documents:
 - 2.1 Site excavation and lime stabilization to be included in bid. Contractor to assume an excavation depth of 12 inches and to provide a unit cost for additional stabilization depth if needed.
 - 2.2 Submit shop drawings and product data for approval.
 - 2.3 Identify all utilities prior to commencement of work.
 - 2.4 Install 6 inch layer of clean, washed crushed limestone drain rock over the entire sub-grade.
 - 2.5 Install sand and rubber per manufacturers specs.
 - 2.6 Install 20 mil PVC liner over entire field sub-grade and Install 2x4 treated wood turf attachment nail board along new concrete curb.
 - 2.7 Use laser guided equipment to grade drain rock to achieve finished elevations per synthetic turf design requirements.
 - 2.8 Provide turf maintenance equipment for the field and owner training as per manufacturers specs.

- 2.9 Provide maintenance training to school staff and Dallas ISD-M&O.

32 80 00 Irrigation (Landscaping)

1. General Requirements:
 - 1.1 Landscape irrigation design and specifications to follow current Texas Commission on Environmental Quality (TCEQ) requirements and guidelines.
 - 1.2 New Schools: Irrigation to be considered for the “front” yard(s), or street frontages, and athletic fields for the campus. Unless local code requires entire site to be irrigated.
 - 1.3 Renovation Projects: To be discussed directly with the Dallas ISD-M&O during Schematic Design / STB phase. Preliminary approach to include front yards, street frontages and athletic fields.
 - 1.4 Coordination and final review of irrigation plans and specifications to occur with the Dallas ISD-M&O at the Design Development and 95% CD stage.
 - 1.5 Architect to provide the Dallas ISD-M&O with estimated water usage for landscaped areas with recreational fields calculated separately.
2. Landscape Ordinance: If relocation of an existing Dallas ISD parking lot is required to comply with landscape ordinances such as a 10 foot buffer strip, notify Dallas ISD designated representative immediately. Dallas ISD policy is to request a variance to allow the existing lot to remain without modification.
3. Irrigation System:
 - 3.1 Connectivity: Controller to have Ethernet connection for inclusion in the building management and control system (BMCS).
 - 3.2 Components: System to include the following components at a minimum:
 - 3.2.1 Master valve and 2 inch flow sensor.
 - 3.2.2 Lightning protection for system.
 - 3.2.3 Sufficient flow for two zones to operate simultaneously.
 - 3.2.4 Controller zone chart.
 - 3.2.5 Bubblers at trees and large shrubs.
 - 3.3 Construction Documents: Comply with and reference all applicable codes including but not limited to ball valve and backflow preventers, meter monitoring requirements, and water conservation codes.
4. Hose Bibs Connectors:
 - 4.1 Location: Building perimeter, no more than 100 feet apart.
 - 4.2 Type: Keyed type, freeze resistant, flush mounted in a lockable box.
 - 4.3 Provide underground water line with quick-couplers in boxes with lockable covers at grade. Quick Couplers
5. Quick Couplers:
 - 5.1 To include a ball shut off valve 3’-4’ from each quick coupler location and within 18” of mainline supply.
 - 5.2 Must accept 1 inch hose.
 - 5.3 Locate constant flow quick-couplers:
 - 5.3.1 Ball Fields: Behind home plate and behind pitcher's mound.

- 5.3.2 Along football field sidelines near the 50 yard line.
- 5.3.3 All sidewalk and pavement areas to have at least one (1), 4 inch sleeve with two (2) pull strings at each irrigation crossing.

6. Architect to include the following requirements at a minimum in the Contract Documents:

6.1 Operation and Maintenance Manuals:

- 6.1.1 Prepare and deliver to the Owner within ten calendar days prior to completion of construction, three hard cover binders with three rings containing the following information:
 - 6.1.1.1 Index sheet stating Contractor's address and telephone number, list of equipment with name and addresses of local sources of equipment installed. Manuals and/or catalog and parts sheets on all material and equipment installed under this contract.
 - 6.1.1.2 Guarantee statement.
 - 6.1.1.3 Complete operating and maintenance instructions on all major equipment.
 - 6.1.1.4 Copy of the Irrigation Installation Certification Letter.
 - 6.1.1.5 Water Schedule: Water schedule shall state watering times and frequencies of each irrigation zone. Water schedule shall be based on the local ET (evapotranspiration) rate.
- 6.1.2 In addition to the above mention maintenance manuals, provide the Owner's maintenance personnel with instructions for major equipment.
- 6.1.3 It is the responsibility of the Licensed Irrigation Contractor to demonstrate that final installed sprinkler system will operate according to intent of originally designed and specified system. If Licensed Irrigation Contractor notes any problems in head spacing or potential coverage, it is his responsibility to notify the Owner in writing, before proceeding with work. Licensed Irrigation Contractor guarantees 100% coverage of all areas to be irrigated.

6.2 Equipment to be Furnished:

- 6.2.1 Supply as part of this contract the following tools:
 - 6.2.1.1 Two (2) sets of sprinkler wrenches for adjusting, cleaning or disassembling each type of sprinkler and two (2) each of any special tools required for any other equipment.
 - 6.2.1.2 Four (4) pop-up spray heads each type and four (4) nozzles of each type installed.
 - 6.2.1.3 Four (4) rotary heads of each type installed.
 - 6.2.1.4 Two (2) quick coupling keys with hose swivels, hose bibs/garden valves to match size installed.
 - 6.2.1.5 Two (2) valve keys each for operating cast iron and brass gate valves.
 - 6.2.1.6 Two keys for automatic controller lock.

6.2.2 The above mentioned equipment shall be turned over to the Owner via a signed transmittal at the conclusion of the project. Before final inspection, verification that materials have been provided will occur.

6.3 Guarantee:

6.3.1 The guarantee for the sprinkler irrigation system shall be included in the operations and maintenance manual.

GUARANTEE FOR SPRINKLER IRRIGATION SYSTEM

We hereby guarantee that the sprinkler irrigation system we have furnished and installed is free from defects in materials and workmanship, and the work has been completed in accordance with the contract documents, ordinary wear and tear and unusual abuse, or neglect excepted. We agree to repair or replace any defects in material or workmanship which may develop during the period of one year from date of acceptance (substantial completion) and also to repair or replacing of such defects at no additional cost to the Owner. We shall make such repairs or replacements within a reasonable time, as determined by the Owner, after receipt of written notice. In the event of our failure to make such repairs or replacements within a reasonable time after receipt of written notice from the Owner, we authorize the Owner to proceed to have said repairs or replacements made at our expense and we will pay the costs and charges therefore upon demand.

PROJECT:

LOCATION:

SIGNED:

ADDRESS:

PHONE:

DATE OF ACCEPTANCE:

6.4 Project conditions

6.4.1 Sleeves and Conduits: Installed by Contractor as indicated on Drawings. Do not use as main or lateral lines.

6.4.2 Contractor shall verify on-site pressure is adequate for a proper installation. Contractor shall submit letter certifying that on-site pressure exceeds design pressure by 10%.

6.4.2.1 If on- site pressure does not exceed design pressure by 10%, contact Architect for resolution. If construction work is started prior to receiving certification letter, Contractor assumes all costs for changes required to meet on-site pressure requirements.

6.4.2.2 If on-site pressure exceeds design pressure by greater than 10%, Contractor shall install a pressure regulator.

- 6.4.3 Site Utilities: Determine locations of underground utilities, including but not limited to, site lighting, cable, telephone, and irrigation lines prior to commencement of work. Perform all work in a manner which will avoid possible damage. Do not permit heavy equipment or trucks to damage utilities. Hand excavate, as required to minimize possibility of damage to underground utilities.
- 6.4.4 Determine locations of underground utilities, including but not limited to, site lighting, cable, telephone, and irrigation lines prior to commencement of work. Perform all work in a manner which will avoid possible damage. Do not permit heavy equipment or trucks to damage utilities. Hand excavate, as required to minimize possibility of damage to underground utilities.
- 6.4.5 Contractor is responsible for protecting all existing trees, plants, lawns, and other features designated to remain.
- 6.4.6 Provide and install a dedicated irrigation meter and backflow preventer for the irrigation system water supply.
- 6.4.7 Design Pressure: (Unless System Designer Proposes Differently)
 - 6.4.7.1 Design Static Pressure: 52.6 PSI.
 - 6.4.7.2 Spray Zone: 30 PSI.
 - 6.4.7.3 Rotary Zone: 40 PSI.
 - 6.4.7.4 Tree Bubbler Zone: 30 PSI.
- 6.4.8 Acceptance of Substrate: Contractor shall automatically assume the responsibility for any unacceptable finished work caused by substrate conditions.
- 6.4.9 Damages: Contractor shall be responsible for any and/or all damages that might occur during the project to utilities and relative items. In addition, contractor agrees to promptly make any repairs or pay damages whichever Dallas ISD prefers, should damages occur. Contractor shall locate all utilities.

7. Architect to include the following product specifications at a minimum in the Contract Documents:

7.1 Materials:

- 7.1.1 General: Use only new materials as specified below.
- 7.1.2 PVC Pressure Mainline Pipe and Fittings:
 - 7.1.2.1 Pressure mainline piping for sizes 1 inch and larger, shall be PVC Schedule 40.
 - 7.1.2.2 Pipe shall be made from an NSF approved Type I, Grade II, PVC compound conforming to ASTM resin specification D1785-68. All pipe must meet requirements as set forth in Federal Specification PS-21-70, with an appropriate standard dimension (S.D.R.) (Solvent-weld pipe).
 - 7.1.2.3 PVC solvent-weld fittings shall be Schedule 40, 1-2, II-I NSF approved conforming to ASTM test procedure D2466.
 - 7.1.2.4 Solvent cement and primer for PVC solvent-weld pipe and fittings shall be of type and installation methods prescribed by the manufacturer.

- 7.1.3 Flexible PVC Tubing: All flexible PVC tubing shall be I.P.S. heavy wall hose made from rigid PVC material. Hose shall meet or exceed schedule 80 wall thickness and shall comply with ASTM D2287 and tested in accordance with ASTM D1598. Hose shall be tested at 200 psi static pressure for 2 hours and a quick burst rating of a minimum of 400 psi.
- 7.1.4 Swing Joints and Nipples: Install threaded and gasketed schedule 80 PVC 3-way swing joints and nipples. The unit shall contain o-ring seals at all elbow connections.
- 7.1.5 Manual Valves:
- 7.1.5.1 Gate valves 3.0 inches and smaller shall be USA made, 200 lb. WOG, highest grade cast bronze gate valve with screw-in bonnet, nonrising stem and solid wedge disc, threaded ends and a cast iron handwheel, manufactured by Nibco or Dallas ISD approved equal.
- 7.1.5.2 Isolation Valves shall be Nibco schedule 80 PVC ball valves with union connection at both ends of valve sized same main line or Dallas ISD approved equal.
- 7.1.6 Quick coupling Valves: Quick coupling valves shall have a brass one-piece body designed for working pressure of 150 PSI operable with quick coupler key. Key size and type shall be as shown on plans.
- 7.1.7 Control Wiring:
- 7.1.7.1 Connections between the automatic controllers and the electric control valves shall be made with UF-B UL PVC double insulated, two conductor solid core wire, (Maxi-Wire) #14, under 30 VAC RMS using a National Electric Code Class II circuit. Install in accordance with valve manufacturer's specifications and system design.
- 7.1.7.2 Conductor shall be soft drawn, annealed solid copper conforming to ASTM 33.
- 7.1.7.3 Conductor insulation shall be 4/64 – inch thick polyvinyl chloride (PVC), conforming to UL Standard #493 for thermoplastic-insulated style UF, rated at 60 degrees C.
- 7.1.7.4 The two insulated conductors are laid in parallel and encased in a single outer jacket of 3/64- inch thick, high density, sunlight resistant polyethylene conforming to ICEA S-61-402 and NEMA WC5, having a minimum wall thickness of .045-inch.
- 7.1.7.5 Conductor shall be one red, one black.
- 7.1.7.6 All wire insulation shall be intact and free of nicks and cuts.
- 7.1.7.7 For runs greater than 4000 feet, larger wire may be used provided it conforms to controller manufacturer's specifications for both material specification and installation.
- 7.1.7.8 Underground splice kit shall be 3M DBR-6 or approved equal, water-tight, dry splice connector or approved equal. All wire splices shall be protected by a valve box. No splices shall be installed on runs less than 500 feet.
- 7.1.7.9 Where control wire leaves mainline, install in Schedule 40 PVC conduit.

7.1.8 Automatic Controllers:

- 7.1.8.1 BaseLine BaseStation 3200R or Dallas ISD approved equal controller with ethernet connection to be compatible with Baseline BaseManager system. Ethernet connection to initiate at the MDF cabinet and terminate inside the irrigation controller cabinet with a RJ 45 connector. Cable to be CAT5 newer. Provide lockable, weatherproof metal cabinet. Verify intent with Dallas ISD prior to final install of this portion of the system.
- 7.1.8.2 Automatic controllers shall be of size and type to accommodate system design. Final location of automatic controllers shall be approved by Dallas ISD-M&O.
- 7.1.8.3 Unless otherwise indicated, the 120 volt electrical power for the controller is available at the site. The final electrical hook-up shall be the responsibility of the Irrigation Contractor. Controller to be hard wired. Plug-in connection is not allowed.
- 7.1.8.4 Flow sensor(s), bicoder(s), surge protector(s) and bisensor(s) to be compatible with BaseLine system.

7.1.9 Valve Boxes:

- 7.1.9.1 Manual Valves: 10 inch box, Carson Industries or Ametek, with green bolt down cover. Use extensions where required.
- 7.1.9.2 Electrical Control Valves: Standard rectangular box, Carson Industries or Ametek, with green bolt down cover or Dallas ISD approved equal. Install extension sleeves as required.
- 7.1.9.3 Backflow Preventer: Pump Guard Box. Box shall be sized to fit required backflow preventer by minimum of 6" on each end.

7.1.10 Sprinkler Heads:

- 7.1.10.1 Sprinkler heads in lawn areas as specified on plan.
 - 7.1.10.1.1 Popup heads twelve and six inches.
 - 7.1.10.1.2 Spray adjustable nozzles.
 - 7.1.10.1.3 Adjustable rotor heads 3/4 inch- female inlet NPT.
 - 7.1.10.1.4 Spray heads 1/2 inch-female inlet NPT.
 - 7.1.10.1.5 Approved Manufacturer: Hunter or Dallas ISD approved equal.
- 7.1.10.2 All sprinkler heads shall be of the same size, type, and deliver the same rate of precipitation with the diameter (or radius) of throw and discharge as to accommodate designed system and/or specified in these special provisions.
- 7.1.10.3 All sprinkler heads of the same type shall be of the same manufacturer.
- 7.1.10.4 Ensure that Sprinkler head at the building perimeter are pointed away from the building so not to stain materials.

7.1.11 Rotary Heads: Rotary pop-up sprinklers shall be in-line combination type with positive drive by means of a water-driven gear motor. Nozzles shall be readily accessible without removing the upper head assembly.

7.1.12 Sleeves:

7.1.12.1 Definition: a pipe with in another pipe for carrying water will be installed.

7.1.12.2 Wire sleeve: a pipe used to carry low voltage irrigation wires for operation of electric control valves.

7.1.12.3 All sleeves shall be SCH 40. Size shall be equal to twice the diameter of the pipe or combination of pipes enclosed within the sleeve.

7.2 Accessories:

7.2.1 Connections for PVC and Metal Pipe: For all threaded connections between PVC and metal pipe use Heavy Duty Rectorseal thread sealing paste with virgin Teflon No. 100 as manufactured by Rectorseal Corp or Dallas ISD approved equal. Apply in accordance with manufacturer's instructions.

7.2.2 Drainage Fill: 1/2 inch washed pea gravel.

7.2.3 Sand Layer: Washed sand.

32 90 00 Planting (Landscaping)

1. General Requirements:

1.1 Provide positive drainage including surface and/or sub-surface drainage improvements.

1.2 Improvements to emphasize trees and lawns, and to use only proportionately small amounts of ground covers, low shrubs, vines and perennials.

1.3 Simplicity in design and ease of maintenance to be prioritized.

1.4 Avoid planting that limits visual surveillance.

1.5 Use indigenous and native drought resistant plant material whenever possible.

1.6 Renovation Projects: Any new landscaping to Complement the existing landscaping.

1.7 Architect to review landscape drawings and specifications with Dallas ISD Grounds Care Division at the STB and 95% CD stage.

2. Sod:

2.1 Tifway 419 to be used at all areas receiving partial to full sun.

2.2 Renovations:

2.2.1 Areas likely to be disturbed by proposed construction to receive sod and irrigation through the establishment period.

2.2.2 Provide a minimum of 2 feet of new sod along each side of new or renovated walkways in sodded areas.

2.3 New Construction: All grounds to receive properly installed sod and irrigation through the establishment period.

3. Trees:

- 3.1 Ensure that landscaping close to exterior walls does not trap water that may contribute to erosion and future structural damage.
- 3.2 Placement of trees near exterior walls where root systems may contribute to future foundation issues is not allowed. Proximity of trees to buildings or other permanent structures to use the following criteria, based on the full tree height at maturity:
 - 3.2.1 Large trees: Minimum 25 feet.
 - 3.2.2 Small trees: Minimum 15 feet.
- 4. Edging:
 - 4.1 Planting beds to be separated from lawn areas by steel edging.
 - 4.2 Steel Edging: 1/8 inch x 4 inch installed with steel stakes.

END OF DIVISION 32

Division 33 – Utilities

33 05 00 General Requirements

1. Project Budgets: Architect to contact the utility companies immediately upon notice to proceed to determine extent of work regarding any new or upgraded services that are required.
 - 1.1 Estimated costs associated with off-site and on-site utilities are to be identified in the project construction cost estimate.
 - 1.2 Associated fees are paid by Dallas ISD directly to the service providers and are not to be included in the Construction Cost Limitation (CCL).
2. Architect to verify existing size of all services for record purposes.
 - 2.1 Information to be included in required field report during the pre-design phase.
 - 2.2 Refer to Dallas ISD provided 'Checklists' for further requirements.
3. Architect to reference the "Standard Specifications for Public Works Improvements", latest edition as published by the North Central Texas Council of Governments (NCTCOG) as related to:
 - 3.1 Water systems.
 - 3.2 Sanitary sewer systems.
 - 3.3 Storm sewerage.
 - 3.4 Gas distribution.
 - 3.5 Earthwork.
 - 3.6 All related materials and products noted for systems listed above.
 - 3.7 Refer to Divisions 22 and 26 for additional requirements regarding utilities, service and equipment.
4. Construction Documents to comply with the following codes/regulations at a minimum:
 - 4.1 NFPA 24 and local utility standards pertaining to the sanitary sewerage and storm sewerage.
 - 4.2 EPA or other environmental agencies as related to sanitary sewerage.
 - 4.3 Local gas company requirements unless otherwise approved during design process.
5. Utility Service and Distribution:
 - 5.1 Planning and detailing of utility service entrances and service equipment is critical and should be reviewed with Dallas ISD designated representative during Design phase.
 - 5.2 All services to be brought in underground.
 - 5.3 Utility lines located within a school kitchen are to be located in the floor, wall or ceiling. Surface runs on the floor are not allowed.
 - 5.4 New Construction: Irrigation and recreational fields to be separately metered or sub-metered.
 - 5.5 Renovations/Additions: Architect to verify City of Dallas (or applicable utility district) metering requirements for renovations or expansion of existing systems.

6. Site Drainage:

6.1 When natural drainage is interrupted by drives or paved areas other than sidewalks:

6.1.1 Water to be diverted by swale, re-grading, or piped drainage as determined by cost comparison, value and analysis.

6.1.2 Civil Engineer to determine sizing of piping, flow velocities of swales, or adequacy of re-grading in all sitework.

6.2 Provide underground drainage at each outdoor playground area.

END OF DIVISION 33