DESIGN/ PLANNING PRINCIPLES & CONSTRUCTION GUIDELINES
FOR
MEMPHIS-SHELBY COUNTY SCHOOLS

Department of Major Construction

1364 Farmville Road
Memphis, Tennessee 38122

Updated 02/17/2026

TABLE OF CONTENTS

SECTION I - INTRODUCTION

These Guidelines have been developed to assist Architects and Engineers in the planning and design of functional, cost effective and durable educational facilities that are attractive and enhance the educational experience for their students. Designers are encouraged to develop the design in a straightforward manner by utilizing standard building materials and details with a minimum of applied ornamentation and special treatments. Highest priority should be placed on the development of the interior learning environment with full attention given to the development of appropriate infrastructure, appurtenances, accessories, etc.

The Guidelines are not intended to limit or control opportunities for innovative design, but rather to assist the Designers in understanding certain planning requirements, design criteria, and concerns regarding construction and operation of Memphis-Shelby County Schools. Whenever the design of facilities varies significantly from the requirements and considerations of the Guidelines, the Designer shall obtain prior approval from the Director of Construction.

Additional and separate pre-design guidelines listing detailed space, programming, and equipment requirements will be issued for each construction project. **In the event of any conflict between previous Guidelines and this Revised Guideline. The latest dated Guideline shall supersede the requirements of previous Guidelines.** Any current adopted code requirements shall supersede all of these requirements.

The Major Construction process will be strengthened and made less complicated if designers use these Guidelines at each phase of the project. It should be understood that these Guidelines will continue to evolve, and your comments and recommendations are invited for consideration in future revisions.

It is the desire of Shelby County Public Schools that the designs of its new school buildings and renovations incorporate certain characteristics. The following constitute our goals for good design:

- *Sustainable Design:* This applies to all building projects. It is Shelby County Schools' intent to approach each project to follow the basic LEED Design Qualifications to provide as many LEED points as practicable without going through the certification process.

- *Economy of space:* The design should provide the programmed spaces in a configuration that minimizes the total area of the building, thus its cost. This means that circulation, mechanical, and service spaces shall be as efficiently arranged and configured as possible.

- *Economy of construction:* It is MSCS's intent to construct buildings that will be usable and function as intended for fifty years or more. The design should use construction methods and techniques that are familiar and common in the local construction industry. Site work, footings, and structural systems should be chosen with efficiency and long-term durability in mind.

- *Economy of materials:* The design should incorporate standard materials readily available in the local market at competitive prices. Long-lasting, easily cleaned and maintained materials and finishes should be chosen, even at a slight premium in cost if necessary.

- *Economy of design:* The design should make use of the massing and arrangement of the elements of the building to achieve an attractive appearance. The use of extraneous and unnecessary design elements of high-cost materials to create a particular "look" or to "make a statement" is discouraged. The intent of the design should be timeless regarding appearance, finishes, and flexibility. The construction funds are much better spent procuring long-lasting materials. The coordination of all disciplines involved in the design process is crucial in order to obtain the most efficient and cost-effective configuration of materials and equipment in the finished building.

- *Economy of operation:* All elements of the design, especially fire protection, mechanical, electrical, and plumbing systems, should be chosen for maximum lifetime, minimum maintenance, and cost-efficient operation.

- *Planning for the future:* The design should, where and whenever possible, lend itself to future expansion; changes in technology or services; or rearrangement of spaces to meet changing educational or administrative needs.

In accomplishing the above, MSCS expects and requires the Designer:

- To follow and comply with each section of the Guidelines and all items included as APPENDIX A - PROCESS IMPROVEMENT CHECKLIST of the Design Guidelines.

- To have the planning team sign off on each design phase of the building after a full presentation explaining how it meets all criteria given in the program.

- To have all specialty stakeholders (Information Technology, Media Services, Library, Food Services, Vocational programs, Plant Operations and Maintenance, etc.) sign off on the final design of their areas, including basic furniture layouts, power and utility service locations and the MEP systems.

- To ensure that the design complies with all applicable Codes and Regulations of authorities having jurisdiction over the project. Specifically, included in this requirement is to have all reviewing agencies complete their reviews and for the Designer to address all comments resulting from those reviews in the bid documents. This shall not be accomplished as addenda.

- To coordinate with all utility services regarding requirements for the project, insuring all are available as needed. Where necessary, assist the Owner in whatever application processes are needed to obtain those services.

- To design the project to be accomplished within the Owner's designated budget. Where the Designer becomes aware that the project will require work outside of their responsibilities (such as sewer or water line construction off the project site), the Designer shall inform the Owner of whatever application processes are needed to obtain those services.

- To be diligent in the administration of the Contract during Construction. Reviews of shop drawings and other submittals within a reasonable schedule and immediate attention to problems and questions are considered important parts of services rendered. Ensuring that the quality of materials and workmanship incorporated into the work corresponds to that specified is important to the Owner. Diligent review and inspection of the HVAC System at Shop Drawing stage and during construction is extremely important to the owner.

It is also extremely important that the Contractor have all the information required to complete the project. Claims for delays due to Architects' or Engineers' insufficient or incorrect information and non-responsiveness are not acceptable and will be cause for reimbursement to the Owner from the Architect or Engineer at fault. Any valid delays will be clearly established and substantiated; ambiguous or unclear

A. Abbreviations

AABC	Associated Air Balance Council
ACT	Acoustical Ceiling Tile
ADA	American Disabilities Act
AE	Architect/ Engineer
AFF	Above Finished Floor
AHERA	Asbestos Hazard Emergency Response Act
AHJ	Authority Having Jurisdiction
AHU	Air Handling Unit
AMP	Ampere
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigerating, & Air-conditioning Engineers
ASI	Architect's Supplemental Information
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWI	Architectural Woodwork Institute
BACnet	Building Automation Controls Network
BAS	Building Automation System
BTU	British Thermal Unit
CCTV	Closed Circuit Television
CDR	Contingency Draw Request
CDX	C-D Exposure 1 plywood
CFC	Chlorofluorocarbon
CFM	Cubic Feet per Minute
CLS	Clinical Laboratory Standards
CM	Construction Manager
CMU	Concrete Masonry Unit
CNC	Central Nutrition Center
CO	Change Order
CPM	Critical Path Method
CRI	Carpet and Rug Institute
CSI	Construction Specification Institute
DEM	Digital Energy Monitor
DDC	Direct Digital Controls
DoMC	Department of Major Construction
ECM	Electronically Commutated Motors
EIFS	Exterior Insulation Finish System
EMS	Emergency Management Systems
EMT	Electrical Metallic Tubing
EPDM	Ethylene Propylene Diene Monomer
FCU	Fan Coil Unit
FFE	Furniture, Fixtures, & Equipment
FLCC	Fixed Limited Construction Cost
GC	General Contractor
GFI	Ground Fault Interrupter
GFCI	Ground Fault Circuit Interrupter
GPM	Gallons Per Minute
HVAC	Heating Ventilating, and Air Conditioning
IBC	International Building Code
IDF	Intermediate Distribution Frame
IEEE	Institute of Electrical & Electronics Engineers
IMC	Intermediate Metal Conduit
IP	Internet Protocol
ISEA	International Safety Equipment Association
IT	Information Technology

KAIC	Kilo Ampere Interrupting Capacity
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LEED	Leadership in Energy & Environmental Design
LVT	Luxury Vinyl Tile
MLGW	Memphis Light Gas Water
MSCBOE	Memphis-Shelby County Board of Education
MMSCS	Memphis-Shelby County Schools
MSI	**Master System Integrator**
MWSBE	Minority Women-Owned Small Business Enterprise
NEBB	National Environmental Balancing Bureau
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NRC	Noise Reduction Coefficient
NSF	National Sanitation Foundation
OAC	Owner Architect Contractor
O&M	Operations & Maintenance
PM	Project Manager
PO	Purchase Order
PP-R	Polypropylene Random Copolymer
PSI	Pounds per Square Inch
PVC	Polyvinyl Chloride
RFP	Request for Proposal
RFI	Request for Information
RTU	Roof Top Unit
SEER	Seasonal Energy Efficiency Ratio
SMACNA	Sheet Metal & Air Conditioning Contractors' National Association
SOV	Schedule of Values
SCUV	Self- Contained Unit Ventilator
STC	Sound Transmission Class
TBI	Tennessee Bureau of Investigation
TPO	Thermoplastic Polyolefin
TSSAA	Tennessee Secondary School Athletic Association
UDC	Uniform Development Code
UL	Underwriter Laboratories
UV	Unit Ventilator
VCT	Vinyl Composition Tile
VFD	Variable Frequency Drive
VOC	Volatile Organic Compound
WAP	Wireless Access Point

SECTION II - PROJECT ADMINISTRATION

A. OFFICE OF MAJOR CONSTRUCTION

1. Purpose

The Department of Major Construction is responsible for the administration of the Capital Improvements Program for Memphis-Shelby County Schools as well as other projects requiring detailed construction administration.
In this capacity, the department supervises the programming, design, construction, of new buildings, additions to existing buildings, and major renovations and repair/replacement projects.

2. Staff

NAME	TITLE/ POSITION	EMAIL ADDRESS
Chris Lafoy	**Construction Director**	**Lafoycj@scsk12.org**
Scott Steen	**Senior Project Manager**	**Steensa@@scsk12.org**
Marc Calma	**Project Manager**	**Calmamn@scsk12.org**
Parish Sharkey	**Project Manager**	**Sharkeypl@scsk12.org**
William Rudolph	**Senior Project Manager**	**Rudolphwc@scsk12.org**

3. Address

Memphis-Shelby County Schools
Department of Major Construction
1364 Farmville Road
Memphis, TN 38122
Phone: 901-416-1675 | Fax: 901-416-6968

4. Mission Statement

The mission of the Department of Major Construction is to create and support a well-maintained district infrastructure and to provide the highest quality service in a responsive and efficient manner to all our customers and colleagues. We recognize our staff as our strength and will trust and respect each other while working together to support the overall mission of Memphis-Shelby County Schools.

Vision

- Exceed customers' expectations
- Encourage the culture of teamwork
- Ensure the appropriate application of operating, capital improvement, renovation, maintenance, repair, and utility resources.
- Be fiscally responsible
- Optimize management systems and technologies
- Be recognized nationally for excellence in facilities, environmental, and safety management.

5. ADA Compliance Statement

The Department of Major Construction shall ensure that all Shelby County facilities comply with the Americans with Disabilities Act. The Designers shall ensure that all projects comply with the current and adopted Americans with Disabilities Act including revisions and interpretations.

The Department of Major Construction request that the Designer include in the general notes an ADA Disclaimer or Non-discrimination Statement.

SECTION III – DUE DILIGENCE

A. Scope of Work

The Designer may be requested to assist in providing a detailed scope of work to include due diligence specifically related to the project site. This due diligence shall require but not be limited to the following:

1. Boundary, Topographical & Utility Site Survey
2. Tree Density Survey
3. Preliminary Geotechnical Report
4. Primary Geotechnical Exploration Report
5. Phase 1/ Environmental Assessment Study
6. Traffic Impact Study
7. Historical & Archeological Property Survey
8. Protected Species Assessment
9. Wetland Delineation, Assessment, & Consultation

SECTION IV – PROGRAMMING / EDUCATIONAL SPECIFICATIONS PHASE

A. Project Kickoff

The Architect shall meet with representatives from the Department of Major Construction to review and confirm the general goals, scope components, constraints and requirements of the project as set forth in the initial pre-design documents. If the project is an addition to and/or renovation of an existing school, the Architect shall be provided with the latest existing documents on file that may include but are not limited to:

- Fire Marshal's annual inspection reports
- Asbestos surveys
- Roof condition report
- Facility condition reports
- Construction documents- Plans, Specifications, Project Manual where available
- Supplementary Information- AHJ Applications, AHJ Comments, etc.

B. Program Confirmation/Transmittal

A programming session shall be held with the architect, Project Manager and others to determine if any "needs" and "priorities" have changed or need revising. This meeting shall cover the following topics:

1. Participants and points-of-contact in programming:
    a. MSCS Project Manager
    b. Architect
    c. Planning Team
    d. Program Manager
    e. Director of Major Construction
    f. Selected members of the school or other personnel, if determined

2. Confirm the following components as necessary:
    a. Number of classrooms
    b. Auxiliary spaces
    c. Relationship of spaces
    d. Space adjacencies
    e. Size of spaces
    f. Special considerations, programs, or classes requiring additional spaces
    g. Furniture and equipment
    h. Special equipment
    i. Future expansion possibilities
    j. LEED status, when applicable

3. Determine priorities of the components of the project to aid in scope and cost management of the project during design development.

C. Architect's Deliverables

1. Bubble diagrams of building components. (SWOT analysis)
2. Bubble diagrams of site relationships. (SWOT analysis)
3. Cost estimate for construction (per sq. ft.) (SD, DD, CD)
4. Project schedule with MSCS input regarding expectations and fiscal calendar. (SD, DD, CD)

D. Review

The above information shall be reviewed with the Project Manager and Planning Team at a review meeting. Written approval from the Project Manager will be required prior to the architect proceeding with the schematic design phase.

SECTION V - SCHEMATIC DESIGN PHASE

Designers shall develop and submit to MSCS conceptual diagrams of alternative approaches for translating the project requirements into conceptual design solutions. These diagrams shall include, but not limited to, consideration of land use, functional relationships within the program, consideration of relationships to Master Plans, and/or surrounding neighborhood environment, relative volumes of circulation, land use, traffic, parking, transportation, utilities, and systems and organization of major building functions.
Designers shall prepare and submit to MSCS visual studies related to the concepts required conceptual diagrams which shall include, but not limited to, schematic massing studies in model and/or diagrammatic form, sketches of design concepts showing elevations and exterior appearances, and any other sketches or visual studies necessary for evaluation of several alternative concepts.

A. Architects Deliverables

The schematic deliverables shall include but not be limited to the following:

1. Schematic Site Plan.
2. Traffic pattern plan and neighborhood impact review
3. Schematic floor plans
4. Schematic elevations
5. Other drawings as needed to convey the design intent
6. Narrative description of architectural, structural and mechanical, plumbing, and electrical systems
7. Cost estimate per square foot costs updated from programming.
8. Compliance with Master Schedule or recovery schedule proposal
9. Review of input and comments from Zoning, Codes, Public Works, Shelby County Storm Water Division (ponds) and State and Shelby County Fire Marshals.
10. Review of Process Improvement Checklist. (With applicable items initialed by Architect)

B. Review

At the conclusion of Schematic Design, the Architect will meet with the Project Manager, User Groups and selected MSCS staff to present Schematic Design progress. The Schematic Design Documents will be reviewed by Owner as input is collected from other stakeholders on the team. A timeframe for this review shall be agreed upon by all parties.

C. Approval of Schematic Design

Written approval from the Project Manager will be required prior to the architect proceeding with the design development phase.

SECTION VI - DESIGN DEVELOPMENT PHASE

A. Architects Deliverables

Based on the approval of the Schematic Plans by the MSCS staff, the Architect shall completely design the components of the Project that include but are not limited to the following:

1. Site plans showing:
   a. Utilities (including fire protection provisions)
   b. Traffic pattern plan and neighborhood impact review
   c. Landscaping (designate code-required landscaping versus non-code required)
   d. Pedestrian flow
   e. Storm water management (conforming with Public Works Department requirements)
   f. Any Owner furnished items such as the Site Survey, Phase I site assessment, traffic impact studies, or other site information should be included to provide all site related information.
2. Floor plans with square footage calculations per programmed space and room numbers (room numbers to be coordinated with existing room numbers as appropriate for the project scope. Numbers shall be used for code required signage.)
3. Elevations and building sections
4. Roof system proposal
5. Net Area(s) calculations
6. Materials selections
7. Fire Protection System
8. Structural system
9. Electrical system layout
10. Mechanical system layout
11. Plumbing system layout
12. IT system layout (per MSCS Information Services Group requirements)
13. Low Voltage system layout
14. Kitchen plan and equipment description coordinated with MSCS Central Nutrition Center
15. Outline specifications and cut sheets for major equipment and fixtures
16. Massing model or computer model, if appropriate for the project (verify with PM).
17. Furniture layouts as coordinated by MSCS furniture preferred vendor
18. Finish Schedule and notes with finish board with labeled materials
19. Schedule Update with MSCS input (Including construction timeframe)
20. State and Shelby County Fire Marshal review status
21. Review of Owner's Process Improvement Checklist (Applicable items shall be initialed by Architect)
22. Detailed cost estimate to verify the FLCC for the remainder of the project.
23. Draft exterior architectural rendering
24. Engineering submittal to MLGW if required by project scope.
25. Submittal to Public Health if grease trap is part of the project's scope.

The Architect and Project Manager shall agree upon several milestone reviews of the design to ensure proper content and development.

B. Review

At the conclusion of Design Development Phase, the Architect will meet with the Project Manager, User Groups and selected MSCS staff to present Design Development progress. The Design Development Documents will be reviewed by Owner for time to be determined as input is collected from other stakeholders on his team.

C. Approval of Design Development

Written approval from the Project Manager will be required prior to the architect proceeding with the construction documents phase.

SECTION VII - CONSTRUCTION DOCUMENTS PHASE

A. Review

The Architect shall prepare and submit construction documents for formal review by the Project Manager at the 50% stage and 90% stage and shall incorporate or make an appropriate response to all Owner comments and/or requested revisions.

B. Project Manual

The Architect shall prepare the Project Manual according to the Design Guidelines and Process Improvement Checklist furnished by the Owner. Organize specifications in the current CSI format.

C. Regulatory Agencies

The Architect shall make submissions for all regulatory reviews, respond to all comments, and obtain approvals prior to bidding. The following information is given as a guide to help Architects and others to meet their contract requirements (*Article 1.7.2 of the Terms and Conditions of the Agreement between Owner and Designer*) of having a building permit ready prior to bid date. In order to prevent construction delay claims and change orders after bids are received, this process must be complete prior to the last addendum scheduled for issue. Do not submit plans to the Codes Department and wait for them to get to the review agencies; the Architect shall make direct submission to all relevant agencies and is advised to obtain the names, preferably the signatures, of the staff members receiving the documents. The drawings must be reviewed and be approved as code compliant by the required agencies.

D. Payment of Fees

Required review fees to be paid by the designer and is a reimbursable expense under the Designer Agreement. Designer is requested to provide reimbursable fee estimate prior to executing contract.

E. Building Permit Procedures

Refer to www.shelbycountytn.gov and www.SCSk12.org for information pertaining to department contacts.

Permits must be obtained prior to any work performed, no matter the type of work.

When the submittals have been made, notify the MSCS Project Manager the submittals were made.

Submittals to the State Fire Marshal and Shelby County Code Enforcement should be made as early as possible. Interim reviews of the design with the State Fire Marshal and Shelby County Code Enforcement during all phases are encouraged.

F. Required 50% / 90% Deliverables

1. 50% review – Documents required for the review include but are not limited to the following:
   a. 50% working drawings
   b. 50% specifications
   c. Agency Review (submittal verification)
   d. Schedule Update with MSCS input (Including construction timeframe)
   e. Review of Owner's Process Improvement Checklist. (All items to be initialed by Architect.)
   f. Verify that the project meets the FLCC
   g. LEED status where applicable

2. 90% Review Documents required for the review include but are not limited to the following:
   a. Complete working drawings
   b. Project manual
   c. Agency approvals - A building permit must be obtainable at this point.

d. Schedule Update with MSCS input (Including construction timeframe)
e. Full color tempera, acrylic or computer-generated rendering of the project, mounted and suitable for framing (unless project is small scope – see your PM for decision whether this is required).
f. Fully completed Owner's Process Improvement Checklist
g. Verify that the project meets the FLCC

3. The following issues should be discussed at the 100% review meeting.
   a. Hard copy criteria for bid process- Available to bidders at their cost
   b. Bidding process
   c. Revisions to be implemented
   d. Pre-Bid conference date and bid date
   e. Contract award process

G. Division 1 Specifications, Including Invitation to Bid

Architect will request current version of MSCS Division 1 Specifications, including Invitation to Bid, to be incorporated into Project Manual. The designer shall become familiar with the front-end documents' provisions and ensure that other specification sections created by the design team do not conflict with them. Specifically, review all references to "equal" products and procedures for submitting substitutions for specified products.

SECTION VIII – BIDDING PHASE

A. Bid Policy

1. Design Bid Build (DBB)
2. Design Build (DB)
3. CMAR (Construction Manager At Risk)
4. IPD (Integrated Project Delivery)
5. JOC (Job Order Contracting)
6. Multi-Prime (MP)
7. PPP (Public Private Partnership)

All project delivery methods must comply with MSCS standards.

The Architect, following the MSCS approval of the construction documents, shall assist the Procurement Department of Memphis-Shelby County Schools in obtaining sealed bids and in awarding a contract for the construction of the project.

The time and date for the receipt and opening of the sealed bids shall be determined by the MSCS Procurement Department and MSCS Director of Major Construction. Bids will be opened at the location as designated by MSCS Procurement Department.

The MSCS Procurement shall be responsible for the placement of a legal advertisement for bids. The Architect is requested to attend the Bid Opening and record results.

B. Document Distribution

1. Architect is responsible for coordinating the distribution of contract documents with interested bidders. At bidder's request, hard copies of the Bid Documents should be made available and ready for pick-up on the advertised date. The architect will record the recipient's contact information. No partial sets shall be issued.

2. Architect in coordination with MSCS Procurement Department shall be responsible for distributing to all bidders and / or holders of issued sets any addenda that are issued.
   a. No addendum shall be issued, without prior approval of DoMC and MSCS Procurement department. All addendums are required to be approved by the Department of Major Construction. The cutoff time for issuing addenda should be listed on the Invitation to Bid in the Project Manual.
   b. The addenda shall be sequentially numbered and dated. They shall also be signed and sealed by the Architect and appropriately approved by codes.
   c. The Architect shall prepare a notification to the Bidders for any documents available for review at the locations of the project documents.
   d. A bidders' log will be kept, recording date, person and company receiving the bid package.

C. Pre-Bid Conference

This conference is mandatory for all prime bidders. The date for this meeting shall be identified and published in the bid package. The issues in this meeting shall cover and not be limited to the following:

1. Delivery of complete bid packages.
2. Scope of work.
3. Document all changes in writing, verbal instructions are not binding.
4. Addenda.
5. Bid date and time.

6. Tour site if applicable.
7. Coordination of site access and any existing building involved in the work.
8. DBE Program requirements.
9. Wage rates for federally funded projects. (Do not include wage rates for Shelby County funded projects) Note: it is rare to have a federally funded project.
10. Review requirements in the Invitation to Bid.
11. TBI background check is required for all workers on school property.
12. Review LEED requirements.

D. Receiving Bids

MSCS Procurement Department in cooperation with the SC DoMC will determine when bids are to be received. This information shall be noted in the bid package. The following conditions shall govern the bid opening:

1. Bids received after the bid deadline will not be accepted for consideration and will not be opened.

2. No bids will be opened that do not bear the proper information on the bid envelope in accordance with the Instruction to the Bidders and current state law. All bidders must meet all the solicitations requirements and criteria for bids to be accepted.

3. Fully disclose envelopes that meet the above requirements, whether or not all required information inside is present or complete.

4. The Director of the DoMC in coordination with the MSCS Procurement Department may waive certain formalities in the best interest of MSCS.

E. Conducting and Opening

The buyer/ representative of the Procurement Department shall receive, open and read aloud all bids submitted. The following information must be reviewed and recorded. The Architect as well as the Procurement buyer/ representative shall provide a bid tabulation sheet and record the bids as they are read aloud during the opening of a bid.

1. **Bid Envelope**
   a. SCBOE project name and number.
   b. Name of bidder and address.
   c. License number, expiration date, classification and limit.
   d. Listed subcontractors for geothermal heating and cooling, mechanical, electrical, plumbing and masonry trades in accordance with the Tennessee Code Annotated. Must have name, license number, date of expiration, and license classification listed. List additional subcontractors as required by MSCS.
   e. Contractors Federal ID number (tax number)

2. **Bid Form**
   a. Acknowledged Addenda.
   b. Bid Security/ Bid Bond/ Surety with proper signatures and Power of Attorney.
   c. Unit Prices and allowances.
   d. Base Bids and Alternate Prices.
   e. Presence of Insurance Affidavit
   f. Presence of any other required documents.
   g. Authorized signatures as required.

F. Disposition / Awarding of Bids

The Procurement Department buyer/ representative, Architect and MSCS DoMC representatives shall evaluate all bids to determine recommendation for award to the lowest responsive and responsible

bidder. If the bid is in proper order and within budget, a contract preparation will begin after a Notice of Award Intent is issued. The contract draft will be signed by the successful bidder and presented to the Procurement Depart for recommendation for SCBOE approval and signature. If the bid is not in budget, the project will be evaluated with the design team, MSCS DoMC representatives, and Procurement department to determine if the project can be value engineered, modified, and negotiated with the low bidder.

MSCS exercises the right to select “best value” for the project in regard to schedule and financial impacts. These rights may result in the lowest bid not being selected due to a higher bid being more inclusive, including product longevity, and a more efficient project schedule.

SECTION IX – CONSTRUCTION ADMINISTRATION PHASE

A. Architect's Contract Obligation

The Architect is responsible for all components of Article 1.9 "Phase 6: Construction Phase" in the Terms and Conditions of the Agreement between Owner and Designer.

B. Administration

Architect is responsible for:

1. **Requests For Proposal (RFP):** Each RFP shall be written, recorded and reviewed by the Architect. Approval must be coordinated through the PM to perform the same. RFPs are not directives to proceed with any work. The Designer and PM are to maintain an RFP log which shall be distributed once a month and included with AE invoices for services. Architect and his consultants shall review and approve RFP/Proposal prior to submission to the PM and MSCS DoMC for approval.

2. **Request For Information (RFI):** The Architect shall respond to all requests for information, both formal and informal, in a timely manner. The Designer shall maintain an RFI log which shall be distributed once a month and included with AE invoices for services. The log shall include RFI number, date of issue, date of receipt, date of response, summarized requested information, and summarized formal response.

3. **Field Reports:** In accordance with the contract, the Architect shall provide to the Owner a minimum of two written field reports each month. Latest AE field report shall be attached to AE invoice for services. Field reports shall be detailed and provide information regarding schedule, current financial status, deficiencies, weather, etc. MSCS DoMC prefers to have photos attached to reports for visual confirmation. (See A/E Agreement)

4. **Contingency Draw Request (CDR):** The Architect shall not issue CDR's without prior approval from the MSCS PM and the Director of Major Construction. CDR's are funded by the Owner's contingency. The transfer of contingency funds to the contractor's purchase order (PO) can only be executed with a fully executed Contingency Draw Request form that has been signed by the contractor's representative, the AE representative, and the Department of Major Construction. The AE and MSCS PM will keep a CDR log and update as required. The CDR log will be submitted with the AE invoice for services.

5. **Change Orders:** Change orders will be prepared and issued by the AE and MSCS PM after receipt of approved RFP/Proposal that includes in depth detail and support documentation. The Designer is to maintain a COR log and shall be distributed once a month.

6. **Submittals:** As stated in the contract, the Architect shall be responsible for providing a design professional for the purpose of submittal review. Submittal review is critical as a final coordination check for proper inclusion of all building components. Submittals must be thoroughly checked by the designer to make sure that each component meets the intent and requirements of the specifications for the project and will work with the components in the assembly. Failure to do so will be cause for reimbursement to the Owner from the Architect or Engineer at fault should costs be incurred by the Owner in corrections. Submittals shall be reviewed and expedited in a timely manner, and recorded in a Submittal Log, maintained by the Architect and shall be distributed monthly. For roofing, door hardware, HVAC and plumbing submittals MSCS shall review for design intent. MSCS project manager will identify submittals required to be submitted simultaneously to them and the MSCS User Groups.

7. **Pre-Installation Conferences:** The Architect shall conduct Pre-Installation conferences and record meeting minutes for review by the MSCS PM. Architect shall distribute approved meeting minutes within five business days of the meeting. Pre-Installation conferences should be conducted, at a minimum, for the following: masonry/envelope mock-ups, roofing, windows, louvers, fire-caulking,

flooring, spray-applied insulation, low-voltage, and Division 06 Casework.

8. **Progress Meeting (OAC):** The Architect shall conduct Progress Meetings at least twice a month and record meeting minutes for review by MSCS PM and Director of MC. Architect shall distribute approved meeting minutes within three to five business days of the meeting.

9. **Progress Payments**: The Architect shall review and approve contractor's monthly pay application and provide signatures as needed. Special attention should be given to percentage completed on line items of the schedule of values. Items shall be compared to the cost-loaded CPM schedule as provided by the Contractor prior to approval. Formal comments are required to be returned to the contractor for review, consideration, and response.

SECTION X - CLOSE-OUT PHASE

A. Substantial Completion

It is the Architect and MSCS Project Manager's responsibility to determine, after receiving written notification of such from the Contractor, whether or not substantial completion has been reached. Schedule an inspection at the earliest possible time to determine the status of completion. At this inspection, address the following issues:

1. Status of Schedule
2. Contractors Deficiency "Punch" List (Provided by Contractor)
3. Develop Punch List (by Architect)
4. Demonstration of Equipment and Systems
5. Discuss Substantial Completion Certification
6. Obtain Use and Occupancy permits from applicable regulatory agencies and schedule Final Inspection. Architect, Project Manager and Contractor shall all agree upon duration and date for completion of all outstanding items. The Bid Form (thus the Contract) includes a space to define the period following which damages shall apply. The Principal will be asked to review the punch list and suggest items to be included.
7. Commissioning
8. LEED Documentation, as applicable
9. Radon Testing, as applicable.
10. Training as required

B. Final Completion Inspection

Schedule Final inspection upon written notification that a qualified person authorized by the Contractor has reviewed the Contract Documents and Punch List(s), has inspected the work, and finds it complies with the Construction Documents and that all Punch List items are corrected. At this inspection, address the following issues:

1. Review of Contractors Deficiency List
2. Review of Punch List items
3. Discuss completion status
4. Submittal of O&M documents
5. Obtain final Use and Occupancy permits from applicable regulatory agencies.
6. Discuss damages
7. As-Built documents
8. Commissioning log

The punch list shall include all identified outstanding items provided by the Architect with input from the Project Manager and School Staff. This list shall include a completion date for all punch list items. The Contractor, Project Manager, Principal and Architect shall receive a copy of the punch list.

C. Warranty Inspection

A warranty inspection, attended by the principal and/or their designated School Staff, Maintenance Department, Architect, and Project Manager, shall be conducted near the end but prior to expiration of the one-year warranty period for the construction (11-month walkthrough). This inspection shall be for the purpose of determining if there are any unresolved issues that are covered by the contractor's warranty responsibilities and addressing their correction. Items suggested for the warranty inspection can be provided by the Principal, Staff, Maintenance Department, Architect or Project Manager.

SECTION XI - RECORD DOCUMENTS

A. Electronic Drawings

The architect shall provide, at project closeout, a complete set of electronic documents (pdf format) that fully reflects all design revisions, change orders, field directives and Contractors as-built markups without revision clouding. These documents shall be sent to the MSCS PM for storage in DoMC's archival file.

B. Record Set

When requested, the Architect is to provide MSCS PM one set of the above reproducible drawings in the size requested, half or full size. (See A above).

C. Small Scale Set

The Architect shall provide a small-scale set of site and floor plans for the building including graphic scale, scaled to fit the site plan and each floor level as large as possible on sheets 8-1/2" x 11" or 11"x17" in size as determined. Overall floor plans shall be to the same scale and positioned to superimpose upper and lower plans with the sheets stacked. The drawings shall have no dimensions or notes, but should include room numbers, and may be either single- or double-line wall representation, as appropriate, for the scale necessary to fit the plans on the specified sheet size. Site plans shall include all drives, walks, and athletic field layouts, but no landscaping. This set of drawings shall be sent to the MSCS PM during project close-out.

D. AutoCAD Deliverables

The architect shall provide, at project closeout, DWG files of each record document sheet with all x- references bound.

DWG file of overall floor plans with all architectural elements showing, at a minimum, room names and numbers, walls, doors, casework, plumbing fixtures, etc. Exclude F.F.E. Notes, dimensions, and call- outs.

Provide Revit models if available.

E. Asbestos Statement

The architect shall provide, at project closeout, per the requirements of DIVISION 02 26 23 - ASBESTOS NOTICE.

SECTION XII – DESIGN STANDARDS

A. Basis of Design

Unless otherwise noted in these standards, all manufacturers shall be listed as the preferred "Basis of Design". Where manufacturers are noted as "single source," no other manufacturers shall be allowed. AE should confirm with MSCS PM that single source vendors are and have been approved by the MSCS Procurement department as required per state procurement statutes.

DIVISION 01 42 00 - DEFINITIONS AND ABBREVIATIONS

DIVISION 01 40 00 - CODES AND STANDARDS

Projects for Major Construction shall meet all applicable governing codes, standards and regulations. These codes and standards shall supersede the MSCS Design Principles and Planning Guidelines in event of a conflict. It is the Designer's responsibility to verify all applicable codes are followed.

New Construction and complete renovations must be designed with the intent to build to USGBC LEED Silver Certification standards but will not be certified.

All projects must be checked for Storm Water Regulations and meet the latest standards adopted by Shelby County Water Services. If appeals are filed with Shelby County Government agencies, put "fee waived, Shelby County Agency" on the form. No fee is due for appeals.

The Contractor is responsible for cleaning and waxing of floors by a MSCS approved custodial vendor to ensure that the facility is ready to receive students and staff at the end of the contract in preparation for hand-to-glove take over by custodial cleaning staff, including movement of furniture out of areas of work and back into work areas. Work will be done after hours with no disruption of any school function. Coordinate and schedule cleaning efforts with MSCS custodial staff.

Any new projects or renovations must include new and upgraded DDC controls for any new or existing HVAC equipment for the entire site. See Scope of Work for details and/or allowances.

All duct mounted fresh air or outside dampers shall be controllable in BAS system.

The main office area should be a single zone for the energy management system. Individual spaces should have thermostats for independent control. The HVAC system should be located where it can be serviced without disrupting the entire office area in all new construction.

VENTILATION: Each building or portion shall have the capability to provide ventilation in accordance with ASHRAE 62, based on building classification and occupant load. Special thermostatically controlled ventilation should be provided in boilers and mechanical rooms to prevent excessively high temperatures.

MISCELLANEOUS HVAC ITEMS: Electric unit heaters with built-in thermostats shall be installed in all mechanical rooms in lieu of hot water unit heaters.

Provide dehumidification control in all media centers, libraries, and auditoriums to control and reduce relative humidity.

If a non-Siemens BACnet controller is provided, two (2) manufacturer service tools and one (1) field-grade laptop shall be provided to MSCS.

Identify any existing controls that will be made obsolete by the new project and address them as necessary. All

existing proprietary non-BACnet controls shall be upgraded to new BACnet Web-Based stand-alone EMS standard per division 255000 included in this guideline.

Provide bulb wells in central plant piping for electronic sensors. Coordinate with the control system designers for locations of wells. Show detail of wells on drawings.

All damper operators, control, and service valves to be installed such that they can be serviced by personnel standing on the floor of the Mechanical Room, if possible.

Chiller shall control the pump using a hardwire interlock by BAS contractor. EMS shall enable/disable the chiller. BACnet interface with EMS integrations.

If you have two (2) chillers, provide motorized isolation valves for each chiller. BAS contractor shall incorporate control of the valves. Provide thermal dispersion flow switches and strainer at the chiller. BAS contracts should be provided.

MSCS prefers Chiller to control pumps and tower operation. Design Engineer to evaluate and recommend best control options. MSCS to review Sequence of Operations.

BAS contractor shall provide a head pressure control valve for all water-cooled chillers. Head pressure control valves shall be controlled by their respective chillers.

Water cooled Chillers shall control the cooling tower when possible.

Unit controllers shall have a unit mounted user interface with digital display. Provide wall mounted temp/humidity sensor with LCD display, override, and metal guard.

Demand Control Ventilation with CO2 control measuring sensor to MSCS BACnet front end graphics
Provide control valve per Design Engineer either 2-way/3-way or face/bypass damper. Provide factory or field BACnet DDC controller.

Valve packs shall have circuit setter, control valve, isolation valves, y-strainer with blow out valve, P/T ports. All water coils shall have stainless steel coil casing and drain pan.

DIVISION 00 00 00 - DRAWING, SPECIFICATION & BID ALTERNATE REQUIREMENTS

DRAWINGS: The title sheet of working drawings shall include number of acres, number of classrooms, student capacity, number of parking spaces (standard and handicapped), building data, square footage and building envelope energy performance data.

Copies of all UL Designs utilized for fire rated walls, column, floor, roof construction and wall penetrations shall be included on drawings. Any approved modifications to the UL Designs shall be noted.

The AE shall include an ADA compliance policy statement in the construction documents.

The working drawings shall also include a separate set of floor plans showing all code required fire rated walls, occupancy calculations, toilet fixture calculations, and egress travel distances.

SPECIFICATIONS: Ensure that the SCBOE Standard Bidding & Contract Documents, including Division 0 and Invitation to Bid, are used. AE is to confirm with MSCS Procurement department for latest format. These documents will be furnished by the Owner to the Designer.

Ensure that all bidders understand the State laws requiring certain major sub-contractors to be listed on the front

of the sealed bid envelope including their license number and date of expiration. HVAC Plumbing, Electrical, Masonry and Geo-Thermal are currently required. See also SECTION VIII – BIDDING PHASE: E. Conducting and Opening.

Ensure the engineering sections (HVAC, Structural, Plumbing and Electrical) do not conflict with the above “front end” documents. Ensure all trades (Architectural, Mechanical, Electrical, Plumbing, Structural, and Civil) have been thoroughly coordinated between drawings and specs.
The General Requirements section of the specifications shall be written by the Designer, shall address coordination of Prime Contractors' work, pre-installation conferences, project progress meetings (OAC), temporary heating, operation of HVAC system (use and changing of filters to be required during construction), shop drawing review, specific site use requirements, and the asbestos statement noted.

DIVISION 01 14 00 – ACCESS TO EXISTING BUILDINGS

RESPONSIBILITY: MSCS policy requires a responsible employee of MSCS to be present at any existing occupied school buildings whenever outside persons gain access. This person is to be responsible for coordinating with security personnel and monitoring the building to protect MSCS’ property. No persons who have not undergone a TBI background check are permitted on school property while children are present.

WORK HOURS: Hours vary from school to school during the school year but generally include a night crew working. During the summer months, all custodians work a regular day shift from 7:00 AM to 3:30 PM or similar hours, without a night shift. AE shall confirm with MSCS PM specific work times for school facility that the project is located.

AFTER HOURS ACCESS: After-hours access, including weekends and holidays, must be submitted and approved through Facilitron. MSCS PM must be notified of all after-hours work.

DIVISION 01 21 00 – ALLOWANCES

Allowances and unit prices shall be kept to a minimum. Ensure that allowances and unit prices are well defined and understandable. Check allowances and unit prices for items that are specified, such as hardware and brick. Provide a section in the specifications that summarizes all allowances.

Ensure that the allowances include but are not limited to the following:

- Installation of Emergency Management System (EMS) controls
- Installation of MLGW electrical, gas, & water systems
- Testing Laboratories
- Undercutting & Backfilling
- Landscaping Requirements- See Shelby County Design Guidelines
- Network Cabling/ Switches/ WAP
- Wireless Equipment
- Security Cabling & Equipment
- Intercom & PA Systems
- Clock Systems
- Low Voltage Systems
- HVAC Commissioning
- Furniture, Fixtures, & Equipment (FF&E)
- Overtime for MSCS Plant/ Building Engineers for after hours, weekends, and holiday work

Any additional directives that indicate amounts to be charged to the allowance specific to the project.

The contingency allowance shall be indicated as a separate line item on the Contractor's Schedule of Values and as such the General Contractor's overhead, profit, and bond cost for work charged to the allowance shall be considered to be already included in the Contract Sum. Additional General Contractor overhead and profit on the overall work shall not be included in calculations of the cost of additional work charged to the contingency allowance. Subcontractor's overhead and profit may be included in calculations of the cost of additional work charged to the contingency allowance.
The General Contractor's related costs for products, equipment, and labor that they provide as part of additional work charged to the contingency allowance are not part of the Contract Sum and they will be allowed a subcontractor's markup for overhead and profit on those items. These include delivery costs, taxes paid, insurance required, equipment rental, and similar costs in excess of the original contract work.
At project closeout, credit unused contingency amounts back to the Owner by Change Order.

DIVISION 01 32 00 - PROJECT SCHEDULING

All Major Construction services shall provide a Construction Baseline Schedule specific to the project and services provided. The Construction Baseline Schedule will be utilized during the project in relation to the Major Construction progress schedules that are provided with each invoice and pay application to monitor any and all impacts to the schedules.

The construction projects shall be planned, scheduled, executed, reported and accomplished using the Critical Path Method (CPM) in calendar days.

The primary objectives of the use of the CPM: (1) to ensure adequate planning and execution of the Work by Contractor; (2) to assist Owner in evaluating progress of the Work; (3) to provide for optimum coordination by Contractor of their trades, Subcontractors and Suppliers, and of their Work with the work or services provided by any separate contractors; (4) to permit the timely prediction or detection of events or occurrences which may affect the timely completion of the Work; (5) to provide a mechanism or tool for use by the Owner and Contractor in determining and monitoring any actions of the Contractor which may be required in order to comply with the requirements of the Contract Documents relating to the completion of the various portions of the Work by the Specific Dates; (6) assist the Owner in scheduling Owner supplied and Installed items.

Each line item from the Schedule of Values (SOV) will be associated with an activity on the construction schedule. The activity will be coded to correspond to the trade, subcontractor or supplier performing the work. Each line item shall be broken down into labor and materials.

During the preparation of the Contract Documents, the MSCS PM will provide critical milestone dates to be included in the Bid Form for the project.

The architect or designer shall consult with the contractor through the construction process to ensure the construction process is maintained for timely construction completion. Should the contractor fall behind schedule, the AE shall confer with the contractor and shall determine steps necessary to meet schedule compliance. The consultants shall advise the MSCS PM and Director of those measures taken to correct construction schedule.

DIVISION 01 78 00 - SPECIAL WARRANTIES AND MAINTENANCE AGREEMENTS

SPECIAL WARRANTIES: All work shall be fully warranted for one year, unless otherwise noted, from the date of substantial completion by the contractor who shall replace any defective materials and repair any defective workmanship. Mechanical contractors are responsible to maintain the entire system within the first year of warranty including flushing strainers, clean out and flush equipment and piping systems as required, cleaning drain pans, cleaning the coils, washing the coils including condenser coil, changing filters and any other equipment IOM maintenance recommendation. Contractor shall respond within 2 hours of notification. In addition, written warranties shall be provided for the following products and time periods. These warranties shall include

any material and labor costs to repair defective materials and correct defective workmanship.

Product	Required Warranty Period
Soil Termiticide Treatment	5-years
Wood Doors	Lifetime warranty after installation
Carpet	15-years minimum
Theater Seating	5-year minimum
Metal Panel Systems	20-year paint warranty minimum
Marker Board Writing Surface	Lifetime warranty after installation
Fully adhered EPDM Roof	20-year, No Dollar Limit, Full system warranty, & 5-year Contractor labor warranty minimum
Stadium Lighting	25-year, No-Touch warranty

ROOF INSULATION: Warranty states that roof insulation's actual thermal resistance will not vary from the aged R-Value for a period of fifteen (15) years.

MAINTENANCE AGREEMENT: Designer shall include in project documents direction for the HVAC contractor to provide a complete one-year maintenance agreement for the HVAC system as described below for the first year. Specify an Add Alternate to continue maintenance agreement for two years:

- Answer all maintenance calls by MSCS within 2 hours
- All lubrication of equipment as recommended by the manufacturer.
- Replace all drive belts as required.
- HVAC contractor shall provide filter changes every 30 days for 6 months and twice in second half of year.
- Clean out and flush equipment and piping systems as required.
- Readjust all equipment as required to maintain comfort conditions.
- *Monitor system and Alarms using a remote web-based PC / Computer utilizing the Stand Alone BACnet DDC system software via the Building Edge Device, if BAS is included in the scope of work.*
- Product Maintenance Instructions. Must follow closeout OEM.

DIVISION 01 78 00 - PROJECT CLOSE-OUT

OPERATION AND MAINTENANCE MANUALS: Two (2) hard copies and one (1) electronic set via electronic transfer device, i.e. flash drive, of all operation and maintenance manuals shall be delivered by the Contractors to the Owner through the Designer at the Final Completion Inspection. The Index for Close Out Documents shall be included in the Front-End Document to be provided to the Designer. Documents are only acceptable per the provided index. The Designer shall receive and review the Close Out Documents provided by the Contractor and validate that all the required information is included.

See subsequent Sections for additional specific requirements.

FINAL INSPECTION: Each project shall have both Substantial Completion and Final Completion inspections made before it is finally accepted by the Owner. Two complete and thorough training sessions shall be conducted by the contractors and all the subcontractors for the MSCS Maintenance Department, one for winter operation and one for summer operation in each of the first seasons. The first training shall take place on site after the Substantial Completion inspection. A written record of this training and those in attendance shall be made and sent to the Owner and Contractor.

The Substantial Completion inspection shall be held after contractor requests in writing when the building can be used for its intended purpose. At Substantial Completion all systems are in to be place and in operation and Commissioning (when required) or Pre-Functional Testing reports will be available. The Director of Maintenance shall be notified in writing of this inspection and shall take possession of the above-mentioned Operation and

Maintenance Manuals. The HVAC contractor shall demonstrate to the Owner and Designer that all systems in the building are properly installed, balanced, and perform as designed and specified. All Contractors and Subcontractors shall attend this inspection including the HVAC, air and water balance subcontractor. The Designer will generate a punch list from this Substantial Completion inspection and distribute it to the Owner and Contractor.

The Final Completion inspection shall be held with the Owner, Designer, and all Contractors to demonstrate to the Owner that all systems in the building are operating as designed and to their satisfaction and that all punch list items are completed. A record of this inspection and those in attendance shall be made and sent to the Owner and Contractor.

WARRANTY INSPECTION: One post construction inspection shall be held by the Designer with the Contractor and Owner to assure that the building is continuing to operate in accordance with the plans and specifications and that no unusual problems are occurring in the building systems. The post construction inspection shall be held prior to expiration of the 1-year warranty period. It shall address general construction as well as plumbing, HVAC and electrical work. All problems discovered during these inspections that relate to defective materials or defective workmanship shall be corrected by the Contractor at no additional cost to the Owner.

RECORD DRAWINGS (AS-BUILTS): The Designer shall specify that during construction operations the Contractor shall faithfully record all changes to the contract documents, including accurate dimensions where applicable including invert elevations for all below-grade outside utilities with reference to permanent above-grade objects as well as changes to the Specifications including changes in materials actually installed versus those specified.

The Designer shall also specify that at completion of the work all such changes shall be recorded neatly with red ink by the contractor on an unused set of the contract drawing prints supplied by the Designer. The red line change shall be reviewed by the Designer who shall modify all contract drawings to reflect and incorporate all field changes as well as ASI, RFI responses, and other contract modifications.

SUBSTANTIAL COMPLETION: Substantial Completion is the date that the Owner and Designer determine the project is complete enough to be used for its intended purpose. It is also the date that the warranty periods begin.

FINAL COMPLETION: Designer to include MSCS close out document index and designer to validate all items are included in the close out document submittal.

DIVISION 01 81 13 - ENERGY CONSERVATION

Energy Conservation is of the utmost importance for all MSCS projects. Consideration of all new materials and equipment should be discussed for all new construction and major renovations with the goal of providing the most energy efficient building possible within the budget constraints.

The Design Team shall make every effort to provide a system design with maximum utilization of energy conservation measures, consistent with functional requirements of the building. Close coordination between the Mechanical Engineer, Electrical Engineer and Architect in the best interest of energy conservation shall be required.

The following design items shall be performed by or complied with the Design Teams for all work, both new and renovation:

- Review building envelope insulation strategies with the MSCS DoMC during design development phase. Insulation levels shall be maximized to enhance long term benefits and comfort and as required by the current adopted building codes. Considerable care shall be taken to minimize infiltration through the

building envelope. Major areas of concern are windows, ceiling/roof assemblies, roof penetrations, entry areas and the air space in the exterior wall assembly where insulation shall be continuous to create an envelope without joints. All exterior walls shall have vapor barriers (sprayed-on preferred; nailed and taped also acceptable).

- Natural daylighting shall be thoroughly examined and used in all spaces where possible and practical.
- Specify water savings features on all water consuming devices. Drinking fountains shall have bottle fillers with electronic readout indicating ounces filled.

DIVISION 02 26 23 – LEAD / ASBESTOS NOTICE

Lead/Asbestos containing building materials (ACBM) shall not be used in the construction of the project. The designer shall submit a signed statement that to the best of the designer's knowledge that, "no lead/asbestos containing building material (ACBM) was specified as a building material in any construction document for the project or was used in the building". This statement shall be included in all project documents that include but are limited to the construction drawings and project manual.

On file in the office of each existing school (and with a copy in the Department of Facilities Management office) there should be an asbestos management plan, field of study, etc. that details the types and locations of lead/asbestos containing materials (ACBM) within the building(s). This management plan is available for the architects and contractor's review upon request. If under any circumstance these documents are not readily available and current, the contractor must comply with all requirements that will ensure all state and local codes are met. Under all circumstances, asbestos management plan, field of study, etc. must be included in close-out documents. If any materials suspected to contain lead/asbestos are encountered in an addition or renovation work, the Owner's "AHERA DESIGNEE" shall be contacted immediately to investigate and testing of these materials. The Owner shall have the option to either remove the material or supervise the removal of any asbestos containing material by an independent contractor hired and paid by the Owner. A statement to this effect shall be included in the Project Manual.

DIVISION 02 40 00 - DEMOLITION

EQUIPMENT REMOVAL: The Designer and Project Manager shall schedule time for the Owner to remove material and equipment to be saved or salvaged. Designer is to provide a statement to include in the scope of work that the Contractor is to remove, store, and protect existing equipment for possession by Owner if Owner is not able to remove equipment and material prior to the Contractor's start date. If lead/asbestos abatement of a building is required and not included in the project's base bid, the Department of Facilities Management will specify the work and bid the project in a separate contract prior to start of construction. A statement about this effect shall be included in the Project Manual. **Contractors are responsible for their own utilities locates, including private.**

UTILITY DISCONNECTION: Coordinate with MLGW, Shelby County Water Services, early in the project to discontinue or interrupt services to the building. This will allow the utility time to respond prior to demolition and after the abatement of any lead/asbestos is completed. Timing is critical, so as not to delay the project. Where utility relocation is required for an addition to an existing building, the utility shall be provided with all needed information as soon as documents are complete, along with an estimated schedule for when the work will be required. If utilities will be disrupted in an occupied school, the principal and MSCS shall be notified 48 hours before the disruption. A statement about this effect shall be included in the Project Manual. **Contractors are responsible for their own utilities locates, including private.**

EXISTING ELEVATORS: Designer to contact the MSCS elevator maintenance vendor during the design process to discuss renovation plans and review the Code required modifications to the existing elevators. Elevator maintenance vendor will submit a proposal to perform required upgrades, and work shall be contracted directly by MSCS.

SLABS ON GRADE: The Designer shall include detailed information in the Construction Documents to cover the scope of work required to maintain or repair in place radon mitigation systems under slabs on grade that are to be cut during renovation, including radon barriers.

Demolition of Building Structures

- This scope outlines the work required to safely and efficiently demolish existing metal buildings located at [Insert Project Site]. The demolition will include structural disassembly, material removal, site cleanup, and disposal in accordance with Health Department and AHJ's regulations. This scope of work outlines the requirements and procedures for the demolition and removal of existing metal buildings located at [Project Site Address]. The work includes disassembly, removal, disposal, and site cleanup.
- Demolish and remove existing metal building structure, including steel framing, roofing, siding, concrete slab, and associated utilities.
- (SEE ALTERNATE #1 BELOW) Perform all work in accordance with LEED BD+C v4 or v4.1 requirements to support certification goals (e.g., Silver, Gold, Platinum).

1. Pre-Demolition Activities

- Site Assessment: Inspect buildings for hazardous materials (e.g., asbestos, lead paint). This standard applies to all construction activities involving asbestos, lead, or any type of common hazardous waste during demolition, renovation, and maintenance.
- Permitting: Obtain necessary demolition permits and approvals for AHJ.
- Utility Disconnection: Coordinate with utility providers to disconnect water, gas, electricity, and communications.
- Safety Planning: Develop and implement a site-specific safety plan, including fencing, signage, and PPE requirements.
- Pest Control: Conduct a Pest Assessment by Engaging Licensed Pest Control Operators (PCOs)
- Coordinate with Local Authorities: Work with environmental health departments and housing authorities to address pest issues on adjacent properties.

2. Demolition Scope

- Structural Disassembly:
    - Remove roofing panels, wall panels, and insulation.
    - Dismantle steel framing, including columns, beams, and trusses.
    - Remove doors, windows, and other fixtures.
- Foundation Removal (if applicable):
    - Break up and remove concrete slabs and footings.
    - Excavate and backfill as needed.
- Implement Integrated Pest Management (IPM):
    - Use a combination of exclusion, restriction, and destruction methods.
    - Monitor pest activity continuously and adjust strategies as needed.

3. Material Handling

- Salvage and Recycling:
    - Identify and segregate salvageable materials (e.g., steel, aluminum).
    - Transport recyclable materials to approved facilities.
- Waste Disposal:
    - Dispose of non-recyclable debris in accordance with local environmental regulations.
    - Maintain documentation of disposal and recycling activities.

4. Site Restoration

- Cleanup:
    - Remove all debris and hazardous materials.
    - Grade and level the site as required.
    - Seed and Straw all disturbed areas

- Final Inspection:
    - Conduct final walkthrough with project stakeholders.
    - Ensure compliance with all demolition and environmental standards.

5. Deliverables

- Demolition schedule and progress reports.
- Waste and recycling documentation.
- Final site condition report

LEED-Specific Requirements (Alternate #1)

A. Waste Management Plan

- Develop and implement a Construction and Demolition Waste Management Plan (CWMP).
- Target diversion rate: Minimum 75% of total waste by weight from landfills.
- Identify at least five material streams for diversion (e.g., steel, concrete, wood, cardboard, soil).
- Track and report waste quantities monthly, including:
    - Hauler name
    - Destination facility
    - Weight of salvaged, recycled, and landfilled materials

B. Material Reuse and Recycling

- Salvage reusable materials such as:
    - Structural steel
    - Metal panels
    - Concrete (for aggregate or backfill)
    - Wood (for blocking or reuse)
- Separate recyclable materials on-site using clearly labeled containers.
- Avoid contamination of recyclable streams.

C. Energy Efficiency in Demolition

- Use equipment and methods that minimize fuel consumption.
- Optimize transportation routes for hauling debris.
- Consider deconstruction over mechanical demolition where feasible.

D. Site Preparation

- Secure perimeter fencing and signage.
- Designate and label waste sorting areas.
- Protect adjacent structures and vegetation.
- Disconnect and cap utilities (electric, water, gas, sewer).

E. Demolition Activities

- Remove non-structural elements first (doors, windows, interior finishes).
- Dismantle structural steel and metal panels systematically.
- Break and remove concrete slab and foundations.
- Sort and stockpile materials for reuse, recycling, or disposal.

F. Environmental Controls

- Implement dust suppression measures (e.g., water spray).
- Prevent stormwater runoff contamination.
- Monitor noise levels and comply with local ordinances.

G. Documentation and Reporting

- Maintain daily logs of demolition progress.
- Submit monthly waste diversion reports.
- Provide final summary report for LEED documentation.

DIVISION 03 00 00 - CONCRETE

SIDEWALKS: Specify structural 3500 PSI concrete. Preferred reinforcement is concrete fiber reinforcement and admixtures. Alternative reinforcement is minimum 6x6/ W2.9 x W2.9 welded wire fabric.

SLABS ON GRADE: The Designer shall include detailed information in the Construction Documents to cover the scope of work required to maintain or repair in place radon mitigation systems under slabs on grade that are to be cut during renovation, including radon barriers.

STAINED/ COLORED CONCRETE: The use of stained or colored concrete for exterior applications such as courtyards and sidewalks is not permitted. Use of stained/ colored concrete shall be considered for interior use only and on a case-by-case basis.

STAIRS AND RAMPS: Concrete stairs and ramps provided at platforms and stages shall be provided with the ability to be accessed by the audience. Mechanical lifts to platforms and stages will only be considered on a case-by-case basis when ramp access is not attainable. Aluminum/ metal ramps and stairs will be considered on a case-by-case basis in relation to schedule and project budget.

EXPANSION AND CONTROL JOINTS: Expansion and control joints shall be shown on structural drawings. MSCS requests that joints not exceed 120 square feet or 10x12 feet on center. Designer shall coordinate control joints with all finishes,
i.e. terrazzo, VCT, to minimize compromises to finish material i.e. breaks, cracks, etc.

DIVISION 04 20 00 - MASONRY

EXTENT: It is preferred that all interior walls shall be CMU especially in assembly and high traffic areas except at Administration and Media Centers where alternative wall framing materials may be used such as metal framing and sheetrock. If metal wall framing and sheetrock are specified at educational spaces, sheetrock/ gypsum board shall be abuse resistant.

CORNERS: Special shape bullnose units shall be provided at corners of interior CMU wall construction and as needed for safety. The first course of CMU at top of finished slab shall be standard for base application such as vinyl, rubber, etc.

CONTROL JOINTS: At interior and exterior control joints, use paintable silicone or polyurethane sealant with vandal resistant characteristics. Provide backer rods prior to installation of control joints. MSCS recommends vertical control joints to not be located behind downspouts for maintenance concerns.

EXPANSION JOINTS: At all interior expansion joints greater than ½" use a vandal resistant metal covers. At exterior expansion joints, silicone coated compressible expansion joint materials are acceptable. Provide backer rods prior to installation of control joints.

CAVITY INSULATION: See DIVISION 07 27 03 – CLOSED CELL SPRAY POLYURETHANE FOAM AIR BARRIER for continuous insulation applied in cavities. Contractor shall guarantee designed air space is maintained upon installation of spray foam.

WEEP VENTS: Specify aluminum inserts 16" OC staggered top and bottom and at windowsills and heads. Never specify sash cords or void joints.

THRU-WALL FLASHING: MSCS prefers 3oz solid copper that is permanently coated and bonded between two layers of asphalt-saturated glass fabric. **Use of EPDM thru-wall flashing is not permitted**. MSCS will consider on a case-by-case basis the installation of a complete, factory-assembled masonry wall cavity system. This

system shall combine a flashing membrane with a mortar dropping collection drainage mat, weep tabs, drip edge and termination bar into a single, easy-to-install panel. Basis of Design shall be Total Flash by Mortar Net Solutions.

All through wall flashings at any place in the masonry construction that is interrupted by doors, windows, canopies, etc. shall be a bituminous copper material, heavy gauge.

EXTERIOR MASONRY CONSTRUCTION: MSCS prefers that privacy walls, brick column surrounds, etc. not use masonry as top course to minimize efflorescence and recommend use of prefinished waterproof caps such as pre- finished metal flashing when applicable. Architectural details shall be thoroughly reviewed and vetted to ensure no open brick cells are exposed. MSCS recommends darker color tones be used at grade level to avoid staining during final grading.

PROJECTIONS/ RECESSES: Masonry projections and recesses shall be a minimum of ¼". Details shall ensure that all horizontal surfaces have a slight slope to prevent water ponding on masonry surfaces.

SPECIALTY BRICK: MSCS prefers that specialty brick material and colors be minimal if used at all. Specifications shall include provisions for purchasing specialty brick from the same lot for color/ finish consistency.

GLAZED CMU: MSCS prefers no glazed concrete masonry units. Requests shall be reviewed on a case-by-case basis.

CLEANING: All masonry cleaners or high-pressure cleaning shall be approved by the brick-and-mortar manufacturers prior to cleaning and care shall be taken to protect the surrounding construction finishes, i.e. glazing, joint compounds, metal frames, etc.

DIVISION 05 50 00 - METAL FABRICATIONS

All exposed structural steel shall be primed where rust has occurred during exposure to weather.

RAILINGS: Exterior rails finish shall be the most economical and maintenance- free finish. MSCS recommends stainless steel or aluminum finish for interior handrails. Painted handrails are not desired due to finish longevity and maintenance. These finishes shall include but not be limited to stainless steel, brushed aluminum, powder coating, factory finish or primed steel with epoxy painted finish. Railing installation shall not be surface mounted except only when approved by MSCS PM for special conditions. All exposed steel/ metal with finished coatings shall have a minimum 5-year warranty.

INTERIOR METAL STAIRS: Shall be concrete pan only. Stair stringers shall be steel channels or tubing.

LADDERS: Provide painted metal ladder to roof with locked scuttle/roof hatch. Provide fixed painted steel ladders at roof elevation changes. Designer is to determine minimum required height to provide fall cage and intruder access protection such as gate and lock.

EXPOSED STRUCTURAL STEEL: MSCS recommends that all structural steel/ metal be hot-dipped galvanized or powder coated. All exposed metal shall have compatible protection finish applied such as paint to protect from the elements. Colors shall be reviewed and approved by the Designer and Owner.

DIVISION 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK

STANDARDS: Specify to comply with "Architectural Woodwork Standards" published jointly by Architectural Woodwork Institute (AWI), Architectural Woodwork Manufacturers Association of Canada (AWMAC), and

Woodwork Institute (WI), to the most current and adopted standards. Specify “Premium” Grade Casework. Do not register for the project or apply for certification.

MOCK-UP: At Owner request only, contractors shall provide a supplier location to review an exact product or submit a full-scale mock-up including a base cabinet unit with countertop, wall cabinet and at least one accessible and one non-accessible cubby for review and approval for approval by Architect and/ or Owner prior to fabrication. The mock-up may be incorporated into the finished work after approval.

PLASTIC LAMINATE:

- Plastic Laminate Vertical Surfaces: .028 inches in thickness, for exterior surfaces shall meet NEMA LD3-2000 VGS standards including thickness. Open shelving shall be CL20.
- Balancing Sheet for laminate surfaces: White high-pressure cabinet-liner, CL20 in thickness shall meet NEMA LD3-2000 CLS standards. Use for balancing exterior surface laminates. No melamine allowed.
- Countertops: .054-inch thickness with heavy gauge backing sheet for balanced construction.

DOORS: Provide full overlay style. Construction and thickness shall be as required to prevent warping. Plywood is an allowed substrate. Particle board substrates are discouraged and will not be accepted. Doors shall be balanced construction. For wardrobe/ teacher cabinet doors, closers shall be provided to prevent opening over extension.

SHELVES: Do not exceed spans of 3' for 3/4" thick shelves without additional support.

COUNTERTOP: MSCS preferred finish is solid surface. For best value engineering practices in specific cases, plastic laminate surface will be acceptable; countertops shall be 3/4” CDX Plywood (no formaldehydes permitted). Countertops with sinks must be constructed of CDX plywood. Plastic laminate countertops shall have 3mm edge banding.

BASES: Cabinet sides shall not extend down to the floor. Rubber wall base as specified shall be applied on cabinet bases. Install specified floor under the base cabinets, do not spot flooring at cabinets. Independent end panels must be CDX plywood.

CABINET HARDWARE:
Drawer and Door Pulls: 3/16” diameter heavy duty, 4" or 5” brushed aluminum wire pull or other projecting type without extended ends. Do not use recessed pulls.
Drawer Slides: 100 lb. capacity ball-bearing slides with self-closing feature or catch at closed position.
Door Hinges: Specify heavy-duty 5-knuckle hinges. Do not use “European” style hinges.
Door Silencers: Shall be provided at all cabinet doors.
Door/ Drawer Locks: Designer to confirm if keyed lockable hardware is requested. Teacher’s cabinets when provided shall be lockable.

PRECAUTIONS: Do not install architectural woodwork until the building is enclosed, the permanent heating and cooling system is in operation, and residual moisture from plaster, concrete, or masonry has dissipated. Temporary moisture and relative humidity control measures will be considered on a case-by-case basis.

RECOMMENDED HEIGHTS: Use ADA compliant countertop heights in all locations and as required by code and applicable ADA recommendations.

DIVISION 07 00 00 - THERMAL & MOISTURE PROTECTION DESIGN CONSIDERATIONS

ROOFING SYSTEM: Roof design and specification shall be approved by the MSCS Department of Major Construction representative. MSCS requests that all Designers consider wall penetration over roof penetrations when possible to minimize impacts and compromises to building envelope during design. All roofs shall have a positive slope minimum 1/4” per foot, utilizing the slope of structural members, (not tapered insulation) to drains,

preferably at the perimeter**. Use of interior roof drains is discouraged.** Care shall be taken to provide for building expansion and contraction. All roof systems shall be designed to meet Factory Mutual (FM) current wind uplift requirements and max wind speed design. Medium and Low slope roof systems shall require installers to be certified by the product manufacturer of the same system being installed and proof shall be required. Roof warranty shall include a minimum manufacturer's 20-year, No Dollar Limit, full system warranty, and a 5-year labor warranty.

STEEP SLOPE ROOFS: Steep sloped roofs shall have, but not be limited to the following:

- Standing seam Kynar finished structural metal roofing system or architectural system over deck, utilizing seams that are at least 2 ½" above the plane of the roof panel and secured by means of concealed cleats.
- Kynar finished aluminum should be considered if budget allows.
- A minimum slope of 3 inches per foot shall be maintained.
- Total roof insulation rating for steep slope roofs shall be R30 minimum.
- All poly-iso insulation shall be installed over the roof decking and shall have staggered and taped joints. Insulation joints should not align with any decking joints to prevent air and moisture infiltration.

MEDIUM SLOPED ROOFS: Standing seam metal roofing and dimensional, fiberglass shingle roofing weighing 300 pounds per square or greater are acceptable.

LOW SLOPE ROOFS: Fully Adhered non-ballasted 60 mil (black) EPDM is preferred. **PVC and TPO membranes will not be accepted.** Minimum slope to point of discharge shall be ¼" per foot. Provide warranty as required by DIVISION 01 78 00 - SPECIAL WARRANTIES AND MAINTENANCE AGREEMENTS. All roofs Insulations shall be produced CFC free.

CANOPIES: Provide overhead canopies at primary building entrances. Sheet metal panel systems are recommended for soffit construction. EIFS soffits shall not be used.

ROOF INSULATION: Specify minimum R-30 value for roof systems or minimum required by Energy Code – whichever is greater. Mechanically fasten where possible and adhere to concrete surfaces. Provide 2 layers minimum with joints staggered vertically. No gyp board cover board. Roof insulation shall require certification that insulation meets Thermal Warranty per DIVISION 01 78 00 - SPECIAL WARRANTIES AND MAINTENANCE AGREEMENTS.

SKYLIGHTS: Skylights are not preferred and shall only be implemented with MSCS Department of Major Construction approval.

WINDOWS/ CLERESTORY: Designer shall consider sun angles in regard to window locations and sizes as related to the facilities location on site. Locations with high sun exposure should provide shaded canopies or awnings when applicable. Interior window shading options will be considered.

ROOF DRAINAGE SYSTEM

- MSCS prefers a continuous metal gutter system on all medium and high sloped roofs. Gutters shall be designed and sized for 100-year weather events and related water run-off velocities specific to valleys, and other roof areas.
- Downspouts shall be sized in association with gutter design and shall terminate into a drainage boot connected to a site drainage system. MSCS preferred downspout adapter for basis of design is the Piedmont Downspout- Model B1 or approved equal.
- All heavy gauge metal downspouts shall be attached to the brick exterior by means and methods recommended by downspout manufacturers.

- Interior roof drains are discouraged.
- Roofing drains routing shall be overhead to the exterior of the building. Under slab drain routing is discouraged and recommended to be routed at the exterior building perimeter.
- MSCS preferred roof drain manufacturers to be used as basis-of-design are Zurn, J.R. Smith, Josam, or approved equal.

COVERED WALKWAYS AND CANOPIES

- Overhead canopies are requested at primary entrances, vehicular and bus drop-offs.
- All canopies and covered walkways will be sloped to drain water from the building.
- All covered walkways should be designed to ensure proper coverage for standing and paths of travel as well as include rain coverage that includes wind-driven rain events.
- Covered walkway eaves shall be located a minimum of 1'-0" from face of curb and gutter to prevent damage from school buses, oversized trucks, and other high height vehicles.
- MSCS recommends that water runoff is tied into the storm water drainage system.
- Covered walkways shall be provided from building additions and auxiliary buildings used for daily educational operations to the main facility to protect students and staff during inclement weather.

DIVISION 07 10 00 – WATERPROOFING

All below grade wall construction of interior spaces, elevated floor construction at toilet rooms, and shower room floors and walls shall be waterproofed.

DIVISION 07 27 03 – CLOSED CELL SPRAY POLYURETHANE FOAM AIR BARRIER

When requested and applicable, spray applied closed cell polyurethane shall be considered. Designer is to specify a test method for achieving the required thickness. Material shall meet current energy code requirements. Material shall be tested for air permeance per ASTM E2178 and vapor permeance per ASTM E96. Refer to section DIVISION 04 20 00 - MASONRY for information about use as cavity wall insulation. **No spray applied open cell insulation shall be used and highly discouraged**.

DIVISION 07 31 00 - FIBERGLASS SHINGLE ROOFING

When required by project type, asphalt shingle roofing weighing 300 pounds per square or greater are acceptable for use on medium pitched roofs. MSCS recommends the implementation of mildew resistant properties for the specified shingles. Fiberglass asphalt shingles shall be used as required by existing design criteria or written approval by the Director of Major Construction. All roofs shall slope 1-1/2" per foot minimum. Shingles shall be self-sealing; no staples. Mandatory substrate protection is a waterproof underlayment membrane, i.e. ice and water shield. For budgetary constraints, specify minimum #30 felt underlayment. MSCS discourages the use of nail guns and will only be considered on a case-by-case basis.

DIVISION 07 41 23 – SHEET METAL ROOFING

Standing seam roofing is the preferred roof system for medium and high-pitched roofs. Batten seam systems shall be used on roofs greater than 4/12 and rolled seam systems shall be used on roofs less than 4/12.

Acceptable manufacturers include:

- Metal Sales Corporation
- MBCI

- AEP-SPAN
- McElroy Metal
- Architectural Metal Systems

Other materials and types of metal panel roof systems shall be used only with the special consent and approval of the Owner. Specify ice and water shield at perimeter adjacent to gutters.

WARRANTY: Refer to DIVISION 01 78 00 - SPECIAL WARRANTIES AND MAINTENANCE AGREEMENTS Snow Guards: shall be installed at roof eaves. Provide snow guards that attach to the metal roof panel seams. Snow guards shall not penetrate or be adhered to metal roof panels. Snow guard systems shall have **a**ttachments **t**o catch and/or block ice from the roof panels.

DRAINAGE: Drain all metal panel roof areas into external gutters and downspouts per DIVISION 07 60 00 - FLASHING AND SHEET METAL. Downspouts shall drain into an underground drainage system.

DIVISION 07 50 00 - MEMBRANE ROOFING

Slopes shall be accomplished primarily by sloping the supporting structure. Slope to 1/4" per foot in all directions. Small areas and crickets may be accommodated using tapered insulation.

Roofs shall not slope to a parapet wall with scuppers thru the wall (unless required for design aesthetics matching existing and only if approved by MSCS DFM PM). Avoid roof drains in the field of the roof unless the configuration of the building makes sloping the roof to the edges impractical. The preferred collection system is gutters along the low edges of the roof. Gutters and Downspouts to be designed per DIVISION 07 60 00 - FLASHING AND SHEET METAL.

All low slope roof areas shall be accessible by means of a roof scuttle/hatch, exterior door, or exterior roof ladders.

DESIGNER SHALL INCLUDE IN PROJECT MANUAL THAT ROOFING CONTRACTORS SHALL BE CERTIFIED BY THE MANUFACTURER OF THE PRODUCT(S) APPROVED TO BE INSTALLED.

SINGLE PLY MEMBRANE ROOFING: Shall be nominal 60-mil, non-reinforced black EPDM sheet membrane. Membrane shall comply with ASTM D 4637, Type I or II as applicable, and shall be labeled as such. Designer must confirm energy code criteria in reference to reflectance of the roofing system prior to specifying color. The complete roofing system including membrane, insulation, and attachments shall meet requirements of FMI-60 and Class 1A and UL Class A. Acceptable manufacturers include:

- Carlisle
- Versico
- Elevate
- Gen-Flex
- Johns Manville

MODIFIED BITUMEN ROOFING: Shall be hot asphalt mopped type with a minimum of two plies and shall have a factory applied granular surface. Modifiers and reinforcements shall be as recommended by the Design Consultant; however, no organic products shall be specified. Acceptable manufacturers include:

- Manville
- Siplast
- Tamko
- Firestone

FLASHING: Base flashing shall be type recommended by membrane manufacturer. See DIVISION 07 60 00 - FLASHING AND SHEET METAL.

WARRANTIES: No “early bird” warranties will be accepted. Roof warranties shall commence upon substantial completion of project. MSCS requires that all roofing contractors be certified and in good standing with the manufacturer of the product being installed. MSCS requires that the contractor provide at a minimum a manufacturer’s 20-year, no dollar limit, fully system warranty as well as a 5-year contractor labor warranty. These are warranties issued by the manufacturer prior to the roof being inspected by the manufacturer based on the reputation and experience of the roofer. If a condition of the manufacturer issuing a warranty is that the manufacturer will inspect and approve the roof installation, then require a copy of the inspection report (and any follow-up inspections after corrections are made) and approval as part of the closeout documents along with the warranty. Require some sort of confirmation that the warranty fee has been paid before the warranty form is issued. Issuance of the warranty should be made dependent on the manufacturer’s acknowledgment that all conditions have been met for the warranty to be valid.

DIVISION 07 60 00 - FLASHING AND SHEET METAL

Materials and details used for roof edges, gutters and downspouts shall protect against galvanic action, be permanent and require low maintenance. Details shall be in accordance with the NRCA Roofing Manual and the Architectural Sheet Metal Manual by SMACNA. Edge metal shall be included in full system roofing warranty per DIVISION 01 78 00 - SPECIAL WARRANTIES AND MAINTENANCE AGREEMENTS. Exposed fasteners nor gasket screws are permitted.

Install perimeter gutters and downspouts where roofs discharge at eaves. Built-in gutters and downspouts shall not be used. Scuppers shall not be used for primary discharge. When scuppers are used due to architectural condition, scupper shall have a collection head and built in overflows.

All gutters shall be sized as required by the current adopted code. MSCS prefers a minimum 6” box type hung with gutter brackets. Gutters shall be of continuous lengths of 30-foot with expansions at every 60-foot. Gutters small be designed per SMANCA 5th Edition pages 1.1 through 1.7. Gutter mounting shall be designed per SMACNA 5th Edition page 1.31 figure 1-12.

All downspouts shall be minimum 5” x 6” and properly sized to allow proper water relief. All downspouts to have strainers. Downspouts are preferred to connect to underground storm drainage system with protection at grade as follows: heavy-duty covers (22 gauge minimum) or schedule 10 steel or powder coated stainless steel between finished grade and two feet (2’-0”) minimum above finished grade. Covers or pipes shall be painted to match adjacent surface. Provide clean-out flush with finish grade within 10' of building wall or downspout location at all underground storm drainage lines.

DIVISION 07 72 33 – ROOF HATCHES

Roof scuttles/hatches shall be designed as required for rooftop equipment specific to the project. The minimum of 3’ x 3’ shall be considered. They shall be lockable, not located within 10’ of a roof edge and where incorporated with stairs, a collapsible handrail provided. They shall be designed to prevent galvanic action.

DIVISION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

All exterior doors are to be recessed or otherwise protected from direct exposure to precipitation. Construction shall be of heavy-duty weatherproof design with energy-efficient glass to minimize leaks, promote energy conservation, and reduce maintenance problems. MSCS recommends that when double doors are used that a keyed removable mullion be included in the design to allow for large objects and service equipment such as

vending machines, maintenance equipment, lifts, etc. to access the opening.

Heavy-duty hollow metal doors and frames are required for school usage. Aluminum doors and frames shall be considered and if used, shall be designed for high traffic use and security; heavy-duty steel, 16 gauge minimum, with a wraparound design is preferred. Particular attention needs to be given to the preparation and reinforcement for hardware. Doors shall be 1¾" thick and 7'-0" in height or match existing heights where applicable. Doors shall be 36” wide minimum. Generally, entrance doors shall have large vision panels or be hollow metal-framed glass doors. Interior stairs/corridors doors shall have vision lights as allowed by the applicable codes.

EXTERIOR HOLLOW METAL DOORS and FRAMES: Shall be SDI Grade III, extra heavy model 2A (seamless) which requires face sheets of 14 gage minimum. Exterior doors and frames shall be of galvanized steel construction including reinforcement, louvers and other accessories. Top of exterior doors shall be closed flush and welded watertight. Frames shall be welded and fabricated from 14-gauge cold rolled steel. All exterior doors shall be insulated. All exterior hollow metal doors shall be hung on full mortise heavy duty butt-hinges, stainless steel finish.

INTERIOR HOLLOW METAL DOORS AND FRAMES: Shall be SDI Grade III, extra heavy duty, Model 2 (seamless) which requires face sheets of 16 gauge minimum. Interior frames shall be welded and fabricated from 16 gauge cold rolled steel.

HOLLOW METAL GLAZING FRAMES: Shall be fabricated from 14 gauge cold rolled steel. Where used on the exterior both frame and glazing stops shall be made from galvanized sheet metal and glazing stops shall be prime coated prior to assembling.

FRAME ANCHORAGE: Jamb anchors at masonry wall openings shall be 16 gage galvanized T-Buck design. Frames at masonry walls shall be filled with grout. Jamb anchors for plaster and gypsum wallboard partition openings shall be a minimum of 18-gauge steel welded Z shape. Provide floor anchors at all frames.

FINISH HARDWARE REINFORCEMENT: Door and frame reinforcement shall be a minimum of 9 gauge for hinges and be a continuous channel for the full height of door, 12 gauge for closers and be a continuous channel for the full length of the header, and 14 gauge for strikes and be a continuous channel for the full height of the door. 7-gauge reinforcements shall be used for hinges on frames. Twenty-six (26) gauge steel plaster guards or mortar boxes welded to the frame shall be provided at hardware cutouts where installed in concrete, masonry, or plaster openings.

VISION LIGHTS: Shall be provided at classroom, stairs and corridor doors as the current adopted code allows. Coordinate exit device locations with vision lights as applicable to avoid overlapping.

LOUVERS: Shall be sight-proof, weatherproof louvers constructed of 24-gauge steel V or Y shaped blades set in 20-gauge frame. A galvanized wire mesh insect screen shall be provided at the inside face of exterior door louvers. Louvers shall have an applied factory finish with a minimum 10-year warranty.

FINISH PREPARATION: The exposed surfaces of door and frame units including galvanized surfaces shall be cleaned, bonderized, and shop primed using manufacturer's standard baked-on rust inhibitive primer.

DOOR AND FRAME LAYOUT: It is recommended for exterior, main entrance doors to be multiple, single doors swinging in the same direction. Double doors are not to be used in any situation without approval of Department of Major Construction. Corridor doors may be double if hold open devices are used. If possible, where wide openings are needed for movement of large equipment, etc., removable mullions may be specified. However, oversized single doors are preferred.

MAIN MECHANICAL EQUIPMENT ROOMS: Shall have 4’-0” exterior doors with kick plates where possible. Elevator equipment room doors shall be per elevator manufacturer’s requirements, minimum 4’-0”

EXTERIOR DOORS AT KITCHEN FROM DOCK: Single 4’-0” door with armor plate, peep hole and doorbell. A tinted and laminated vision panel will be considered on a case-by-case basis.

DIVISION 08 20 00 - WOOD DOORS

Hollow metal doors are preferred. Wood doors shall be considered on a case-by-case basis and the approved design dictates such a need. If special conditions arise, the following design guidelines should be considered.

Solid core wood doors with transparent finish in hollow metal frames shall be used at most interior doors including fire doors. Doors shall be pre-fitted and pre-machined at factory for finish hardware. Specify 5” wood stile reinforcement to be provided at hinge, closer, lock and strike locations. Doors shall be 1 ¾" thick and 7'-0" height. Doors shall be 36” wide minimum. Door design will be full flush.

WOOD DOORS: Shall be solid core doors complying with requirements of AWI "Architectural Woodwork Standards (AWS)." Cores shall be solid particle board or staved lumber core except for fire-rated doors which shall have a solid core as required to meet rating requirements. At high traffic doorways, use solid core staved lumber doors or metal doors. Doors shall have a factory finish on both sides and all four edges. Kick plates are recommended for doors in high traffic areas. Kick plates shall be installed on push side only unless directed otherwise.

INTERIOR WOOD DOOR WITH TRANSPARENT FINISH: Shall be AWI Premium Grade with hardwood veneer face. Specify plain sliced white birch or red oak veneer, book match, with Grade AA faces. Rotary cut natural birch is not acceptable due to variations in color.

VISION LIGHTS: All doors at instructional areas will have vision lights. The size and placement of the vision lights shall be determined by the applicable code.

Doors shall have a lifetime warranty. Refer to DIVISION 01 78 00 - SPECIAL WARRANTIES AND MAINTENANCE AGREEMENTS

DUTCH DOORS: Use Dutch door w/magnetic hold-open in special conditions only and only at the request of MSCS Department of Major Construction.

DIVISION 08 30 00 - SPECIAL DOORS

Overhead roll-up doors are acceptable at art rooms and other technical/shop areas. In other areas, overhead roll-up doors should not be used unless no other option is appropriate. Overhead roll-up doors and grills, if used, are to limit access to certain areas of the facility but must not interfere with required egress from occupied spaces. All overhead doors and grills shall be of metal construction. Discuss with PM if the roll-up door should be motorized where specified.

Roll-up fire doors shall be avoided except when required by the current adopted code or with Owner’s approval.

Roll-up security grills may be used at serving lines where use of double doors is not practical.

The door at the dish return in the cafeterias shall be stainless steel with the tracks welded to the dish-run backsplash, leaving no gaps. The dish return door shall be specified to be provided by the Kitchen equipment subcontractor.

Exterior sliding glass doors shall not be used.

DIVISION 08 41 00 - ALUMINUM ENTRANCES

Aluminum entrance doors and/or frames shall be considered for use in schools with the Owner's approval. If approved for use, the aluminum doors shall be hung on a full mortise continuous hinge, aluminum or stainless-steel finish.

DIVISION 08 51 00 - METAL WINDOWS & STOREFRONT

Storefront and Window Replacement
Prior to the design phase of a window replacement project, a window opening shall be identified and demolished to reveal site conditions to be addressed by the project that would otherwise remain unseen. This opening may serve as the site of the mockup before project commencement.

If project budget allows, MSCS recommends to include as best practice to include, as a part of any window replacement project, the cleaning, tuck pointing and sealing of the building envelope.

All exterior windows are to be recessed or otherwise protected from direct exposure to precipitation. Construction shall be thermally broken aluminum storefront. Storefronts shall be fixed units unless required otherwise by code. Hollow metal frames shall be used at sidelights and transoms adjacent to entrance doors. Where operable units are required by code, the designer is to determine the best window type to meet the criteria.

Do not use steel or wood windows at exterior.

A horizontal frame approximately 36" above finish floor shall be provided at full height windows, full height curtain walls and sidelights to protect against walking into glass.

Vandal resistant systems shall be used whenever possible. Secure locks and latches that cannot be "jimmied" or broken are important in all cases. MSCS recommends the installation of laminated glass/ glazing on all first floor windows and doors. If budget allows, MSCS would like all exterior glass/ glazing to be laminated.

Windows in occupied spaces such as classrooms, project rooms, offices, conference rooms, etc. shall have window treatments such as sunshades or blinds. An alternate pricing is requested for these items.

WINDOWS & STOREFRONT: Shall be commercial grade type fabricated from aluminum extrusions of not less than 0.062" thickness for main frame and sash thickness. Thermal break construction shall be used. Aluminum sub sills with waterproof edges shall be used and attachment system that eliminates penetration through the head and sill flashings. Ensure separation is provided to prevent galvanic action. Frame finish shall be natural satin anodized finish, color-anodized finish or fluoropolymer Kynar 500 color coating. Finish of flashing, trim, and exposed fasteners shall match frame finish. Aluminum storefront may not have doors.

GLAZING: Refer to DIVISION 08 80 00 - GLAZING.

STOOLS: A non-absorbent, easily cleanable surface shall be provided at windowsills. Solid surface stools are acceptable. Mechanically anchored slates and polymer stools, ceramic and quarry tiles are acceptable. Wood, gyp board, plastic laminate, metal, and concrete masonry unit stools shall not be used.

WINDOWS & STOREFRONT: Glaze windows from interior. Do not use hollow metal storefront without protection from the elements.

DIVISION 08 71 00 – DOOR HARDWARE

All door hardware specifications are to be reviewed by MSCS Locksmith and MSCS Department of Major Construction PM. All hardware is to be compliant with current adopted codes and ADA criteria. This hardware specification is to be submitted to the Project Manager for review prior to incorporation into the Project Manual.

Use full length piano hinges on exterior and high use doors. Use of automatic openers are discouraged but may be used only at the main Entry with approval by MSCS. Due to pandemic criteria, the designer shall make recommendations for use of hands-free hardware.

DIVISION 08 80 00 - GLAZING

Insulated glass shall be installed at exterior windows in accordance with local energy codes and per the energy model requirements of the engineering consultant. Tempered glass shall be installed at and adjacent to doors as required by the code. Interior glazing 6'-0" or less above the finish floor and exterior glazing 6'-0" or less above walkway surfaces shall be tempered. MSCS prefers that all glazing at ground level or 1st story be laminated. If budget allows, all glass and glazing should be laminated.

DIVISION 09 00 00 – GENERAL FINISH REQUIREMENTS

FINISHES: The Owner's approval for all selections is required. The Architect shall assist the Owner in coordinating furniture colors with the approved color schedule. Finishes selected shall be durable, easily cleaned, and easily repeatable when it becomes necessary to renew or refinish. The use of paint graphics or applied graphics should be kept simple and reproducible by ordinary painters or printing company.

PHYSICAL EDUCATION FINISHES: Masonry or similar damage-resistant material with an easily cleanable finish is required. Painted exposed structure is acceptable above, but acoustic treatments should be considered due to the size of the space required, generally acoustical deck and panels or acoustical banners. Floor finish at the elementary level should be resilient flooring with the game lines inlayed. Middle School and High School gyms shall have sprung maple athletic floors.

TYPICAL FINISHES:

Room or Area	Floors	Base	Walls	Ceiling	Special Notes
Typical Classroom including Music and Art Rooms	LVT (1)	4" Rubber Cove	Satin Latex	ACT	Carpet tile where floor electrical boxes are present. VCT for budget constraints.
Typical Office and Conference Rooms	Carpet Tile	4" Rubber Cove	Eggshell Latex	ACT	Carpet tile where floor electrical boxes are present.
Clinic, Workrooms, Storage Rooms	LVT (1)	4" Rubber Cove	Satin Latex	ACT	Carpet tile where floor electrical boxes are present.
Band Room	Carpet Tile	4" Rubber Cove	Satin Latex	ACT	Include Acoustical wall panels and anti-microbial carpet tile.
Playroom	LVT (1)	4" Rubber Cove	Satin Latex	Painted Structure	Include Acoustical wall panels, use MSCS playroom layout.

Platform	LVT (1)	4” Rubber Cove	Satin Latex	ACT	Do not use concrete to create elevation change. Stage curtains included in construction
Gymnasium	Wood	Rubber Cove (3)	Satin Latex	Painted Structure	Use TSSAA painted lines
Stage	Wood	Rubber Cove (3)	Satin Latex	Painted Structure	Stage curtains included in construction

Room or Area	Floors	Base	Walls	Ceiling	Special Notes
Auditorium	Carpet Tile aisles, sealed concrete seating area	4” Rubber Cove	Satin Latex	ACT	Include Acoustical wall panels.
Library	Carpet Tile	4” Rubber Cove	Satin Latex	ACT	Other flooring may be acceptable if approved by MSCS DFM
Kitchen	Quarry Tile	Quarry Tile Cove	Epoxy or Acrylic Latex	Washable ACT with hold down clips	Cementitious urethane floor finish to be an alternate
Serving	Quarry Tile, Terrazzo, or LVT (1)	Quarry Tile or Rubber Base Cove	Epoxy	ACT	Depending on design, choose appropriate flooring and base installation
Cafeteria	Terrazzo or LVT (1)	4” Rubber Cove	Satin Latex	ACT	Include Acoustical Wall Panels.
Staff Bathrooms	Ceramic Tile (2)	Ceramic Tile Cove (2)	Epoxy or Acrylic Latex	ACT	
Classroom Toilets	Ceramic Tile (2)	Ceramic Tile Cove (2)	Epoxy or Acrylic Latex	ACT	
Group Toilets	Ceramic Tile (2)	Ceramic Tile Cove (2)	Epoxy or Acrylic Latex	ACT (4)	Ceramic Tile on wet walls to top of partitions.
Corridors - school	Terrazzo or LVT (1)	4” Rubber Cove	Satin Latex	ACT	Provide colored stripes in flooring for Elementary Schools
Corridors - admin	Carpet Tile	4” Rubber Cove	Eggshell Latex	ACT	
Vestibules	Terrazzo, LVT & walk off carpet mats	4” Rubber Cove	Satin Latex	ACT	Walk-off carpet tiles within 10’ of entry door.
Elevators	LVT (1)	none	Laminate	Luminous Ceiling	
Stairs in Elementary	LVT landings (1)	4” Rubber Cove	Satin Latex	ACT	Use one-piece rubber stair tread and riser cover
Stairs in Middle and High	Sealed Concrete	4” Rubber Cove	Satin Latex	ACT	Metal stair nosing

Custodian Closets	Sealed Concrete	4” Rubber Cove	Epoxy		FRP to 4' behind floor sinks.
Mechanical, Electrical, IDF & other utility spaces	Sealed Concrete	none	none		Paint plywood back boards flat black.

(1) LVT - Consult with MSCS PM on maintenance requirements and performance criteria.
(2) Provide Cove Base. 12 x 12 tiles with minimal grout tiles preferred.
(3) Use rubber base with expansion leg designed for wood sports floor.
(4) Specify hold down clips on ACT in Group Toilets.

DIVISION 09 29 00 - GYPSUM WALLBOARD

Confine the use of abuse resistant 5/8” gypsum board partitions to administration and non-student “support” areas. These areas include Principal’s office, Assistant Principal’s office, support services' offices and all conference rooms shall be constructed to provide an STC rating of at least 54. Metal studs and abuse resistant gypsum wallboard with ¼” plywood backup can be used in other areas when approval of the Project Manager.

MSCS prefers abuse resistant and mold/ mildew resistant 5/8” gypsum board for the ceiling finish in middle and high school complexes.

Mold/mildew resistant gypsum boards shall be used in all wet areas such as toilets, janitor’s closet, locker rooms, showers, kitchens, etc.

DIVISION 09 30 00 - TILE WORK

WATER COOLER ALCOVES: specify a tile or other waterproof floor finish (not VCT) underneath unit and within standing zone. Each location should include a unit designed for accessibility.

MAINTENANCE STOCK: At time of completing installation, deliver stock of maintenance material to Owner. Furnish amount equal to 5% or one box, whichever is greater, of each type and color of units installed.

TILE SIZES AND SHAPES: Use coved bases and bullnose pieces on corners. Limit use of mosaic tiles.

GROUT AND SEALER: Use Epoxy Grout. For quarry tile use a black or other dark color grout. Other colors must be approved by the Owner.

ALUMINUM EDGING AND CORNER GUARDS: Shall be provided at doorways of entrances of toilet rooms.

QUARRY TILE: Flashed color ranges are recommended. Slip resistance is essential. Provide moisture barrier under all ceramic and quarry tile floors above first level.

WALL TILE & WALL LIGHTING: Designer is to coordinate lighting fixture locations and minimize the use of wall sconce light fixtures on walls with tile finish to eliminate excessive shadowing between tile faces and grout lines.

In the months of July and August prior to the start of Teacher’s return, the Contractor is responsible for cleaning and waxing of floors by a MSCS approved custodial vendor to ensure that the facility is ready to receive students and staff in preparation for start of school. Including movement of furniture out of areas of work and back into work areas. Coordinate and schedule cleaning efforts with MSCS custodial staff.

DIVISION 09 51 00 - ACOUSTICAL CEILINGS AND PANELS

MAINTENANCE STOCK: At time of completing installation, deliver required attic stock to Owner. Furnish amount equal to 5% or one box, whichever is greater, of each type, size, and color of acoustical units installed.

ACOUSTIC CEILING PANELS: Provide manufacturer's standard lay-in panels, 24" x 24" grid-size panels, with white non-directional finish. Panels shall have an NRC rating of .70 to 1.00 or higher. Provide non-sag panels if using 24” x 48” ceiling panels. Tegular edge tiles are discouraged. Designers shall use higher NRC rated tile for spaces requiring additional sound attenuation such as Band and Music Rooms. Use hold-down clips in Group Toilets, entry vestibules and other areas of security concern.

ABUSE RESISTANT PANELS: Provide (along with hold-down clips) at areas where damage might be

expected, such as Elementary School PE Rooms.

PANELS: 3/4" thickness cane or wood fiber panels are acceptable in corridors and multi-purpose rooms. Do not use soft acoustical panels at low ceiling installations. Tectum is not acceptable.

ACOUSTICAL CEILING TILE GRID SYSTEM & HANGERS: Designer shall specify that all wire hangers avoid contact with all duct insulation. When applicable, wire hangers shall be fastened to the low web profile of metal decking above so as not to penetrate roof system. All classrooms shall have ceiling grid system visually noted for fixed walls and freestanding as required for seismic events. Ceiling grid system shall be installed according to the manufacturer's instructions and recommendations.

DIVISION 09 64 00 - WOOD FLOORING

STAGE/ PLATFORM FLOORING: Manufacturer's standard straight edge, tongue and groove and end-matched solid wood flooring, 1" thick x 2 1/8" or 2 1/4" strips in standard random lengths. Use Southern Pine, type C and better flooring, near-rift grain with flat black paint finish. Use resilient flooring at elementary schools.

Finish wood stage flooring with a transparent polyurethane finish. The polyurethane shall be installed as per the wood flooring supplier and system manufacturer.

ATHLETIC FLOORING: At high and middle schools use manufacturer's standard straight edge tongued and grooved and end matched solid wood flooring, $^{25}/_{32}$ inch thick x 2 ¼" strips, 2'0" minimum length and averaging 4'- 6" long, double channeled base, or plain sawn, second and better grade, MFMA Grade marked, Northern Hard Maple with transparent polyurethane finish. Specify manufacturer's resilient pads over concrete subfloor with manufacturer's recommended plywood subfloor and vapor barrier. Specify Connor Duracushion I as basis of design. Electrical, including low voltage, connections and volleyball court insert locations need to be field verified prior to installation. Vent cove base needs to be included in the installation. Court graphics to be reviewed with school staff and MSCS PM. Allowances for court graphics shall be included in base bid. Athletic floor finish shall have an elevation differential of no greater than ½" or as code/ ADA guidelines allow.

Demolition and replacement of existing varsity gymnasium maple wood floor.
Demolition of all VCT floor surrounding and touching wood floor and replace with wood floor throughout gym area.
Installation of a new MFMA 2nd grade or better maple floor system with a complete and functioning system.
Replacement of all existing game lines and logos, including all other sports items.
Replace logo in 12' jump circle with new logo to be sent from MSCS.
Installation of a new 10 mil polyethylene vapor barrier. (Vapor barrier must meet staygo standards)
Removal of existing perimeter wood floor cove base in all cases.
Installation of new maple wood floor perimeter venter cove base to match existing. (Must do mock-up for approval)
Removal of existing door thresholds and replacement of door thresholds, including walk-off mats at exterior doors and rubber/vinyl mats at interior doors.
All exterior doors must be waterproof around all opening frames.
Provide new aluminum transition strips through existing door and cased openings Match thickness and size of existing. (Zinc strip)
New hinged brass cover plates shall be installed to cover existing volleyball inserts. Prep gym floor to receive new volleyball sleeves. Size shall match existing
Refinish new maple wood floor per MFMA standards for complete and functioning system.
Replacement of HVAC system filters upon completion of project. Must maintain correct humidity levels during construction.
Readjust new floor to regulation height. All basketball goals must match new flooring.
New floor striping shall meet TSSAA guidelines in all cases.
Readjust basketball goals to regulation height
Replacement of all power/outlets/low voltage/connections on the court.

Attic stock for maintenance cleaners and complete closeouts.
Flatness/test/control moisture levels prior to removal of new floor in all cases. Levels of control would be:
- Floor flatness
- Moisture readings in slab on grade
- Sleeper installs
- Moisture testing air quality and floor moisture

Contractor is responsible for all or any water intrusion for complete and functioning system in all cases.

DIVISION 09 65 00 - RESILIENT FLOORING

Preferred type of tile flooring is Luxury Vinyl Tile (LVT). Vinyl Composition Tile (VCT) may be used as base bid when budget constraints are in place. Other acceptable types of tile flooring are Rubber Tile, and Vinyl Tile goods. Colors shall be standard colors. Premium and custom colors are discouraged. Designers shall include a high moisture content adhesive as part of the base bid in the project documents.

WALL BASE: Rubber or Vinyl Cove. Specify roll products in maximum lengths available to minimize the numbers of joints. Design to specify installation with rounded pre-molded outside corners. Colors shall be standard colors. Premium and custom colors are discouraged.

For each type of product required, including adhesives, cleaning compounds, and other accessories, provide the same product by one manufacturer throughout the project and specify that all products have low VOC's.

For vinyl composition tile (VCT), use premium product lines of the following manufacturers, provided they comply with requirements of the contract documents and have a low VOC:

- Armstrong World Industries, Inc.
- Mannington Commercial
- Azrock
- Approved equal.

It is recommended to not use solid colors without modeled chip patterns nor very light or dark colors of VCT for floor installations.

For wall base, products are to be low VOC.

RUBBER ACCESSORIES: Stairs in elementary schools to have one-piece rubber stair tread and riser cover. In high Schools and Middle Schools use exposed concrete with metal tread nosing.

DIVISION 09 66 23 – EPOXY TERRAZZO

Designer shall provide an alternate design and layout for an epoxy terrazzo floor finish. Terrazzo shall be installed in all high traffic and communal areas such as hallways, corridors, foyers, main lobbies, multipurpose rooms, cafeterias, nurse' stations, etc.

Terrazzo shall be a thin-set epoxy terrazzo and comply with NTMA's written recommendations for terrazzo and accessory installation.

Transition strips shall be installed in doorways to spaces with different floor finishes that abut the terrazzo floor finish such as carpet, LVT, VCT, etc. Careful selection of thresholds shall be considered for future maintenance and replacement. Thresholds shall meet ADA criteria and eliminate any trip hazards.

Epoxy type terrazzo floors shall be burnished/ polished and not waxed to a high gloss finish comparable to a floor wax shine.

DIVISION 09 68 00 – CARPET TILE

This section describes the requirements for carpet tiles to be installed in MSCS projects.

CARPET: Carpet shall be designed for medium to high traffic use. Recommendations include but are not limited to the following: Class III, tufted, commercial carpet, type 6 or 6.6 nylon with modification ratio of 2.2 or less, minimum pile weight: 24 oz./yd., non-woven polyester backing, 20 pound tuft bind, multi-level loop pile, permanent anti-static control, 100% solution dyed, tweed pattern and antimicrobial protection required. Carpet shall carry 15-year warranty. Carpet shall be CRI Green Label Plus or equal.

Carpet shall bear Green Label Plus or other acceptable certification to contribute to LEED certification, as required. Product testing and/or certification must be clearly specified in the construction documents.

Installation connectors shall be specified in lieu of glue (sprayed or spread). Carpet manufacturer's modular tile glue free installation system.

All carpets and components shall be recyclable.

Use carpet tile in rooms where electrical floor boxes

exist. BASIS OF DESIGN: Interface

EDGE STRIPS: When an edge strip is needed at a transition between carpet and tile flooring, it shall be specified as a metal edge strip or an approved equal.

DIVISION 09 90 00 - PAINTING

SINGLE SOURCE RESPONSIBILITY: Provide finish paint and undercoat paint produced by the same manufacturer. If painting a previously painted surface, designer is responsible for specifying products that are compatible with the existing surfaces. A paint compatibility test is recommended.

SW Navajo White or equivalent is the preferred General Wall Paint Color. The color scheme will be approved by Director of DoMC during the design process. Colors will then be presented to the administration and school staff for review and comment only. The color schemes shall be completely defined in contract drawings. Limit number of paint colors.
PAINT: Apply low sheen paint such as satin to CMU walls. Use eggshell for gypsum wallboard walls. Provide finish in high traffic areas that can be washed and scrubbed easily. MSCS prefers a **latex acrylic or water-borne epoxy** for the high traffic areas such as corridors, group toilets, locker rooms, cafeterias and multipurpose rooms. Corridors and high traffic areas are recommended to have a two-tone paint finish. DARK COLORS ARE DISCOURAGED unless necessary for the design intent and approved by the MSCS DoMC. If used, Designer shall adjust application methods to ensure that a complete, consistent, and uniform coverage is obtained. This may include but not be limited to additional primer and finish coats, application methods, surface preparations, etc.

DOOR FRAMES: Semi-gloss.

Specify water-based solvent and mercury free paint with low or zero VOCs.

BLOCK FILLER: Shall be applied to all exposed masonry block. Specify two coats of block filler in Kitchen and Dishwasher areas to completely fill block pores to eliminate pinholes in painted finish and shall be approved by the Owner before application of finish paint. Block filler equivalent or substitute will be considered on a case-by- case basis.

COLOR SCHEMES: The designer shall include a final color schedule in the project construction documents. The contractor shall provide a final paint schedule of all paint used on the project. This schedule shall have

as a minimum the following information for each paint used: paint manufacturer name, paint color name, number and the area of the school where each paint was applied. The final paint schedule shall be included in the Operation and Maintenance Manuals.

CORRIDORS: Corridors shall be a two-tone color scheme with a darker color on the lower portion of the scheme. Height of darker color shall be 5'-4" above finished floor.

CABLING: The designer is to verify that any cabling called out to be painted is acceptable to code and the cable manufacturer.

Require a sample finish to be applied to the wall of the PM's choice for each color and type of finish wall or surface.

RESTROOMS/ AREAS SUBJECTED TO VANDALISM: In areas where there may be a high probability of vandalism such as graffiti, Designer shall include in the construction documents directives to use anti-graffiti protective coatings for long term easy cleaning and maintenance. Preferred manufacturers for basis of design include but are not limited to Sherwin Williams, Tex-Cote LLC, Vanguard, TK-PermaClean, or approved equal.

DIVISION 10 11 00 - MARKER BOARDS & TACKBOARDS

Provide Marker boards and tack boards in accordance with the building program for each specific project. Attention to the constraints of applicable codes governing the use of combustible materials is required. Do not specify combination marker/tack board units.

DRY-ERASE MARKER BOARDS: 24-gauge porcelain enamel steel face with backer board in extruded aluminum frame. Provide head tack strip where specified by program. Provide marker tray on all marker boards except for in Playrooms, locker rooms, or other areas of high student activity. Finish shall be manufacturer's standard low- gloss white.

TACKBOARDS: 1/4" thick composition cork mounted to 1/4" hardboard in extruded aluminum frame. Fabricate composition corkboard of pure cork material compounded with linseed oil and pigment on burlap back. Use Forbo Linoleum, Inc. bulletin board as a basis of design. Provide head tack strip where specified by program.

HEAD TACK STRIPS: Shall be 1/4" thick composition cork mounted to 1/4" hardboard in extruded aluminum frame. Where specified by program, tack strip to be 12" high and shall extend full width of adjacent marker and tack boards.

Consider running two 2" wide tack strips down some corridors to aid in displaying current student work. Tack strips shall be located at 5'-4" above finished floor and 3'-4" above finished floor.

ACCESSORIES: Furnish standard continuous box-type aluminum marker tray with slanted front, rounded edges and cast aluminum end closures for each marker board. Furnish map rail complete with 1"-2" wide cork display rail, end stops, one flag holder per room and 2 map hooks for each 4 feet of rail. Map rail shall extend full width of
adjacent marker boards and tack

boards. All products shall have a 50-

year warranty.

All dry-erase marker boards, tack boards, and tack strips shall be factory assembled.
Size, location and mounting height of marker boards, tack boards, and tack strips shall be according to building program requirements.

At physical activity spaces such as dance studios, gyms, and multi-purpose rooms, do not provide

protruding trays at marker board installations.

DIVISION 10 14 00 - IDENTIFYING DEVICES

An exterior marquee sign will be required at the main site entrance of new schools. The school's name and street number shall be installed on the building exterior wall in a highly visible location using large aluminum letters to comply with local Codes and ordinances. Marquee sign installation shall include required underground electrical utilities and accessories for wireless. The marquee signage may require local authority approval for permitting.

Interior signs will be required at all doors to occupied spaces and as required by code. Interior signs shall be installed at heights and locations that comply with ADA criteria. Final room names and numbers will be developed by the Architect and MSCS PM during design development. The room numbers on all drawings shall match the room number of the existing space in existing buildings. Provide a sign which meets the local ordinances. If additional information is required, it shall be provided by the MSCS PM.

INTERIOR SIGNS: Shall be manufactured from 1/16" clear matte acrylic that is sub-surface printed with a background color and laminated to a 1/16" opaque white or black acrylic base and has 1/16" raised acrylic letters. No abbreviations shall be permitted at elementary schools. Abbreviations are strongly discouraged at middle and high schools. Only signs for Library, Gymnasium, Cafeteria, Kitchen, Restrooms, Auditorium, Main Office and Mechanical/Electrical rooms shall have the room name permanently included on them. All other signs shall have the room number only. Classrooms and offices will have a slot for the insertion of a paper identifier which can be easily prepared and inserted by the Occupant of the space. All signage shall comply with current ADA requirements.

BRONZE OR ALUMINUM BUILDING DEDICATION PLAQUE: Information to be provided by MSCS PM and included on the plaque:

- Month and year opened
- Name of the School
- Names of the Shelby County Board of Education members at the time of project inception and/or completion. Designer to confirm and obtain MSCS approval.
- Name of Memphis-Shelby County Schools Acting Superintendent
- Name of Architectural Firm
- Name of General Contractor

**Include in Specification- "All Dedication Plaques shall be approved by the Director of Major Construction for recommendations to the executive administration for approval prior to order or installation. This includes but is not limited to size of the plaque, color of the sign, lettering style, content and order of content on sign.*
Replacement costs for Plaques without formal approval will be the responsibility of the Contractor.

DIVISION 10 21 00 - TOILET PARTITIONS

TOILET PARTITIONS: Shall be floor mounted, overhead braced, solid color phenolic partitions at all student and group toilet installations. Doors shall be hung on a continuous stainless steel or aluminum hinge. Doors shall match partition construction. Colors shall be selected for each project from full range of available colors.

HARDWARE AND FITTINGS: Shall be heavy-duty stainless-steel construction with bright finish. Door hinges shall be self-closing continuous hinge with 20 degree hold open. Continuous wall brackets shall be used at all toilets. Use "thru-bolts" (threaded insert with vandal resistant bolt at both sides) to secure hinges, brackets, stops and latches to doors and partitions. Provide vinyl bumper strips to absorb impact at doorstops and latch.

PARTITION DOORS: Shall be provided at all compartments and include door pulls. Where accessible stall doors swing towards a wall, place a bumper on the wall to protect the door edge and wall.

URINAL SCREENS: Shall be provided between adjacent urinals and where located next to lavatories. These screens shall be of the same construction as the toilet partitions.

DIVISION 10 22 26 - OPERABLE PARTITIONS

Operable partitions shall only be used with the express approval of the Director of Major Construction.

PARTITIONS: Shall be manually operated type, 20 lb. maximum pull, where size permits.

SOUND SEAL: shall be provided, with an STC rating of 54.

PANELS: shall be single panels only. The use of paired-panels is NOT acceptable.

FINISH: MSCS prefers vinyl coating on lower half and fabric/ carpet covering on upper portion for sound attenuation qualities. Vinyl coating shall be no less than 18 oz.

MSCS prefers steel ball bearing wheels for easy operation and maintenance.

WARRANTY: Minimum 5-year warranty and 10-year special warranty for track trolley and panel.

Designers to coordinate required overhead structure to ensure support beam flanges compatible with manufacturer's support brackets.

Avoid the use of sound insulation or coverings that emit VOC's or use formaldehydes in the manufacturing process.

For operable partitions, only premium product lines of manufacturers will be accepted, provided they comply with requirements of the contract documents and have a low VOC.
Insulate space above ceiling to deck above operable partition.

DIVISION 10 28 00 - TOILET ACCESSORIES

TOILET ACCESSORIES will be surface mounted type unless noted otherwise. Some accessories will be supplied by the Owner to the Contractor for installation. The designer shall check the dimensions of those items being provided and allow the proper space in all mounting locations. Designer to include mounting height elevations in construction documents to cover all age group users of the school. All mounting heights and clearances shall be in compliance with ADA criteria.

PAPER TOWEL DISPENSERS: Shall be supplied by the Owner and installed by the Contractor. Install one dispenser for every two lavatories for group toilets and one per sink in other areas; locate immediately adjacent to lavatories for ease of use.

SOAP DISPENSERS: Shall be supplied by the Owner and installed by the Contractor. Locate directly over lavatories and at required ADA heights.

TOILET PAPER HOLDERS: Designer to obtain cut sheet from MSCS DFM PM for standard roll dispenser. For toilets and stalls shall be supplied by the Owner and installed by the Contractor. The designer shall determine a solution for providing toilet paper holders that meet the requirements of the ADA for mounting height. Toilet paper holder types shall be selected so as not to conflict with grab bar locations.

WASTE RECEPTACLE: Shall be free standing waste basket provided by the Owner.

MIRRORS: Shall be polished stainless steel at student toilet rooms and framed mirror glass elsewhere. Size of mirrors at student toilet rooms to be approximately 18"w x 24"h at elementary student toilet rooms and 18"w x 30"h elsewhere. Mirrors shall be located on walls away from student lavatories. Mirrors at staff toilets may be located over lavatories. Assure that mirror heights meet ADA requirements for the reflective surface.

COAT HOOK: Shall be stainless steel with #4 satin finish and concealed attachment. Shall be provided at individual toilet rooms, individual offices and at door of all toilet partition compartments.

SANITARY NAPKIN DISPOSAL: Shall be of stainless-steel construction with #4 satin finish. Provide type for mounting onto toilet partitions. Recessed wall mounting shall not be specified. Shall be provided at all women's staff and girls' middle and high school toilet rooms. Install at each compartment of Group toilets rooms.

HAND DRYERS: If hand dryers are specified, a hard, cleanable surface shall be applied to the wall directly below the dryer to act as a splash guard. Materials approved to be used are stainless steel or solid surface.

DIVISION 10 44 00 - FIRE EXTINGUISHERS AND CABINETS

CABINETS: Shall be semi-recessed installation. Breakable transparent glazing shall be scored Plexiglas. Wall- hung fire extinguisher types are allowed in mechanical/ electrical rooms, service platforms, and other services spaces.

FIRE EXTINGUISHERS: Shall be provided by the Contractor. 10 lb refillable/rechargeable type.

LOCATIONS: In addition to the code required minimums, MSCS requires an extinguisher cabinet near each exterior egress door.

DIVISION 10 51 00 – LOCKERS

High school lockers shall be a single recessed in wall construction or have sloping tops and masonry end walls. Middle school lockers shall be double tiered and recessed in wall construction or have sloping tops and masonry end walls. Bases shall be provided by locker manufacturers unless noted otherwise. Use closed a closed base to provide a substrate for vinyl/ rubber base installation in lieu of open base unless noted otherwise. Base height shall be determined by vinyl/ rubber base specified, i.e. 4” or 6”.

STUDENT LOCKERS: Shall be of steel construction with a baked enamel finish. Doors shall be louvered with a recessed handle. Minimum size for student locker compartments shall be 12" x 36" x 12" deep. Middle and high schools shall use double-tier lockers where practical. Elementary schools shall use casework cubbies. Each installation of lockers shall include an appropriate amount of accessible lockers with the accessible symbol attached to the locker door. All lockers shall have an integral pocket pull. Locks shall not be recessed. Lockers shall be specified with latch to accept a pad lock unless noted otherwise. The pad lock will be provided by MSCS. For Middle and High Schools, the Designer shall confirm with school if combination locks with master override key or pad locks are to be used for locking mechanism.

PHYSICAL EDUCATION LOCKERS: 12” x 12” x 36” Lockers. Provide perforated doors at compartments for gym and athletic clothes.

TEAM SPORTS LOCKERS: 18” x 18” x 72” Provide perforated doors for base bid.

DIVISION 11 00 00 - MISCELLANEOUS EQUIPMENT

ART ROOM KILN: Kiln to be installed if required by program. Kiln to be Owner-provided by preferred vendor. Provide proper electrical outlet. Coordinate voltage with owner (typically 240 volts, 1 phase, 48 amps). Use Amaco EX-270 as a basis of design. Provide exhaust fan and heat detector, mounted in an exhaust hood if required, tied to electrical so that exhaust fan operates when the kiln is in use and continues to operate until the kiln is cool. Provide a vent to the outside for kiln vent system. MSCS recommends to locate Kiln Room on exterior wall.

DIVISION 11 40 00 - FOOD SERVICE EQUIPMENT

Food service equipment shall be bid as a part of the prime general construction contract with Owner supplied and Contractor installed. Coordination with the Central Nutrition Center administrative staff is critical in this process to determine specific equipment for fire protection, mechanical, electrical, and plumbing requirements for the requested equipment.
Refer to APPENDIX D - CAFETERIA AND KITCHEN DESIGN GUIDELINES for Owner's detailed instructions on kitchen design.

WALK-IN COOLERS AND FREEZERS: Concrete floor slabs will be recessed as required so that kitchen finished floor and freezer/ cooler floors are at the same level and material (thick set quarry tile required in new kitchens) as the Kitchen floor for food cart operation. If other drains are not used, provide floor drains near and outside the cooler and freezer and run copper drain from evaporators into this floor drain. Locate temperature controls and thermometers on the outside near the cooler and freezer doors. Temperature setting for the cooler shall be 35°F and temperature for freezer shall be minus 10°F. Provide properly constructed insulated floor slab where units are not constructed with integral insulation.

Provide electrical heat strip around freezer door to prevent freeze-up of door.

FUEL SHUT-OFF: Provide automatic type, as required by code.

FIRE EXTINGUISHING SYSTEM: Provide under-hood fire protection system, as required by code. The construction documents shall be fully Coordinated between the hood equipment and fire protection, mechanical, electrical, gas, and plumbing utilities as required by code for proper operation and life safety protection.

DIVISION 11 06 65 - ATHLETIC AND RECREATIONAL EQUIPMENT

ELEMENTARY SCHOOLS MULTIPURPOSE/ ACTIVITY: Designers shall consider wall mounted adjustable goals one at each end of the multipurpose room for base bid. Designer to confirm/ verify programming needs for school. Ceiling heights shall be 22' or higher clear inside to the bottom of any and all obstructions.

MIDDLE SCHOOLS: For base bid, six standard height backboards – two competition units on regulation court on main axis and four side retractable units defining two cross-courts. Retractable backboards shall be motorized with a manual back-up.

VOLLEYBALL NET INSERTS: Provide inserts on the floor for installation of volleyball net. Verify number of volleyball courts specific to design. Standards and judges chair shall be part of the construction contract. The net and support are not provided as part of the school contract.

HIGH SCHOOLS: Programming to be determined specific to the project. For base bid design, provide six standard height backboards with two competition units on regulation court and four retractable backboards at the sides with two on each side. Retractable backboards shall be motorized with a manual back-up. Volleyball inserts shall be included in design as well as PA, intercom, and data floor boxes. Retractable bleachers shall be included in design.

GYMNASIUMS shall be sized according to the building program. Middle and high school gyms shall be competitive/ regulation courts. Ceiling heights shall be 25' or higher clear inside to the bottom of any and all obstructions at high schools and 22’ clear in middle schools. New gym additions shall be designed to meet safe building criteria for existing schools.

Provide 10' or more overrun on ends of main court in high schools.

Make sure that side court backboards are not over the main court (make them retractable if necessary). Ensure that main and side court backboards will not intrude on required clearances for volleyball tournament play (25’ in retracted position).

BASKETBALL BACKSTOPS: Backstops shall be glass for main court, solid for cross courts unless budget allows for consistent finish for all. Rims shall be "breakaway" type. Retractable backstops shall be electrically operated. Provide protective pads at bottom rail.

SCOREBOARD: Wall mounted electronic type, with timeclock, team scores, period, bonus, jump ball, next possession, and possession. Timeclock shall be bi-directional with ability to directly set any number of minutes and seconds. Designers shall request preferred manufacturers from MSCS during design. **NO CENTER MOUNTED SCOREBOARDS WILL BE ALLOWED IN ANY SCHOOL.**

SOCCER AND FOOTBALL GOAL POSTS: Shall be furnished and installed by Contractor.

VOLLEYBALL AND BADMINTON FLOOR SLEEVES: Provide floor sleeves for volleyball at high school and middle school gymnasiums. Sleeves shall be recessed steel with hinged floor plate. Top of floor plate shall be flush with wood floor. Floor plates shall be either solid brass or steel with chrome plated finish.

VOLLEYBALL EQUIPMENT: Contractor shall provide the standards and judge’s chair(s) for volleyball.

WALL PADS: 2" thickness, polyurethane foam, mounted on 3/8" plywood and covered with heavy duty vinyl and permanently mounted at end walls of main basketball courts at 8’-0” to each side of the center line of the goal. In auxiliary gyms, end walls of side courts shall also be padded. Designers shall include in project manual notes to ensure school colors and mascot graphics are included in the costs of the wall pads.

DIVISION 11 61 43 - STAGE CURTAINS

Stage / Platform Curtains must be tested in accordance with the large-scale tests of NFPA701. In addition to the written certificate, all must have a label permanently attached to the back of the curtain (within reach of the stage floor) noting the certification.

Design layout and support shall be determined specific to school type (ES, MS, K8, HS) and needs of school administration and staff. Designs shall include custom valance specific to school colors.

DIVISION 12 00 00 - FURNISHINGS

FURNITURE AND EQUIIPMENT: FFE or Furniture, Fixtures, and Equipment such as chairs, desks, tables, etc., will be specified and the acquisition of the FF&E will be determined to bid acquired within the project or by separate bid. Designers to provide a typical furniture layout for all standard spaces and furniture layout for specialized rooms such as project rooms, science labs, art rooms, media rooms, etc. All built-in casework and equipment required for classrooms, kitchen and offices shall be included in the design and bid as part of the contract for construction. Verify with the Owner if there is any “built in casework” that may be provided by the MSCS Furniture Contract. Layouts for Owner-provided furniture will be developed by the designer in cooperation with the owner and all needed services (plumbing, electrical, etc.) provided in the design of the building.

DIVISION 12 20 00 - WINDOW TREATMENTS

Window shades shall be provided by the Contractor. Designers shall allow adequate space at window heads for installation of room darkening shades with a fascia or valance to conceal the roller assembly. Specify perforation with 6% open area. Designers shall locate window shades for interior windows as required for tactical safety such as classroom windows along corridors.

DIVISION 12 35 53.19 - LABORATORY EQUIPMENT AND ART ROOM CASEWORK

Refer to DIVISION 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK for general construction requirements.

Basis of Design can use systems by Sheldon and Institutional Casework Incorporated.

Contractors should be required to submit samples of transparent wood casework finishes which indicate range of color variation to be expected in finishes.

Both built-in and portable casework shall work together as a system and shall be by the same manufacturer.

CASEWORK: Visible surfaces shall be solid oak and oak plywood construction. Unexposed materials shall be solid wood and hardwood veneer plywood. Veneered particle board is not acceptable for this use.

COUNTERTOPS: Shall be acid resistant solid epoxy resin or similar material approved by the Project Manager. Sinks shall be of the same material. Coated wood tops are not acceptable.

ART ROOM COUNTERTOPS: Shall be solid epoxy resin or similar material approved by the Project Manager. Sinks shall be of the same material. Coated wood tops are not acceptable.

FITTINGS: Shall be vandal-resistant.

HARDWARE: Shall be heavy-duty, stainless steel. All locks for all lab casework shall be master-keyed to a single key for each space and grand-mastered for a single key for each facility. Hardware shall be ADA compliant.

EYEWASH AND SAFETY SHOWERS: Are required in each middle school and high school science room not dedicated to physics. Eyewash stations are required in all preparation rooms and recommended for elementary school science rooms.
Maximum travel distance from every workstation to:

- Eye Wash: 25 feet (within 10 seconds of each workstation)
- Shower: 50 feet

A minimum of one eyewash and shower shall be accessible. Each eyewash and safety shower shall be supplied with lukewarm water. Provide a mixing valve for each individual or group of closely located safety equipment.
Water temperature shall be adjusted to be in compliance with ISEA Z358.1 Depressed/ sloped slabs and drains shall be provided at each station as required. A compartmental shower unit will be acceptable.

FLAMABLE AND ACID STORAGE CABINET- in Middle and High School projects, the contractor shall provide a combination acid and flammable storage cabinet approximately 35”W x 35”H x 22”D for basis of design.

GOGGLE STORAGE/STERILIZATION CABINET: In Middle and High School projects provide a cabinet which stores and sterilizes safety glasses and goggles using ultraviolet light. The unit shall accommodate 40 goggles or 40 safety glasses.

FUME HOOD: In 8th grade science rooms and High School projects provide a 4’ fume hood, work surface and ADA base unit. As a basis of design for the hood, refer to the Protector Premier Laboratory Hood #100400002.

DIVISION 12 61 12 FIXED AUDITORIUM SEATING

Auditorium/ theater-type seating is available in a variety of styles and designs for various assembly uses. The seating should meet the different expectations unique to each space in regards to aesthetics, comfort, seating maintenance, and durability. These projects will have varying budgets.

DESIGN: Shall comply with Americans with Disabilities Act (ADA) rules and regulations.

QUALITY ASSURANCE: Reference is made to a brand name as a base specification; however, this is not intended to limit competitive bidding. Products that are equal to or better than base specification will be given full consideration.

WARRANTY: Provide manufacturer's warranty covering structural components and operating mechanisms, material and workmanship for a period of fifteen years from the date of final acceptance.

DIVISION 12 66 13 - TELESCOPING GYM SEATING

Seating in gym shall consist of telescoping bleachers with plastic/ polymer seats and integral aisle rails. If more than eight rows high, seating shall be powered.

DESIGN: Shall comply with Americans with Disabilities Act (ADA) rules and regulations.

QUALITY ASSURANCE: Reference is made to a brand name as a base specification; however, this is not intended to limit competitive bidding. Products that are equal to or better than base specification will be given full consideration.

BASE SPECIFICATION: Irwin Seating Company's telescopic bleachers with plastic seating on Model 4500 steel understructure

WARRANTY: Provide manufacturer's warranty covering material and workmanship for a period of ten years from the date of final acceptance.

OPTIONS: Provide the following options:

- Scorer's Table: Provide one 8' x 15" scorer's table.

REAR WALL COLUMN CUTOUTS: Provide custom bleacher cutouts at rear wall building columns (where they occur).

Shop drawings are required for bleachers.
Motorized Retractable Gym Bleachers with rows of seating made from high density polyethylene (HDPE) with two remote controllers required.
Demolition of existing bleachers and prepared for storage if school sees fit.
Installation of new motorized retractable plastic gym bleachers must meet all local & state code requirements to complete a functioning system.
Bleacher seats color will be determined.
Professional installation requires to ensure proper alignment and structural integrity and compliance with safety regulations.
Site preparation will ensure where the bleachers are installed is level and suitable foundation to support weight of bleachers when fully extended and to protect existing conditions.
Properly lubricate all moving parts like wheel, tracks and drive mechanism to maintain a smooth operation and prevent excessive ware.
Proper training for all operators.
Must follow latest MSCS Design Guidelines

DIVISION 14 24 00 – ELEVATORS: PASSENGER / FREIGHT / SERVICE / RESIDENTIAL / HYDRAULIC / TRACTION / MRL (MACHINE ROOM-LESS)]

Provide a hydraulic telescopic hole-less single or dual piston passenger elevator for accessibility. The capacity shall be 3500 lbs. with a speed of 150 FPM. The cab height shall be 8'-0". The hallway fixture is to be a key operated call with up/down buttons. Specify reduced voltage starting. Hydraulic Oil shall be biodegradable.

To supply and install a complete elevator system, meeting all applicable codes, standards, and performance requirements, including associated structural, electrical, and mechanical work necessary to deliver a fully functional elevator ready for use. (When applicable)

Elevator Type and Specifications:

- Type: [Passenger / Freight / Service / Residential / Hydraulic / Traction / MRL (Machine Room-Less)]
- Capacity: [e.g., 2,000 lbs., 3,500 lbs.]
- Speed: [e.g., 100 FPM, 350 FPM]
- Stops / Openings: [e.g., 1-4 stops, front and rear openings if required]
- Travel Distance : [e.g., 40+/- FT]
- Cab Dimensions: [Width x Depth x Height]
- Door Type: [e.g., center opening, single slide]
- Finish**:** [e.g., stainless steel cab, laminate panels, custom flooring]

MANUFACTURERS: Reputable manufacturer with a minimum of 20 years' experience in elevator system construction

GUARANTEE: Elevator Contractor shall guarantee that the materials and workmanship of the apparatus installed by them under this specification are new and that they will correct defects not due to ordinary wear and tear or improper use of car which develop within one year from date of acceptance for all parts.

MAINTENANCE: Elevator Contractor shall provide twelve (12) months full contract service beginning at the date of Final Acceptance by Owner of each elevator. Service is to be provided on a monthly basis during regular working hours of regular working days except that emergency minor adjustment callback service shall be available at no additional cost 24 hours a day, 7 days a week.

TEMPORARY SERVICE: The elevator shall not be used for temporary service or for any other purposes prior to completion and acceptance by the Owner.

END USER DEMONSTRATION: A factory-authorized service representative shall perform a minimum of 8 hours training to the Owner's building and maintenance staff. Proper use, operation, and fire service test shall be demonstrated at this time.

The Contractor shall make a final check of the elevator operation with the Owner's maintenance personnel present. The Contractor shall ensure that the Owner has all necessary keys, manual, etc. as required in the specifications.

Specify stainless interiors with durable interior wall panels such as plastic laminate or equal. Specify VCT floor finish. Specify LED down lighting. Specify phone line connection, floor numbering, LED floor lanterns at each floor, and call buttons for each floor.

Designers may consider Limited Use Limited Access (LULA) lifts in lieu of elevators should the condition and current adopted building codes allow. LULA lifts will be considered on a case-by-case basis.

Scope of Work

1. Design and Engineering/Project Delivery Method
   - 100% Design Build delivery Method for all Elevator work
   - Coordinate with architectural and structural teams.
   - Provide elevator shop drawings and submittals for approval.
   - Ensure compliance with local building and elevator codes (e.g., ASME A17.1, ADA).

2. Supply and Delivery
   - Supply elevator equipment including:
     - Elevator machine, machine room, control systems & all associated components
     - Cab/Car, doors, and frames
     - Guide rails and pit equipment
     - Hoistway and shaft equipment
     - Fixtures (car and hall stations)
     - Integration with fire alarm and building systems
     - Elevator Sump system with Oil detection
     - Oil Interceptor where applicable tied into Sanitary Sewer system
       - Grease interceptor or automatic grease removal device for drainage from fixtures and equipment with grease-laden waste.
     - HVAC for elevator machine room (if required).
     - Elevator shaft work includes hoist beams, walls, framing, flat ledges, and any fire-rated construction
     - Overhead structure above the shaft to support the elevator machinery and equipment
     - Power supply including disconnecting switches and related electrical infrastructure
     - Wiring and cabling necessary for communication and light fixtures in all cases
     - Smoke and Heat Detection in all cases with fire safety system within the shaft and machine room
     - Cutting and patching floors, walls, ceilings etc., must be replaced if damaged in all cases
   - Deliver equipment to site per schedule.
3. Installation
   - Installation of all elevator components.
   - Integration with fire alarm and building systems.
   - Provide all electrical connections (power, lighting, controls).
   - Coordination with MSCS and other trades.
4. Testing and Commissioning
   - Perform all required tests (load test, safety test).
   - Final adjustments and fine-tuning.
   - Coordinate inspections with local authorities (AHJ).
   - Obtain final certification for use.
   - Collaborate with JCI for monitoring
5. Documentation and Training
   - Provide O&M manuals and as-built drawings.
   - Train building staff on elevator operation and emergency procedures.
6. Warranty
   - Provide standard warranty for [typically 1 year] from date of final acceptance.
   - Include details for preventative maintenance during the warranty period.

Exclusions (if applicable)

- Construction of the elevator shaft or hoistway.
- Emergency generator or UPS.
- Fire alarm panel or building-wide systems.
- Structural modifications or enhancements outside elevator requirements.

Schedule

- Start Date:
- Completion Date:
- Milestones: [Insert key milestones such as delivery, start of installation, inspection dates]

DIVISION 22 30 00 - PLUMBING SYSTEM

All water consuming devices shall be approved water saving type.

Provide freeze protection on all water lines subject to freezing conditions.

Provide a ball valve in branch piping to all exterior hose bibs. Where suitable, locate hose bibs adjacent to exterior mechanical rooms, dropping branch piping exposed in mechanical room and locating ball valve a maximum of 6'-0" above floor finish.

Location of all shut off valves for plumbing, HVAC, gas or other shut off shall be coordinated and located in proximity of one another to minimize access panels in hard ceilings and for ease of access everywhere.

Require Contractor to completely rod and flush out all sanitary waste lines, both new and existing, and coordinate with Owner-provided “smoke test” of all sanitary piping.

All sinks shall have both cold and hot water supply.

Provide metal chrome escutcheon rings at all exposed ceiling and wall penetrations.

Provide isolation valves in cold water and hot water piping so that water can be shut off to each classroom

wing. Specify plaster type P-traps for all art room sinks.

DIVISION 22 05 53 - PLUMBING IDENTIFICATION

Use same identification system throughout project.

PIPE MARKERS AND FLOW ARROWS: Specify stencil paint type. Pipes to be labeled include but are not limited to Cold Water, Hot Water, Hot Water HVAC supply, Cold Water HVAC supply, Natural Gas, and Fire Suppression.

UNDERGROUND PLASTIC PIPE MARKER: Specify 6” wide x 4mil thick multi-ply tape, solid aluminum foil-core between 2 layers of plastic tape.
VALVE TAGS: Specify 19 gage polished brass valve tags.

ENGRAVED PLASTIC LAMINATE SIGN: Specify 1/16” thick fastened with self-tapping stainless steel screws. Locate pipe markers and flow arrows as follows:

- Maximum of 25' & closer if congested.
- Near each valve
- Near each branch
- Near equipment
- Near origination & termination points
- Near where pipe passes through walls (both sides of wall)
- Near access doors

DIVISION 22 07 00 - PLUMBING INSULATION

Insulate all domestic water piping as required by code. Minimum MSCS requirement shall be with 1" thick minimum except 1 1/2" for re-circulation hot water. Insulate roof leader horizontal piping with 1" thick insulation to include roof drain pan and vertical piping from roof drain. Install rigid jackets on all exposed insulated lines within 8' above floor in occupied spaces.

FIBERGLAS INSULATION: ASTM C 547 class I with type I all-service jacket.

EXPOSED INSULATION: Specify 8 ounce canvas rosin sized cloth jacket.

FITTINGS: one-piece pre-molded PVC fitting covers.

DIVISION 22 11 16 - DOMESTIC WATER PIPING

This includes domestic hot water and cold water piping within the building to a point 5' outside building.

UNDERGROUND PIPING: Type "K" copper with silver soldered joints. Do not locate joints below ground.

ABOVE GROUND PIPING: Type "L" copper with silver soldered joints for 1 1/4" and smaller, silver solder for 1 1/2" and larger.

Quick connect fittings shall not be used.

Pro-Press or Pex piping is not accepted and will not be approved.

BACKFLOW PREVENTER: Provide reduced pressure principle assembly with strainer. Provide redundant assembly (i.e. two 4” BFPs where a 4” line is serving the building). The building design should dictate where the BFP is located, either in a hot box or pit along the service entrance, or in the building. If located within the building, locate between 12" and 60" above finish floor. Pipe discharge to floor drains.

Install a hot and a cold water cut-off in the Corridor ceiling for each supply for a safety/maintenance cut-off.

PRESSURE REGULATING VALVE: Provide for all installations. Include strainer, bypass, and pressure gauge.

POLYPROPYLENE PIPING SYSTEMS (PP-R): Designer shall consider the use of a PP-R system in relation to project schedule and budget. PP-R system installation shall be heat-infused only. Basis of design shall use Aquatherm blue piping for heating/ cooling and green piping for domestic water and sprinkler piping. Design shall include training and certification for MSCS maintenance as well as equipment for maintenance for PP-R piping. DESIGNER SHALL PROVIDE IN PROJECT MANUAL AND ON CONSTRUCTION DOCUMENTS THAT THE PP-R INSTALLER(S) ARE CERTIFIED BY THE MANUFACTURER OF THE PRODUCT THEY ARE INSTALLING AND HAVE A MINIMUM WORK EXPERIENCE WITH THE PRODUCT OF NO LESS THAN FIVE
(5) YEARS. PROJECT MANUAL SHALL INCLUDE TRAINING AND CERTIFICATION OF MSCS MAINTENANCE PERSONNEL.

DIVISION 22 13 16 - DRAINAGE AND VENT SYSTEMS

Includes sanitary, acid and storm drainage and vent piping systems inside building to a point 5' outside building. Roof drains are furnished and installed by General Contractor. Plumbing Contractor connects line to roof drain outlet.

CLEANOUTS AT FINISH GRADE: Cast brass plug with recessed slot in fitting or in caulked cast iron ferrule. Set in center of 24" x 24" x 8" thick concrete pad flush with grade.

PIPE SLEEVES: Schedule 40 black steel.

VENTS THROUGH ROOF: 10' minimum from fresh air intake. Extend vent 2'-0" above finished roof. MSCS recommends minimizing roof penetrations and request wall penetrations when applicable.

Depress floor drains below room perimeter minimum of 1/2".

Provide acid neutralizing sump for darkroom waste, high school chemistry and middle school IPS science room waste.

DIVISION 22 42 00 - PLUMBING FIXTURES

MSCS recommends that an accessible plumbing chase be provided between group restrooms for ease of maintenance and repair. Access shall be through a secured access panel or secured janitor's closet for security purposes.

Specify all vandal-proof options for all fixtures used by students. This includes handle screws, aerators and showerheads.

Manufacturers to consider for basis of design are American Standard, Eljer or Kohler. An approved equal will be accepted. All fixtures shall be white. All fixtures shall be standard height and meet ADA criteria when required. No child height fixtures shall be installed unless mandated or required by any agency outside of MSCS.

Elkay and Just are acceptable manufacturers for the basis of design for stainless steel sinks.

Specify carriers for all wall hung fixtures including drinking fountains, urinals and lavatories. Toilets to be floor set unless requested otherwise.

Specify chrome plated rigid supplies with angle I.P.S. loose key stops for all Group toilet lavatories. Wheel handle stops may be used for K-2 School and all administration areas.

Specify chrome plated cast brass p-trap and wall nipple for all lavatories.

Lavatories outside of the Group Restrooms are to be Bradley Verge LVRD Series with Moen Model 8886 metering faucets. Hard wired hands-free sensor faucets shall be considered on a case-by-case basis.

Specify chrome plated semi-cast 17 gage brass p-traps for all sinks and water coolers.

Specify separate stops for all fixtures unless integral stops.

Sloan or Delany are acceptable basis of design manufacturers of flush valves with solid ring supports. As an alternative, the TOTO EcoPower flush valve, hydropower self-generating system or equivalent can be used.

Metered faucets shall be provided at all lavatories. (Moen M8886 two-handle ADA metering lavatory faucet) Automatic faucets shall only be used at student sinks in pre-K rooms. (Moen M8554 .5 GPM sensor faucet) Hardwired hands-free sensor faucets will be considered on a case-by-case basis.

Specify chase for multiple lavatory installations (minimum 6" clear).

Specify chase for group toilets (walk-in chase is preferred but not required with 24” minimum

width). Connect circulating pumps to Energy Management system.

Specify separate flue for water heaters.

Use energy efficient gas water heaters for kitchens and gym areas. High performance water heaters shall be considered on a case-by-case basis.

Dimension floor drain locations on drawings.

Specify washer box for all residential type washing machines with cold water, hot water and drain.

Specify vitreous china wall hung lavatories, 4" centers, 20" x 18" with grid drain.

Specify center-set lavatory fitting for student Group toilets. Use single-hole faucets for lavatories.

Specify single bowl sinks for K-4 classrooms and workrooms. Verify they are ADA compliant

installations.

Hose Bibbs in group toilets are to be recessed Woodford model 75 wall hydrant SWVL INL. An approved equal will be considered.

Specify pre-cast mop receptor with stainless steel wall protector. Custodial sinks should be deep and steel-edged to prevent chipping. Coordinate with the Owner.

Specify cold water for all refrigerator icemakers.

Specify floor mounted elongated bowl, siphon jet water closets. Specify 1.6 gallon/flush type.

Specify institutional grade water closet seats with self-sustaining check hinge.

Specify flush valve for all water closets with handle 39" above finish floor.

Coordinate water closet flush valve height with grab bars.

Specify wall mounted ADA compliant, electric water cooler, with metal bubbler spout, by Halsey Taylor or approved equal. Units with remote chillers or in-the-wall chiller are not acceptable. Provide one bottle filler unit with filter at each electric water cooler location.

Specify ASME expansion tanks for water heaters larger than 80 gallons.

Do not connect gas water heaters to DDC system due to thermal shock of tank.

DIVISION 22 13 00 - KITCHEN PLUMBING

Use stainless steel 12" x 12" x 10" ZURN Z-1752-KC-Y-2 or equal floor sink for indirect waste from prep and pot sinks & steamer. PVC or porcelain floor sinks are not acceptable.

Use 7" round recessed strainer floor drain for indirect waste from ice machine, serving line equipment, and cooler/freezer.

Use stainless steel floor troughs for wastes from tilting skillet, and area in front of steam kettle (if specified).

Use stainless steel strainers built-in as a component of the trough.
Provide wrist blade handles at hand sinks.

Supply 120° F water to hand sinks.

Add adequate quantity of general area floor drains to kitchen so entire floor can be hosed down.

Use utility raceway to serve equipment under hood. Use flexible hoses to serve equipment. Length of hoses shall be adjusted or shortened to prevent hoses from lying on the floor.

Kitchen equipment will use natural gas where available. Do not use LP gas.

Hood manufacture will furnish solenoid gas shut off valve to Plumbing Contractor for installation.

Supply 140°F. water to dishwasher, prep and pot skins, can wash and mop receptor. Use of supplemental heater may be acceptable in some kitchen configurations.

Circulate hot water for 140° and 120° loops.

Use American Standard freeze-proof mixing faucet for can wash. Use non-clog floor drain for can wash.

Use recoiling manual hose reel in dishwashing area and 3-compartment sink area for wash down.
Do not connect disposals to grease interceptor.

Use manual hose reel in Serving Area for water fill and wash down.

Use copper pipe for prep and pot sink continuous waste.

Use trap primers for all floor drains.

Use shock absorbers for all solenoid operated equipment. Provide water filter at kitchen icemaker connection.

Design grease trap in accordance with Shelby County Health Department requirements.

DIVISION 23 00 00 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

The Architect/ Engineer shall determine the best HVAC system for the project with the focus on the equipment first (installed) cost, yearly maintenance, equipment replacement, annual energy costs, life cycle costs, learning environment control, and ease of maintenance including disruption to daily operations.

The contractor shall install equipment according to State & Shelby County Mechanical, Electrical, Plumbing codes, and manufacturer's installation instructions.

The contractor shall provide and install temporary cooling as necessary to achieve a comfortable climate for students and staff, including electrical provision and venting, Vent to exterior of building if possible.

Equipment shall not be demolished until new equipment is on-hand and ready to install.

All projects shall have a commissioning report. Report to be submitted as part of closing documents.

Any new projects or renovations must include new and upgraded DDC controls for any new or existing HVAC equipment for the entire site. See Scope of Work for details and/or allowances.

In the months of July and August prior to the start of Teacher's return, the Contractor is responsible for deep cleaning of all four walls, doors, floors and ceilings each time work is done in any space by a reputable vendor to ensure that the facility is ready to receive students and staff in preparation for start of school. Including movement of furniture out of areas of work and back into work areas. Coordinate and schedule cleaning efforts with MSCS custodial staff.

A new chemical system shall be provided for hydronic projects including Cooling Tower, Boilers and Chillers by current MSCS vendor to include solid release chemical feed system and control equipment including new pot feeders, controller, sensors, blow down, solenoid etc.

The selection of all HVAC systems and other systems shall be approved by the Owner at the schematic phase of design. Refer to MSCS preferred equipment list referenced in Appendix K.

All air and water balancing shall be done by an AABC or NEBB certified test and balance firm, which employs a registered qualified Engineer under contract with MSCS. The Mechanical Contractor shall coordinate with this balancing Contractor.

Quick connect fittings shall not be used.

Pro-Press, Pex piping or equivalent will not be accepted and will not be approved on any hydronic, gas, plumbing or refrigerant piping.

Re-heat or air blending systems shall only be used for special areas where dehumidification is required.

Air side economizer cycles shall be used where possible, for energy savings and the effect on health through the reduction of airborne bacteria count. Contact the Owner when a water side economizer is being considered.

Low-leakage type outdoor air dampers shall be used to minimize air infiltration during off-hours. Maximum leakage of ½ of 1% at pressure differentials under 4" WG.

All duct mounted fresh air or outside dampers shall be controllable in BAS system.

Electric resistance heaters should only be used for comfort heating where indicated by a life cycle cost study to be most economical. However, electric heaters shall be used in all exterior mechanical rooms.

The main office area should be a single zone for the energy management system. Individual spaces should have thermostats for independent control. The HVAC system should be located where it can be serviced without disrupting the entire office area.

The fresh air system should be integrated into the heating and air conditioning system to avoid stale or offensive odors and CO_2 becoming concentrated. Special care should be taken in locating fresh air intake away from stack vents and toilet exhausts.

Provide full AC coverage for all storerooms in order to avoid mildew. The outside equipment storage should be ventilated to avoid build-up of flammable vapors and heated enough to prevent freezing of stored materials.

Exhaust Restrooms and vent their plumbing to prevent intake of the contaminated air by fresh air intakes.

The kitchen, IT Room, choral, band, gyms, cafeteria, offices, auditoriums, and community rooms should have its HVAC zoned separately from the rest of the building to allow for after-hours use. BAS shall install a room senso in IT rooms for monitoring and high temp alarm.

Kitchen hood ventilators should have a fire extinguishing system, with gas cutoff and fire alarm connection, as appropriate and required by code.

Natural gas regulator ventilation - **NFPA 54/ANSI Z223.1 NATIONAL FUEL GAS CODE**
The vent shall be designed to prevent the entry of **water**, insects, or other foreign materials that could cause blockage.

An evaluation of any changes in site use and building envelope conditions, including new load calculations, shall be performed to determine the capacity of all new equipment (not default like for like).

All equipment shall be protected from electrical phase loss.

Emergency STOPS for mechanical equipment shall have hinged, non -lockable, clear, protective covers to prevent accidental shut-down.

Designers shall specify engraved plastic laminated labels on all equipment. See DIVISION 22 05 53 - PLUMBING IDENTIFICATION. Labels shall include equipment number, area(s) served, number and size of filters and capacity. Use actual room numbers used at the facility - not architectural room numbers. The following are examples of labeling to be used:

Air Handling Units
AHU #1 (Classrooms 10 & 12) S.C.: 11/16/94 Filters: 2 - 24”x24”x1” Capacity: 2000 CFM @0.5” ESP

Boilers
Boiler #1 (Buildings 100 & 200) Input: 1,000 MBH Output: 900 MBH

Chillers
Chiller #1 (Buildings 100 & 200) Capacity: 190 Tons

Condensing Units
CU #1 (Classroom 10 & 12) Capacity: 5 Tons

Cooling Towers
CT #1 (Chiller #1) Capacity: 190 Tons

Fans
EF #1 (Toilets 110 &112) Capacity: 500 CFM @ 0.3” ESP

Pumps
BP#1 (Boiler #1) Capacity 200 GPM @ 50 FT.

Roof Top Units
RTU#1 (Classrooms 10) Filters: 8 – 24”x24”x2” Capacity: 5 Tons

FUEL SOURCES: Engineer shall determine most cost and energy efficient fuel source based on current and projected energy costs.

DESIGN CONDITIONS AND ENERGY USAGE: All new work shall comply with the applicable energy code. The design team shall submit the "Building Energy Performance Criteria" and "Energy Summary" to the Owner. Provide estimates of monthly energy use in BTU/SF and cost/SF by fuel type, using current unit fuel cost, at the design development and working drawing phases of the design to the Owner.

SUMMER DESIGN CONDITIONS		WINTER DESIGN CONDITIONS	
Indoor	72 degrees F, 50%RH	Indoor	72 degrees F DB
Outdoor	96 degrees F DB 78 degrees F WB	Outdoor	10 degrees F DB
Load Calculation Safety Factor = 0%		Load Calculation Safety Factor = 10%	

VENTILATION: Each building or portion shall have the capability to provide ventilation in accordance with ASHRAE 62, based on building classification and occupant load. Special thermostatically controlled ventilation should be provided in boilers and mechanical rooms to prevent excessively high temperatures.

Compliance with ventilation codes shall be pursuant to the Indoor Air Quality Procedure and employ outside air mitigation strategies, such as the use of ionizers or demand ventilation.

All spaces that produce dust, such as the cabinetry labs, etc., shall be negatively pressurized to assist in reducing the infiltration of dust to adjacent spaces. Also, the mechanical systems for these spaces should have easily replaceable filtration systems.
The heating of make-up air for welding shops is not recommended from an economic standpoint.

Work areas for internal combustion engines shall have provisions so that exhaust gases can be exhausted directly to the outside by a carbon monoxide exhaust system.

Paint spray rooms shall have special treatment with respect to ventilation and safety requirements. Paint spray booths, commercial type, are recommended. If the booth is not to be used and a paint spray room is desired, the designers shall investigate thoroughly with respect to codes and standards.

The storage of flammable or combustible liquids shall be in UL-labeled cabinets with mechanical ventilation, or in storage rooms designed for the purpose. If a flammable or chemical storage room is needed, the designers shall investigate thoroughly with respect to codes and standards.

It is recommended that a separately switched exhaust fan be provided for each chemistry or IPS science laboratory and be of such capacity to quickly remove objectionable odors. A fan is not needed in a separate physics lab. An exhaust fan (with a hood if not in a dedicated kiln room) shall be provided at all kiln locations.

A separate air exhaust system shall be provided for all locker/dressing rooms. Air shall be re-circulated during unoccupied hours and exhausted during occupied hours. Switchovers by an occupancy sensor is recommended.

Mechanical ventilation shall be provided for all toilet rooms, for janitor's closets, and for storage rooms where odors could become a problem. Group toilets shall have 2 CFM per square foot minimum ventilation. Provisions shall be made to prevent sound transmission through any common duct system serving more than one area, such as adjoining rooms.

Exhaust fans must be disabled when mechanical system is UNOCCUPIED unless special conditions dictate an Owner is informed well in advance of this criteria.

KITCHEN: Automatic wet chemical fire extinguishing systems shall be installed in all hoods as required by code. Ansul is an acceptable system for the basis of design. Upon activation of the extinguishing system, all fuel shall be shut off, whether gas or electric, and will include fuel to all equipment under the hood, including fryers, broilers, griddles, and ranges. Make-up air shall be shut off, but exhaust fans shall continue exhausting. Exhaust fans shall have an adjustable high limit shutdown switch normally set at 350°F.

Range hood roof exhaust fans shall be designed to prevent air from being discharged down toward the roof.

All kitchen hoods shall have 80% minimum outside make-up. Deliver heat only, unless required by code, air at the perimeter of hoods.

MISCELLANEOUS HVAC ITEMS: Electric unit heaters with built-in thermostats shall be installed in all mechanical rooms in lieu of hot water unit heaters.
Provide dehumidification control in all media centers, libraries, and auditoriums to control and reduce relative humidity.

Electrical contractors shall provide and install surge protectors and lightning arrestors for all RTUs, VFDs, chillers, and Cooling Towers.

All chilled water shall be selected based on a chilled water temperature of 2 degrees higher than that leaving the chiller. Show all selection data in a coil schedule on drawings. All air handling units and ventilating units with hydronic coils shall have freeze protection with BAS feedback alarm for both CW and HW coils.

All HVAC equipment shall be selected for low noise levels. The units shall not exceed 45dBA in an empty classroom. The HVAC systems shall be provided with a complete labeling system for all equipment. Specify that all refrigeration compressors have 5-year material warranty.

Locate all cooler and freezer condensers outside the building on reinforced concrete pads at ground level, protected and fenced for maximum ventilation or located on the roof.

There shall be no open-flame heaters, open-coil electric heaters, or spark-producing electric components in areas likely to be used for spray painting or where there will be open containers of gasoline or other explosive vapor or dust.

Each hot water boiler shall have a low-water cutoff. Low-water cutoff should be manually reset type. Equipment shall be ASME Code-stamped, AGE-labeled, or UL-labeled as and when applicable.

Hot water relief valves and refrigerant relief devices must be piped to locations to minimize danger to personnel or students upon relief. Hot water relief valves should be piped to funnel-type floor drains located near the equipment.

Filters for all air handling equipment shall be standard size, manufacturer approved, and disposable type. Filter racks must support filters from both sides and must have closure panels. Filters must be readily accessible and require no tools to change. Specify that any questionable means of access will be replaced at no additional cost to the Owner.

All major items of mechanical equipment that employ any solid-state electronic components shall be fully protected from electrical surges and lightning.

Remove, replace or add cut-off valves for each piece of mechanical equipment being replaced.

For all hydronic heating/cooling systems, provide manual shut off valves at the point where main supply and return lines leave the central mechanical room, where piping leaves and/or enters a building and in mains such that classroom wings can be isolated. Provide isolation valves for all mains.

Do not locate AHU's in same room as boilers.

Electronic thermostats using battery backup shall do so only to maintain memory. Thermostats that draw down the battery during power outages through other loads are not acceptable.

Libraries are required to have dehumidification.

All chilled water and hot water systems shall be constant flow, primary/secondary.

WARRANTY: See DIVISION 01 78 00 - SPECIAL WARRANTIES AND MAINTENANCE AGREEMENTS for information about HVAC service contracts.

HVAC Replacement Projects:

Where none exists, isolation (ball) valves shall be added for zones, floors and/or terminal equipment to eliminate the need to fully drain a hydronic system for maintenance.

The electrical subcontractor on an HVAC project shall be charged with providing power to all energy management equipment requiring power of 96 volts or greater.

The electrical contractor on an HVAC project shall be charged with installing any high voltage device (96 volts of greater) provided by the energy management vendor, such as a digital energy monitor (DEM), if one or any are called for in the project documents.

If a non-Siemens BACnet controller is provided, two (2) manufacturer service tools and one (1) field-grade laptop shall be provided to MSCS.

Natural gas regulator ventilation - **NFPA 54/ANSI Z223.1 NATIONAL FUEL GAS CODE**
The vent shall be designed to prevent the entry of **water**, insects, or other foreign materials that could cause blockage.

An evaluation of any changes in site use and building envelope conditions, including new load calculations, shall be performed to determine the capacity of all new equipment (not default like for like). All equipment shall be protected from electrical phase loss.

If outside air is connected to an existing fan coil unit, the unit shall be replaced with a unit ventilator for proper conditioning and moisture removal in the space. Fan coil units are not the correct product when used to condition fresh air for a space or classroom.

Provide and install P/T ports, isolation valves, pressure/temperature gauges, drain valve to supply and return piping at each chiller for both evaporator and condenser. Provide and install P/T ports, isolation valves, pressure/temperature gauges, drain valve to supply and return piping at each boiler and cooling tower.

The contractor is to provide and install connections with isolation valves for temporary hook up of chillers and towers for every project.

All equipment shall have a visible, UV protected label to display unit tag, room #, Instance number, and MAC address, location and tag of the breaker panel on the exterior of each unit. This is the responsibility of the mechanical contractor.

All pipes to be tagged and have an arrow clearly displaying proper direction of flow.

Provide and install sock filters for chiller pump, boiler pump, and main system pumps for both closed and open systems.

If new chemical equipment is requested new system should match existing chemical feed at MSCS.

All pumps repaired and replaced to be laser aligned. Reports must be provided with closing documents.

All drive motors and fans to be dynamically balanced. Submit report with closing documents.

All projects shall have a certified balance report. Report to be submitted as part of closing documents.

Maintain average temperatures in sedentary academic areas between 68 heat and 72-cooling degrees Fahrenheit in summer and 72 heat and 76 cooling in winter.

All air handling units shall have direct drive EC fans. Belt drive is not acceptable due to additional required maintenance. Each air handling unit shall have a minimum of two EC fans for redundancy.

Provide access sections with min of 18 inch hinged doors for all coil sections.

Identify any existing controls that will be made obsolete by the new project and address them as necessary. All existing proprietary non-BACnet controls shall be upgraded to new BACnet Web-Based stand-alone EMS standard per division 255000 included in this guideline.

MSCS PREFERRED HVAC MANUFACTURERS PER EQUIPMENT TYPE

List below is for reference and not meant to be exclusive of any manufacturer.

Equipment	Manufacturer	Manufacturer	Manufacturer
Pumps	B&G	Grundfos	Armstrong
Boilers	Lochinvar	Patterson-Kelley	Cleaver Brooks
Cooling Towers	Reymsa	Marley	Evapco
Variable Frequency Drives	ABB	Emerson	Siemens

Plate Frame Heat Exchangers	B&G	Armstrong	BAC
Controls	**Siemens Talon/Desigo Automation**	**JCI, Metasys**	**Trane, Tracer**
Chillers	Trane	Carrier	Daikin
Unit Ventilators/ SCUV	Trane	Magic Aire	Daikin
Roof Top Units	Trane	Carrier	Daikin
Dedicated Outdoor Air Unit	Trane	Carrier	Daikin
Split Systems DX	Trane	Carrier	Daikin
Fan Coil Units	Trane	Carrier	Daikin

DIVISION 23 05 14 - DIFFUSERS AND GRILLES

A complete system of ceiling and sidewall diffusers and grilles for supply, return and exhaust air shall be provided throughout the building.

Perforated diffusers shall not be permitted.

The diffusers and grilles shall be constructed of steel with powdered coated surfaces. Aluminum diffusers and grilles shall be specified for moist and humid locations.

In general, provide 4-way adjustable stamped louver faced diffusers and double deflection registers.

Provide opposed blade dampers in all diffusers and registers. Designers shall show location of all balancing dampers on plans.

DIVISION 23 11 23 - NATURAL GAS SYSTEMS

Engineer and Contractor -MSCS will coordinate with the natural gas utility and have the gas line routed to the gas meter, MSCS will pay any cost incurred. The plumbing contractor shall connect to the load side of the meter and extend inside the building.

Provide main gas valves above ground and prior to entrance into building. Use ball valves on all gas lines inside the buildings.

Gas piping may be installed above the accessible (lay-in) ceiling and as dictated by the current adopted building code. Do not locate gas piping under a floor slab on grade or inside solid partitions including CMU. Provide accessible chases for concealed gas piping (i.e. access panels).

Floor trenches are not allowed.

Provide gas shut-off valves for each piece of equipment.

Provide an emergency one button operation gas shut-off valve in science rooms. Mount the valve box near the teacher demonstration table.

Final connections to equipment shall be made with flexible connectors. Provide 6" dirt leg at each vertical rise and prior to each equipment connection.

Each gas fueled HVAC appliance/ equipment shall have an individual gas regulator.

DIVISION 23 21 13 - HVAC PIPING SYSTEMS

All piping systems for HVAC systems in buildings shall be schedule 40, black steel with either welded, screwed or Victaulic joints except as follows in Products below. Polypropylene heat infused piping shall be considered for schedule and financial impacts on a case-by-case basis. Aquatherm shall be used as a basis of design with this intent and endeavor.

Condensate drains from AHU's and fan coil units shall be type "L" copper. Plastic or PVC drain lines shall not be allowed. Insulate all drain lines. All condensate drains shall be piped to a suitable drain location with cleanout. Provide unions on both sides of the p-trap.

COLD WATER LINES: Cold water lines and chilled water/hot water run outs 1" and smaller, maybe type K copper with soldered joints. Use 95-5 solder.

HOT WATER LINES: Designer shall specify and show on drawings expansion loops on all hot water piping that runs over 200 feet in length.

EXPOSED PIPING: All exposed piping, both insulated and uninsulated, shall be labeled. Exposed un- insulated piping shall also be painted. Paint and color-code all exposed piping system.

UNDERGROUND PIPING: All underground lines should be marked with a bright colored continuous- printed plastic tape on top of the line.

FREEZE PROTECTION: Provide positive freeze protection for all water systems subject to freezing conditions such as air-cooled outdoor chillers, cooling towers, outdoor piping (above ground) etc.

The engineer shall provide specifications for thoroughly flushing all HVAC piping before placing it in operation. This flushing must be witnessed and verified by the commissioning agent or project engineer (24-hour notice is required). This is especially critical for all hydronic systems. Hydronic systems shall be connected so as to by- pass the units before flushing begins and then flush and clean the filters at least three (3) times before the units are connected to the system and placed in operation. All cooling towers shall be completely cleaned and flushed after all systems are in operation and the sitework has been completed.

Provide bulb wells in central plant piping for electronic sensors. Coordinate with the control system designers for locations of wells. Show detail of wells on drawings.

Provide shut-off valves for all hydronic mains at all take-offs to mechanical rooms and pump rooms. Provide shut-off valves at the supply and return side of all equipment to provide for removal and repair.

Repair any insulation in areas where piping is being replaced or disturbed unless otherwise specified. Provide section on pressure testing of all piping systems.

Insulate all hot water and domestic hot water with 2" thick fiberglass insulation.

Insulate all domestic cold water above ceilings or in exposed mechanical spaces with 2” fiberglass insulation.

All water make-up assemblies shall be provided with a backflow preventer.

Provide aluminum jacket on all insulated outdoor piping.

Pipes venting gas from appliances or other devices shall terminate outside the building 2' above any roof line within 10'. Keep away from louvers and overhangs.

All pipe supports have saddles and blocking and all exposed piping, hangers, saddles and supports to be painted with two (2) coats.

All exposed piping in occupied spaces below eight feet to be covered with a 20-gauge metal jacket. Show bypass piping for all heat exchangers.

Show wye strainers in inlet piping to heat exchanger and cooling tower outlet unless strainer is built-in basin.

All damper operators, control, and service valves to be installed such that they can be serviced by personnel standing on the floor of the Mechanical Room, if possible.

Designers shall require contractor to dimension actual location of all underground piping on as-built drawings. A minimum of two dimensions from building reference points shall be provided and a bury depth indicated.

DIVISION 23 31 13 - DUCTWORK

All metal ductwork except kitchen hood shall be galvanized sheet metal with

zinc coating. Exposed ductwork shall be mill phosphatized for painting.

Use stainless steel (Type 302, 304, or 316) round ductwork with welded joints for the kitchen hood and certain other critical hood exhaust.

Low-pressure ductwork shall be rectangular. Medium and high-pressure ductwork shall be spiral round duct.

Insulate all ductwork, except exposed ductwork, by wrapping it with minimum 1-1/2" thick fiberglass insulation with vapor proof jacket or as required by the energy code.

Insulate exposed ductwork by lining with 1" thick fiberglass liner.

Flexible ducts may be used for the above ceiling lay-in system. Use spiral spring steel with flameproof vinyl sheeting, or as allowed by Codes.

Fabric duct systems may not be used.
Seal all ductwork joints with non-hardening mastic or liquid elastic sealant.

DIVISION 23 37 13 – VARIABLE FREQUENCY DRIVES

Provide 3-year parts and labor warranty.

All VFD’s shall have factory startup.

Drives shall have UL listed bypass with disconnect circuit breakers without a need for external input fuses. The bypass system shall be designed for stand-alone operation and shall be completely functional in both Hand and Automatic modes. Systems with redundancy do not require bypass.

Drive shall have BACnet interface to EMS. The drive shall have programmable LCD display with circuit breaker disconnect with a 100 KAIC short circuit breaker.

Cooling tower VFDs shall be Nema-4X with circuit breaker and a redundant drive. Installed VFDS outside and as close as possible to the tower. Any VFDs mounted outdoors must have Nema-4X factory enclosure.

The manufacturer shall provide factory training for two eight-hour sessions on service and maintenance class for up to 10 MSCS HVAC technicians. One at the close of the project and the second later. Coordinate training dates with MSCS. This is in addition to the walk-through training at the school.

DIVISION 23 64 00 – PACKAGED WATER CHILLERS

Provide air cooled scroll chillers from 10 to 240 tons with medium and high-pressure refrigerant without a phaseout date.

Provide 5-year complete parts, labor, refrigerant, warranty, and factory service maintenance contract. Service contract is based on full manufacturer task list with quarterly and yearly tasks. A complete report shall be provided to MSCS each quarter and on a yearly basis for each chiller. Chillers must include factory start-up.

Chiller shall control the pump using a hardwire interlock by BAS contractor. EMS shall enable/disable the chiller. BACnet interface with EMS integrations.

Provide motorized isolation valves for each chiller. BAS contractor shall incorporate control of the valves. Provide thermal dispersion flow switches and strainer at the chiller. BAS contract should be provided.

All chillers shall have factory disconnect switch, GFI, phase under/over protection, ground fault protection, isolation service valves, replaceable core filter dryer with isolation valves, insulated suction lines, sound kit for compressor and fans, metal louvers for entire chiller.

Magnetic chillers shall be medium or high pressure with refrigerant cooled hermetic compressors. Refrigerant shall not have a phase out date. MSCS prefers non-blend refrigerant without temperature glide. Open drive compressors are not acceptable due to additional required service and maintenance costs. Screw compressor is not acceptable due to noise issues. Provide VFD for each chiller.

MSCS prefers Chiller to control pumps and tower operation. Design Engineer to evaluate and recommend best control options. MSCS to review Sequence of operations.

BAS contractor shall provide a head pressure control valve for all water-cooled chillers. Head pressure control valves shall be controlled by their respective chillers.

Water cooled Chillers shall control the cooling tower VFDs when possible.

Manufacturer shall offer local factory service and maintenance class for up to 10 MSCS HVAC technicians Coordinate training dates with MSCS.

All open loop hydronic systems shall have bypass feed with cartridge filter and air/ dirt separator with blowdown to floor drain. The contractor shall install a drain valve and P/T ports in both pipes at each chiller.

All centrifugal chillers shall be medium to high pressure refrigerant with dual compressors for redundancy. MSCS requires hinged water boxes for centrifugal chillers for both ends of evaporator and condenser. The contractor shall insulate the headers.

The contractor shall provide and install temporary cooling hook-ups shall be 6” connections with isolation valves. Provide two (2) 6” to 4” reducers.

The manufacturer shall factory train for two eight-hour sessions on service and maintenance class for up to 3 MSCS HVAC technicians. One at the close of the project and the second later. Coordinate training dates with MSCS. This is in addition to the walk-through training at the school.

DIVISION 23 65 00 - COOLING TOWERS

The cooling tower shall be installed on a foundation that meets all related current adopted code criteria. A basis- of- design may include reinforced concrete piers or concrete slab designed by structural engineer with the suction outlet located above the centerline of the condenser water pump of sufficient height to provide proper NPSH to the pump. Cooling towers are to be included in the one-year service agreement for the HVAC system. Contractor to provide pipe size temporary hookup connections with isolation valves.

The cooling shall have two (2) fans

The overflow/drain shall be piped full size to the storm drainage system or sewage system as code or municipal rules dictate.

Provide VFDs or new motor starters. BAS to monitor the tower VFDs and motor starter for alarm/status.

Provide gated fence enclosure around cooling tower of sufficient size to allow access and maintenance of the tower. May reuse pad and fencing if manufacture specification is meet.

Provide Cooling Tower treatment prior to start up with near neutral pH water and use of only reasonable levels of film forming inhibitors. The contractor shall verify water treatment system shall be fully functional and operable.

MSCS chemically treats the process water in HVAC systems. Designer to ensure chemical feeders are included in project documents for the implementation of the chemicals into the HVAC system at time of operation.

Contractor shall coordinate with MSCS chemical treatment vendor to pre-treat (passivate) cooling tower per manufacturer's requirements before placing into service. This is not required for fiberglass towers.

MSCS recommends that the basis of design be a reinforced fiberglass cooling tower with seamless basin, dual fans for redundancy and mechanical ball float level for makeup water. MSCS prefers the cooling towers to have a 5-year warranty against rust and 5-year motor part warranty. Pretreatment is not required for Reinforced Fiberglass Cooling Towers.

An alternate stainless steel cooling tower design with welded, seamless, stainless-steel basin with dual fans for redundancy and mechanical ball float level for makeup is acceptable equivalent to cooling tower design and meet the same performance as the basis-of-design. Provide 5-years motor parts warranty and 5-years warranty against rust.

With the following accessories:
Ladder
Permitter handrails
Vibration switch
Mechanical ball float level only. Water lever using solenoids is not acceptable.
Low sound fans
Direct drive fan motor or gear driven belt is not acceptable.

Contractor to provide connections with isolation valves for temporary Tower connections.

The manufacturer shall provide factory training for two eight-hour sessions on service and maintenance class for up to 3 MSCS HVAC technicians. One at the close of the project and the second later. Coordinate training dates with MSCS. This is in addition to the walk-through training at the school.

DIVISION 23 74 00 – PACKAGED OUTDOOR ROOF TOP HVAC EQUIPMENT

Roof Top units shall have the minimum manufacturer warranty, 10-year heat exchange parts warranty (Stainless Steel HX only), 5-year complete unit parts warranty and 1-year manufacturer labor warranty. Warranty starts at substantial completion. Startup shall be performed by manufacturer.

Units serving classrooms with 3-6 tons shall meet minimum 15.2 SEER 2 rating. MSCS prefers and recommends energy efficient two stage compressors. VFD compressors are not recommended but will be reviewed and approved on a case-by-case basis for specification inclusion.

Units 7.5 tons and larger shall have a minimum of two refrigeration circuits. MSCS prefers and recommends energy efficient two stage compressors. VFD compressors are not recommended but will be reviewed and approved on a case-by-case basis for specification inclusion. All units are required to have compressor vibration isolation.

Unit controllers shall have a unit mounted user interface with digital display. Provide wall mounted temp/humidity sensor with LCD display, override, and metal guard.

Hot gas reheat coil is required for all classroom RTUs.

Direct Drive ECM motors for all classrooms roof top units. Belt drive & VFD will not be

acceptable. RTUs to have phase protection and condenser coil hail guards.

Units will be commissioned to the indoor air quality procedures as dictated by ASHRAE.

BACnet interface card should be provided for all RTUs to interface with BAS.

Demand Control Ventilation with CO2 control measuring sensor to MSCS BACnet front end graphics.

Roof curb shall be seismic and curb height shall be determined in relation to roof slope at the specific unit. The basics of design shall use a minimum 18 inches above roof.

Hinged access doors with door handles.

Provide exhaust as required by Design Engineer to maintain proper building pressure.

All roof top units shall have factory mounted non-fused disconnect switch and factory powered 120-volt convenience outlet.

The manufacturer shall provide factory training for two eight-hour sessions on service and maintenance class for up to 10 MSCS HVAC technicians. One at the close of the project and the second later. Coordinate training dates with MSCS. This is in addition to the walk-through training at the school.

All roof top units have a minimum of 2 stages of primary heat and 2-stage cooling. All roof top units have non-corrosive drain pan with condensate overflow switches. Roof top shall use medium or high-pressure refrigerant without a phaseout date. Condenser fans to be direct drive.

Provide bipolar needlepoint ionizers with self-cleaning function and meet the UL-2998 non-ozone certificate criteria. Designers may use the manufacturer, GPS, as a basis of design.

DIVISION 23 81 00 – UNIT VENTILATORS

Units shall have ECM supply fan and condenser motor with stainless steel drain pan. Provide 5-year parts warranty and manufacturer startup.

Provide control valve per Design Engineer either 2-way/3-way or face/bypass damper. Provide factory or field BACnet DDC controller.

Provide wall mounted sensor with fan speed, override, set point adjust, and display with guard. Provide new wall sleeve, outdoor air louver and relief damper.

Valve pack shall have circuit setter, control valve, isolation valves, y-strainer with blow out valve, P/T ports. All water coils shall have stainless steel coil casing and drain pan.

MSCS prefers self-contained unit ventilators to have 2-stage scroll compressors with thermal expansion valves and medium or high-pressure refrigerant without a phaseout date. VFD compressors with electronic expansion valve are not recommended and will be reviewed on a case-by-case basis.

Designer, Engineer-of-Record, and contractor shall confirm and verify wall openings to ensure correct sizing.

Designer, Engineer-of-Record, and contractor shall provide all modifications to the wall openings to ensure weather-tightness to prevent moisture intrusion and any impacts to the unit performance. When openings are required to be larger than the existing opening, the Engineer-of-Record shall provide a detail to ensure structural integrity and weather-tightness to prevent moisture intrusion and any impacts to the unit performance.

Provide bipolar needlepoint ionizers with self-cleaning function and meet the UL-2998 non-ozone certificate criteria and 3-year warranty. Designers may use the manufacturer, GPS, as a basis of design.

The manufacturer shall provide factory training for two eight-hour sessions on service and maintenance class for up to 10 MSCS HVAC technicians. One at the close of the project and the second later. Coordinate training dates with MSCS. This is in addition to the walk-through training at the school

DIVISION 25 50 00 – ENERGY MANAGEMENT SYSTEM

The building Energy Management System shall comply with the following specifications and should describe a system to control the HVAC of the building for the purpose of minimizing energy usage while maintaining a comfortable environment for the occupants. Any new projects or renovations must include new and upgraded DDC controls for any new or existing HVAC equipment for the entire site.

ENERGY MANAGEMENT: The installation of a BACnet Stand-Alone Web Based "EMS" energy management system with the capability of being monitored REMOTELY by the Maintenance Department via a web browser utilizing any smart device or computer for each NEW facility shall be provided. The specified system should be capable of controlling all HVAC, water heating, exhaust fans and other mechanical-electrical systems in the building.

Any new IT drops or required Ethernet switches is the responsibility of the contractor.

All new DDC controls shall be BACnet open protocol and shall be a stand-alone web-based browser operating system. The system shall have a building edge device containing all required software, programming, and graphic data base to provide stand-alone building operation, and remote secure access via the Web and smart device APP. System shall be capable (FUTURE) of seamlessly integrating to MSCS's "SIEMENS DESIGO AUTOMATION" management level web server via Edge2Cloud, N-Haystack, and BACnet IP.

BAS Contractor to program and display outside air and supply air flows on equipment graphics. Points to be capable of being modified and trended for every AHU and RTU equipped with airflow measuring devices via BACnet.

The engineer of record shall follow the "MSCS" Standardized Sequence(s) of Operation for all newly installed equipment. (Please contact MSCS Facilities for these Standardized Sequence(s) of Operation as they are continually being updated).

The following Design Criteria are items that shall apply to the EMS design:

- **Discharge air temperature sensors shall be included in the design and not be value engineered.**
- **Exhaust fans must be disabled when mechanical system in UNOCCUPIED unless specific conditions require otherwise and MSCS is notified in advance of this condition.**
- **All controls valve mounted outdoors must be Nema-4X rated.**
- **Use conduit in mechanical rooms, outdoors, and spaces with hard ceilings.**

DIVISION 26 00 00 - ELECTRICAL REQUIREMENTS

The following Design Criteria are general items that shall apply to the design of all Plumbing, HVAC, Electrical and Electronic Systems in the buildings.

The Engineer shall confirm the delivered voltage to the site by MLGW (480 volts) and specify equipment that will function within the full range of power provided by the electrical distributor (480 volts).

The electrical subcontractor on an HVAC project shall be charged with providing power to all energy management equipment requiring power of 96 volts or greater.

The location of all existing and proposed new EMS panels, DEMs and other EMS devices shall be shown on drawings and noted in specifications.

The electrical contractor on an HVAC project shall be charged with installing any high voltage device (96 volts of greater) provided by the energy management vendor, such as a digital energy monitor (DEM), if one or any are called for in the project documents.

The location of all existing and new EMS panels, DEMs and other EMS devices shall be shown on drawings and noted in specifications.

The location of all existing and new electrical panels shall be shown on drawings and noted in specifications. Remove and/or bypass any obsolete control systems.

Identify any existing controls that will be made obsolete by the new project and address, as necessary.

Exhaust fans must be disabled when mechanical system is UNOCCUPIED unless specific conditions require otherwise and MMSCS is notified in advance of this condition.

Emergency STOPS for mechanical equipment shall have hinged, non-lockable, clear, protective covers to prevent accidental shut-down.

Exhaust fans must be disabled when mechanical system is UNOCCUPIED unless specific conditions require otherwise and MMSCS is notified in advance of this condition.

SCIENCE CLASSROOMS: Provide a single emergency (mushroom type) shut-off switch in each science lab /classroom that will close valves in the gas, water source serving each particular science lab / classroom; (except that serving emergency showers and eye washes) and interrupt all power (excluding overhead lighting, exhaust

systems and fume hood) serving the classroom. Devices used to interrupt the gas and water valves shall normally be closed devices, and devices used to interrupt the electrical power shall fail open. The emergency switch shall be highly visible, have a keyed reset and be readily accessible to the teacher but not easily reached by students. For gas systems, gas service remains off at all times unless activated by a 0-6-hour timed switch. Timed switch shall require a key access.

DESIGN REQUIREMENTS: In any building where future expansion is planned, as conveyed by Owner, the Designer shall provide adequate additional capacity and connection points in the Mechanical and Electrical Systems as directed by Owner. The additional capacity shall be clearly noted on the front sheet of the drawings. Provide four (4) 3/4" spare conduits for all recessed panelboards to stub out above ceilings.

The electrical contractor shall provide power wiring for each piece of mechanical equipment. The mechanical contractors are required to furnish all starters and disconnects and turn over to the electrical contractor for installation and to make final connections from slack wire left by electrical contractor to each piece of equipment. Show detail on drawing to avoid confusion.

All points for future connections shall also be clearly shown and labeled on the drawings with the capacity (GPM, Tons, kW, etc.) that is available for future at each connection point.

Where future additions are not planned or are unknown, 25% spare capacity, both electrical and physical shall be provided in the electrical service, all panelboards and related equipment after all known loads are included.

Do not locate pumps, motors, or other equipment requiring routine maintenance overhead.

All air handling equipment, pumps, motors, valves, etc., shall be mounted in areas easily accessible for routine maintenance. Provide code required manufacturer’s recommended or 3 feet clearance whichever is greater, around equipment for access to motors, compressors, bearings, controls, filters, valves, etc. Provide filter change space and coil pull space. Locate related equipment together, i.e., in the same room and on the same floor. Do not layout equipment rooms such that equipment, piping and/or ductwork must be removed to perform maintenance. Do not locate equipment overhead and above ceilings unless specifically approved by Owner.

Show dotted lines on floor plans of all mechanical rooms and all other heavily concentrated areas to designate pull spaces for equipment, (coils, motors, etc.) and maintenance space for equipment (filter change out, lubrication, belt replacement, bearing replacement, compressor replacement, valve maintenance, etc.).

Show a complete legend and symbol list on the first sheet all trades (Plumbing, HVAC, Electrical, etc.).
Provide a detailed isometric scaled typical detail showing the equipment, and/or piping and the walls, ceiling, and floor of the room, where terminal units and/or piping are to be installed exposed in classrooms, media centers, cafeterias, kitchens, administrative areas or other finished areas of the building.

Show complete piping schematic drawings for all piping systems.

Isometric piping diagrams shall be shown for all mechanical equipment used in the building showing all fittings, valves, thermometers, gauges, and other devices required for proper operations and isolation.

All mechanical and boiler rooms shall be shown at a scale of a minimum of 1/4" = 1'-0" and all equipment in the room including piping, drawn to scale with all clearances shown. Show all trades on the large-scale drawings. Show a minimum of two (2) sections through the rooms or show the room in a full isometric drawing. Show all door swings. Do not block access for any item of equipment with another.

Designers shall consider the implementation of a mechanical platform located above the main corridors of the highest floor to assist in minimizing roof penetrations. Access shall be through stairwells and door openings sized per largest piece of designed equipment. No ship ladder access will be allowed. If stairwells are determined not to be able to accommodate large equipment, Designer shall incorporate alternate access methods such as exterior hinged louvers with pulley system or breakaway walls.

All building heating loads (MBH), cooling loads (tons), domestic hot and cold water demand (GPM), waste load (fixtures units), connected electrical loads (kW), gas loads (CFH), a list of "U" valves and an estimated maximum electrical demand (kW) shall be clearly shown in tabular form on the front sheet of the P/M/E drawings.

All capacities provided for future building additions shall also be shown in this table.

Show all mechanical and electrical equipment to scale including panelboards, fire alarm panels, sound panels, water heaters, etc.

CONSTRUCTION DOCUMENTS: The drawings for construction must include the following statement: All required documentation regarding the design of fire detection, alarm, and communications systems and the procedures for maintenance, inspection, and testing of fire detection, alarm, and communications systems shall be maintained at an approved, secured location for the life of the system.

SPECIFICATIONS: Show a list of acceptable manufacturers for all items of equipment specified. Refer to this document or if uncertain, consult with the Owner.
Specify maximum noise levels for each item of equipment specified. Note: Do not locate noisy equipment near noise sensitive areas of the building. Equipment inside building shall not exceed 50 dB (decibel levels).

Engineer shall not locate noisy outdoor equipment (i.e.; chillers, cooling towers, etc.) near adjacent property owners which might result in complaints from the adjacent neighbors.

Specify minimum energy efficiency for each item of mechanical and electrical equipment based on it. For a water chiller, specify the minimum efficiency at the 25, 50, 75, and 100% operating conditions.

Specify that the Owner shall employ the services of an AABC or NEBB Certified Test and Balance Contractor to balance all air and water systems.

Specify that all belt driven equipment shall be provided with a spare belt to be turned over to the Maintenance Department.
Specify that all warranties shall commence from the date of Substantial Completion, not from the start-up date of the equipment.

Specify that three (3) complete electronic sets of operation and maintenance manuals on an electronic transfer device, such as a flash drive, shall be delivered to the Owner through the Designer before the Substantial Completion inspection is held.

All electrical systems' main service equipment and panel boards shall be designed with 25% minimum spare capacity, both physically and electrically, for future growth capabilities.

Provide lightning and surge suppression on all security, intercom, energy management system, CCTV, and fire alarm systems.

Provide transient voltage surge suppression for main electrical switchboard and all branch circuit panel boards serving computers and electronic loads.

Provide phase loss protection at electrical panels serving HVAC motors and compressors.

Electrical Contractor shall provide dedicated and protected 120V power to all HVAC control panels and damper operators. Provide a junction box and an on/off service switch directly over the control panel.

The O&M CD shall be submitted digitally and formatted per the MMSCS close out manual index.

DIVISION 26 05 00 – CONDUIT

Conduit types shall be rigid steel, IMC, schedule 40 (or heavier) PVC or EMT.

Fittings shall be steel, Cast, pot metal, or crimp type fittings shall not be permitted, zinc die-cast fittings are not

allowed. EMT connectors shall be insulated throat. Plastic bushings may be used in lieu of insulated throat.

EMT couplings and connectors may be Compression or Set Screw on the interior of the building, for exterior use, connectors and couplings to be Rain Tight steel compression fittings.

MC cable may be utilized per UL and NEC standards with the following limitations: MC cable may only be used as lighting switch legs above a dropped ceiling, but the final connection to fixtures must be with a standard 18/3 fixture whip. MC may be used to fish a finished sheetrock wall to add a switch or receptacle and must terminate to junction box and conduit within 3 feet of exiting the top of the sheetrock wall.

Conduit Uses:

1. Rigid steel conduit or IMC may be used for underground branch circuit wiring without concrete encasement when installed greater than 24 inches below finished grade. All rigid steel and IMC feeder conduits shall be encased with 3 in. of concrete on all sides and have red caution tape in trench 1 foot above concrete. Where subject to physical damage, branch circuits exposed less than 8 ft. above finish floor and all feeder conduits run above grade shall be in rigid steel conduit or IMC.

2. PVC Conduit may be used without concrete encasement for branch circuits directly under concrete slabs, when turning up out of the slab, the last 10-foot section shall be Rigid Steel conduit to above grade, then transitioning to EMT is permissible where damage is not likely. PVC may be used without concrete encasement for site lighting and marque signage power. PVC for main feeders and feeders to out buildings must be encased with a minimum of 3 inches of concrete on all sides and have red caution tape in trench 1 foot above concrete. PVC is not acceptable for any wiring above grade.

3. EMT may be used inside walls, in ceilings, and exposed where not subject to physical damage. EMT is not permitted to be installed below grade.

4. Minimum home run size shall be ¾ inch conduit, with no more than 3 ungrounded current carrying conductors per home run. For receptacle and lighting branch circuits, when they reach the area served, may be reduced to ½ inch conduit for piping to individual receptacles and lights.

Plastic bushings or insulated throat connectors shall be used in all conduit terminations.

Conduit shall be used in walls, from the outlet to the ceiling, for public address, intercom and MATV wiring.

DIVISION 26 05 19 - WIRES AND CABLES

All conductor materials shall be copper. Aluminum conductors **are not allowed** as main feeders. Only in special conditions and with written approval by Owner will aluminum be allowed.

All low voltage wiring, including fire alarm, data, controls, security, etc., where exposed shall be in conduit to be painted at the owner's discretion.

Provide plenum rated cabling for low voltage cabling and wiring.

Contractor Shall include the purchasing, installation, testing, and maintenance of systems that operate at 50 volts or less. These systems are essential for communications, security, and automation in MSCS districts commercial, industrial, and residential buildings. The contractor shall provide all labor, materials, equipment, and services necessary to remove existing low voltage cabling there after installation of new systems. This includes structured cabling, security systems, audio/visual setups, and building automation components where applicable in all cases to complete functioning system.

Project Planning & Coordination

- Review construction drawings and specifications.
- Coordinate with MSCS project teams, general contractors, electricians, and other trades.
- Attend project meetings and site walkthroughs.
- Responsibility for obtaining permits or scheduling inspections may be excluded unless specified.
- Includes trenching, core drilling, wall penetrations, or any structural alterations unless explicitly stated.
- Work in hazardous environments (e.g., asbestos, mold, contaminated areas) is included unless addressed separately.
- Inspect existing cabling infrastructure.
- Identify obsolete or damaged cabling.
- Document cable routes and termination points.
- Develop a detailed cabling layout.
- Ensure compliance with BICSI, TIA/EIA, IEEE, NFPA, and ISO/IEC standards.
- Coordinate with IT and facilities teams for access and scheduling
- Contractors shall replace any ceiling tiles, wall finishes, or flooring that are damaged during construction activities, restoring them to their original condition or better, at no additional cost to the owner**."**

Cable Installation

- Pulling and routing of low voltage cables (e.g., Cat6, fiber optic, coaxial, speaker wire, Etc.
- Installation of cable trays, conduits, raceways, and supports.
- Labeling and documentation of all cable runs before Removal of Existing Cabling**.** Safely disconnect and remove all outdated or non-compliant low voltage cabling.
- Dispose of removed materials in accordance with environmental regulations.
- Ensure minimal disruption to ongoing operations.
- Removing dust, debris, and construction materials daily
- Cleaning floors, windows, walls, and fixtures daily
- Ensuring the site is safe, presentable, and ready for public use/occupancy daily

Termination & Testing

- Termination of cables at patch panels, jacks, and devices.
- Testing for continuity, signal strength, and certification (e.g., Fluke testing).
- Troubleshooting and correcting any deficiencies.
- Final testing, certification, or commissioning may be excluded unless explicitly included in the scope.

System Installation

- Installation of devices such as:
    - Network switches and routers
    - Wireless access points
    - Security cameras (CCTV)
    - Access control systems
    - Intercom and Paging Systems
    - Audio/visual equipment
    - Rack and cabinet installation and dressing.

Documentation & As-Builts

- Provide updated as-built drawings.
- Submit test results and certification reports.
- Deliver operation and maintenance manuals.
- Provide warranty for workmanship and materials.

- Offer emergency support within a specified response time (e.g., 2 hours).
- Include routine maintenance and troubleshooting services.

Compliance & Safety
- Adherence to NEC, ANSI/TIA, BICSI, and local codes.
- Use of proper PPE and safety procedures.
- Firestopping and pathway sealing as required.

DIVISION 26 05 00 - ELECTRICAL CONNECTIONS TO EQUIPMENT

The Electrical Contractor shall provide power wiring to all Kitchen, Plumbing or HVAC equipment.

The Kitchen Equipment, Plumbing or HVAC Contractors will be required to make final connections inside the equipment from slack wire left by Electrical Contractor for system check out.

All disconnect switches and starters shall be supplied to the Electrical Contractor by the Kitchen Equipment, Plumbing or HVAC Contractors for mounting and wiring. The supplying Contractors shall furnish all fuses and heaters. Show detailed drawings to avoid confusion.

All connections to equipment subject to moisture, not supplied with factory installed cord shall be connected with UL listed LFMC utilizing steel or cast-iron fittings, where not subject to moisture FMC with steel or cast-iron fittings may be used.

LFNC (Carflex) is not permitted.

Provide dedicated 120 volt, 20 AMP circuits at all Energy Management System (EMS) panel locations and in all mechanical rooms or other mechanical equipment locations requiring 120-volt control power.

Provide a dedicated 120-volt, 20-amp circuits at the Fire Alarm Control Panel location and for security monitoring equipment supplied by Owner’s vendor, and supply breaker lock

DIVISION 26 05 00 - WIRING DEVICES

All receptacles, breakers and switches shall be minimum 20 ampere rated, heavy duty.

RECEPTACLES: Receptacles should be properly located throughout the building for cleaning equipment and other similar uses. A minimum of one duplex receptacle shall be provided on the interior near the top of the ladder serving the scuttle (where present) to the roof area and at each exterior mechanical equipment location. Provide a duplex receptacle and work light in all crawl spaces, open chases and attic spaces.

PE ROOMS: Minimum of one quad box outlet in each wall, with impact resistant installation. Coordinate with the IT Department for TV, Data and other technical requirements to be included in the Contract Documents. Clock location shall be provided in this room with a guard or other features to prevent damage from thrown objects.

CLASSROOMS: A receptacle is required on the wall where the short throw projectors are mounted to the wall, or in the ceiling for ceiling mounted projectors where designed. The electrical box shall be of the type suited for the type wall or ceiling.

In classrooms the receptacle directly under Promethean, Smart boards, or projector screen shall be a 20 amp 125-volt combination outlet with 2 USB 3.1 amp chargers and duplex receptacles.

DIVISION 25 05 00 - SERVICE ENTRANCE

The primary transformer and primary wiring should be owned and maintained by the utility serving the school, if possible. Any primary system costs that exceed the utility's contribution should be included in the general contract. The main distribution panel shall be sized to provide adequate capacity for all current and proposed future expansion.

The designer shall coordinate with the power supplier and indicate and/or specify all requirements for:

- Point of service
- Division of work (contractor and power company)
- Fault current: Overcurrent device(s) shall have interrupting capacity in excess of available fault current throughout system.

DIVISION 26 24 16 – PANEL BOARDS

The main panel should not be located in an area subject to moisture, excessive heat, or the possibility of physical damage. Do not locate main panels below grade or any panels in inaccessible locations. For projects at existing buildings, insure that the existing panels are grounded as required by Code.

TRANSFORMERS: All transformers of any voltage **shall not contain any aluminum** components. Only in special conditions and with written approval by Owner will aluminum be allowed.

PANEL BOARDS: All panel boards shall have a copper bus. All panel boards shall be provided with main breakers, including sub-panel boards that are served from another panel board except where sub-panel boards are located in the same room as the panel board serving them. NEC required clearances shall be provided around all panel boards. Show a clearance detail on drawings for clarification. Lighting panel boards shall contain only lighting circuits. All other loads such as receptacles, mechanical/plumbing equipment, etc. shall be served from separate panel board(s).

Provide dedicated protected circuits serving computers.

All panel boards shall be specified for 25% minimum spare electrical and physical capacity above the anticipated demand load. Include spare 20 amp breakers in each panel board "knockout" and label as spare.

All distribution panels shall have their circuits clearly and accurately marked. Specify typed directories in all panel boards. Room names and numbers shall match final signage used at the site.
Specify screwed-on laminated plastic identification labels on cover of all panel boards. Key all panel door locks alike.

DIVISION 26 50 00 - LIGHTING

These requirements pertain to all interior, exterior canopy and exterior building lighting. Coordinate site lighting requirements with Owner. All lighting systems shall be designed based on Illuminating Engineering Society (IES), ANSI schoolhouse lighting standards, and the current adopted building codes. Discuss lighting ideas and control strategies with Owner before design and layout of lighting systems.

All interior and exterior fixtures MUST meet the following:

1.) Be UL Listed
2.) Have a 5 year or greater Manufacturer's warranty
3.) Have a local representative for warranty purposes (no internet sourced fixtures)
4.) Be DLC Certified, DLC Premium Certified is preferred

INTERIOR LIGHTING: Classrooms, Cafetorium's, and office areas to have Occupancy and Light Harvesting controls, in accordance with current IECC codes. Lighting in all areas to have a minimum of one fixture with battery backup nearest to exit door, this includes all offices and restrooms, large areas with multiple exit doors to have a fixture with battery backup near each door. All fixtures to be controlled by a lighting control system such as the Acuity n-Light Air or Lutron Vive system, or approved equal that must be Bacnet compatible to be considered. Classrooms shall have a “multi- scene” controller to control lights where projectors or Promethean boards are used. Hallways to have sufficient motion control devices to adequately control lighting. Interior lighting shall be 4K color temperature.

Fixture design for all interior lighting is based on the Litonia BLT series Single Basket Volumetric Troffers with a smooth curved lens. Similar fixtures are acceptable but must be approved by MSCS.

SITE LIGHTING: All fixtures should have vandal-resistant lenses and be controlled by a time clock, or other appropriate energy conserving controllers, installed in an easily accessible interior location. Ordinary wood poles and “cobra” fixtures should only be used in extreme budget constrained cases. Aluminum poles and “box” type fixtures should be used where proximity to the building makes a more attractive pole and fixture desirable. Energy efficient (LED) wall mounted fixtures are normally used to light the areas around the building. Shielded lighting may be required to provide cutoff at

property lines. All wall mounted fixtures to be sealed with silicone between the fixture and wall to prevent water and insect intrusion. Exterior lighting shall be 5K color temperature.

PHYSICAL EDUCATION LIGHTING: High efficiency LED fixtures providing natural color light should be specified. Guards will be required over all fixtures. Foot-candle level shall be as recommended for a gymnasium by TSSAA for basketball, volleyball, and wrestling.

Locate light fixtures in stairwells that is conducive to the paths of travel and do not impede paths of travel. All stairwell lighting must require no more than a 10-foot ladder for repair.

Incandescent lighting shall not be used except for special utility lighting, as approved by the Owner.

Stage and Studio lighting shall be LED.

No HID fixtures shall be specified.

LED lighting shall be used as the basis of design. Any other type of lighting must be owner

approved. Each space with designated occupancy shall have a lighting occupancy sensor.

Use of warm-up fixtures is not permitted.

Exterior lighting shall be provided for building entrances, parking lots, outdoor storage areas, loading docks, bus ports, covered walkways, exterior mechanical room doors and other outdoor areas where in the judgment of the engineer or Owner, lighting is required for night functions, security, or safety.

ILLUMINATION LEVELS: Illumination levels shall meet or exceed the current adopted building codes. As a basis-of-design, use Illuminating Engineering Society handbook as a guide. Lighting calculations shall be based on room surface reflectance for interior finishes selected by the architect, which in all cases shall not be less than the following for instructional areas:

- Ceiling - 80
- percent Wall - 50
- percent Floor -

  20 percent

Be aware of lighting codes relative to adjacent properties. (See Zoning Code Chapter 17)

Since lighting technology is constantly changing, special designs not strictly adhering to the preceding recommended light levels, but still meeting the lighting needs in the designer's opinion, will not be prohibited but shall have prior approval of the Owner.

EXIT SIGNS: LED exit and directional signs shall be provided with individual battery back-up power. Exit signs and directional signs should be wall-mounted where possible in lieu of ceiling-mounted.

EMERGENCY LIGHTING: Emergency lighting shall be provided. Use of 2X4, or 2X2 fixtures with battery backup is preferred where applicable. The primary source may be connected at any point within the normal lighting system. The secondary source shall operate automatically upon interruption of the primary source and shall be self-contained batteries. The areas listed shall have emergency illumination, whether having natural lighting or not, and are as follows, but not limited to:

- Exits and exit access corridors
- Small and large assembly
- areas Areas occupied by over 50 persons
- Gymnasium dressing rooms
- Band and choral rooms
- Career Technical Education spaces
- Administration or other building control
- centers Kitchens
- Group toilets
- Main electrical service disconnect
- location Emergency power equipment location

LIGHTING SYSTEM SECURITY: All practical measures should be taken to provide protection for lighting fixtures and equipment. Vandal-resistant materials or metal guards shall be used for fixtures that can be reached from floors, in P.E. rooms and gymnasiums, and at all outdoor locations. Metal guards shall be mounted to walls with masonry wall anchors.

Mounting heights should be specified to afford protection, consistent with ease of maintenance.

Designer shall certify the foot-candle levels at the completion of the project and provide report to Owner as part of closeout.

DIVISION 28 30 00 – FIRE ALARM SYSTEMS

- The facility shall have a monitored fire alarm system as required by governing codes, including requirements for accessibility. The system shall incorporate the two-way communication capabilities of the required intercom (or telephone) system to satisfy Fire Code requirements to allow elimination of corridor pull stations. Electrical backup for both the fire alarm and intercom (or telephones) shall be by battery, not generator. Portable fire extinguishers shall be provided throughout the building as required by codes. Note that fire codes require all spaces used by first grade and younger students (including auxiliary spaces such as P.E., cafeteria, media center, music, art, etc.) to be on the ground floor.
- Install a new commercial-grade fire alarm system in accordance with NFPA 72, local building codes, and AHJ (Authority Having Jurisdiction) requirements. The system will provide early detection, occupant notification, and integration with emergency response protocols.

- MSCS will mandate a Design-Build delivery method to be used in construction where a single entity—known as the design-builder—is responsible for both the design and construction of the New Fire Alarm Protection project.
- Single Point of Responsibility: The owner contracts with one entity for both design and construction, simplifying communication and accountability.
- Integrated Team: Designers and builders work collaboratively from the beginning, which can lead to better coordination and innovation.
- Faster Delivery: Because design and construction phases can overlap, projects often finish sooner.
- Cost Efficiency: Early collaboration can help control costs and reduce change orders

Any building built after 2002 is required by the Life Safety Code to have the fire alarm monitored by an approved central station. Any school that has a fire pump is required to have the signals from that pump transferred to a central station as well.

1. Include in the specifications to provide in the bid price, the cost to monitor, test and inspect for one (1) year. The design and installation of the fire alarm system shall implement the following criteria but not be limited to:
2. The new systems shall be tested with all deficiencies corrected prior to requesting a final AHJ inspection.
3. All smoke detectors shall be labeled with the appropriate address for identification and troubleshooting purposes. Label shall be visible from the floor below or immediately adjacent to the device.
4. Ground fire alarm control unit and associated circuits shall comply with IEEE 1100. Install a ground wire from the main service ground to the fire alarm control unit. Ground shielded cables at the control panel location only. Insulate shield at device location.
5. Provide and install plenum rated cabling only, no exceptions!
6. Contractor shall install J-Hooks or bridal rings to support cabling above suspended ceilings at every 3’ to 4’ intervals.
7. Wall penetrations shall be sleeved with conduit, bushed on both ends and fire caulked at both ends.
8. Grout space between new sleeve and CMU wall after sleeve installation. If the wall is sheetrock, the space between the new sleeve and sheetrock must be spackled with sheetrock patching compound. Both sides of wall sleeve must be sealed.
9. The existing fire alarm system must remain operable while the new system is being installed.
10. The installation supervisor shall be on the job site during the entire installation. The installation supervisor shall maintain marked up copies of the drawings at the job site showing as-built conditions. These drawings shall be updated daily and available for Owner review.
11. After the new fire alarm system has been installed and approved by all Authorities Having Jurisdiction, the Contractor shall demolish and remove the old system. Demolition shall include the removal of the fire alarm panel, remote annunciator panel, power supplies, system cabling, associated raceways, devices and enclosures. Prior to demolition, consult with MSCS project manager to determine if there is any MSCS wanted salvageable old fire alarm system equipment. Any identified equipment shall be delivered to the MSCS Maintenance Warehouse located at 1364 Farmville Rd. Memphis TN 38122.
12. After existing system demolition, the Contractor shall replace any suspended ceiling tiles that contained pre-existing devices or any ceiling tiles that are damaged as a result of the installation process.
13. After existing system demolition, the Contractor shall install stainless steel cover plates over all abandoned fire alarm recessed receptacle boxes.
14. The Contractor shall perform touch-up painting below any suspended ceilings from any voids that arise from the demolition process. This includes, but not limited to, pre-existing wall mounted enclosures, raceways, power supplies or fire alarm devices.
15. Upon completion, the Contractor shall supply the MSCS project manager with a minimum of four keys to new fire alarm system cabinet.
16. After new fire alarm system installation, the Contractor shall conduct a training session with school staff and other MSCS personnel on system operations. Topics covered shall include annunciator panel location(s), monitoring company contact information, voice evacuation system operation,

test mode, silencing and supervisory location points.

17. All exposed Fire Alarm wiring to be installed in conduit.
18. The Contractor shall be responsible for paying all necessary costs associated with having elevator, sprinkler, fire suppression and HVAC companies/personnel present for testing purposes related to obtaining a successful final Code inspection.

System Design

- Conduct site survey and risk assessment.
- Develop fire alarm system layout including:
- Existing System must be monitored during installation process of New Fire Alarm system in all cases.

Demo Existing System, Patch, Paint, fire Caulk all penetrations and replace all damaged items/materials once new system is installed and inspected for owner acceptance.

- Smoke detectors
- Heat detectors
- Pull stations
- Notification appliances (horns, strobes, speakers)
- Fire alarm control panel (FACP)
- Annunciator panels
- Smoke detectors (including duct-type), heat detectors, flame detectors.
- Dry-contact relays for fan shutdown and damper control.
- Supervisory signals for duct detectors.
- Install duct-type smoke detectors in HVAC return and supply ducts.
- Program detectors to initiate supervisory or alarm signals.
- Interface fire alarm system with HVAC controls to:
- Shut down air handling units.
- Close fire/smoke dampers.
- Prevent smoke migration across zones.
- Ensure all control wiring is monitored for integrity or designed fail-safe.
- Coordinate with electrical, architectural, and life safety plans.

Equipment & Materials

- UL-listed fire alarm control panel (addressable or conventional)
- Backup batteries and power supplies
- Initiating devices (smoke/heat detectors, manual pull stations)
- Notification devices (strobes, horns, speakers)
- Wiring and conduit per NEC standards
- Surge protection and grounding

Installation

- Install all devices per approved plans and manufacturer specifications.
- Route and terminate wiring in compliance with NEC and NFPA 70.
- Mount and connect FACP and remote annunciators.
- Label all devices and circuits clearly.

Integration

- Connect fire alarm system to:
- Building sprinkler system (flow/tamper switches)
- Elevator recall
- HVAC shutdown
- Emergency lighting and exit signs (if applicable)
- Central monitoring station (if required)

Testing & Commissioning

- Perform pre-functional testing of all devices.
- Conduct full system test witnessed by AHJ or third-party inspector.
- Verify signal transmission to monitoring station.

- Provide test documentation and as-built drawings.
- Include programmable logic or firmware software updates

Training & Documentation

- Train building staff on system operation and emergency procedures.
- Provide Electronic and Hard copied manuals, warranty information, and maintenance schedule.

Warranty & Maintenance

- Provide 1-year warranty on labor and materials.
- 1 hour responds time for emergency calls.
- Optional ongoing maintenance and monitoring services. (alternate #1)
    - Fire alarm systems must be inspected routinely to ensure functionality and compliance.
    - Monthly and annual tests are often required.
    - Keep manuals, inspection records, and maintenance logs organized and accessible.
    - Include battery-backed exit signs and emergency lights that are activated during power outages.
    - Suppression and foam systems should be tested monthly, quarterly, and annually as per regulations.

DIVISION 27 30 00 – TELEPHONE/ DATA SYSTEMS – OWNER FURNISHED/ CONTRACTOR INSTALL

Designer shall coordinate with MSCS Information Technology department all requirements and standards for telephone and data systems. When applicable, allowances for telephone and data systems will be acquired for inclusion into the contract documents specific to the project.

All exposed Telephone/Data wiring to be installed in conduit

DIVISION 27 51 16 – INTERCOM/ PUBLIC ADDESSS SYSTEMS – OWNER FURNISHED

Designer shall coordinate with MSCS Information Technology department all requirements and standards for intercom and public address systems. When applicable, allowances for intercom and public address systems will be acquired for inclusion into the contract documents specific to the project.

All exposed Intercom/Data wiring to be installed in conduit.

DIVISION 28 16 00 - SECURITY SYSTEMS

The MSCS School Security Department has an ongoing contract for security monitoring of our schools and shall be contacted for input on any security system.

The equipment installed in the building now uses a line-seizure device on a phone line to provide the connection to the monitoring contractor. The security system will be provided a network connection point at the coordinated panel location for alerting and management. The security system vendor should be put in contact with TIS in order to identify this location and coordinate the connection. Alarm companies should always try to design the installation of the central control panel into the IDF A space for ease of conductivity and security of the panels.

Installation should follow the MSCS Low Voltage Standards (version adopted at the time of contract signing). It is imperative that this company be contacted and made to understand the importance of schedule and proper installation, i.e. no exposed conduit or wiring.

Security provisions to be provided by the General Contractor shall include electrical outlets as well as rough-in boxes for contracted security monitoring services to install their equipment after completion of the building. Provisions for serving the sensing units to be mounted throughout the building shall be provided. Coordinate

with the security monitoring contractor during design. The designer is to determine whether the use of plenum rated cable will be required and advise the Owner.

All exposed Security System wiring to be installed in conduit.

DIVISION 31 00 00 - SITE DEVELOPMENT DESIGN CONSIDERATIONS

All exterior development, including paving, landscaping, fencing, lighting and planting shall be included in the contract for construction. There are various issues that need to be addressed in the site design of a school. These considerations include: (1) The allowance for future building expansion and accommodation of future re- locatable classrooms; (2) The development of circulation patterns that separate pedestrian from vehicular traffic, the bus drop/parking from the parent drop off and staff parking from student parking; (3) Main building entrances which are readily identifiable and provide shelter for student early arrival; (4) Building orientations and configurations which conserve energy and allow for daylighting and ventilation. Providing accessibility to all buildings and play areas as per Building Code and ADA requirements; Sidewalk systems and improvements as prescribed by the Zoning Code (17.20.120) are required.

BUILDING EXPANSION AND PORTABLES CLASSROOMS: The planning for future building expansion and re- locatable classrooms shall consider grading, circulation patterns and utility stub-outs. An area large enough for six re-locatable classrooms shall be identified on the site plan. Additionally, an area for future expansion of six permanent classrooms separate from the re-locatable classrooms shall also be included on the site plan.

BUS DROP OFF, STUDENT DROP OFF AND PARKING TRAFFIC: These three functions should be separated. At all drop-off areas the discharge or pick-up of students at the loading-unloading zones shall be from the right side of the vehicle (opposite the driver) and towards the building. The following percentages are a “rule of thumb” for a typical elementary school (contact: MSCS Department of Transportation for more specific data): 60 % Buses 25 % Cars 15% Walkers and Bikes. MSCS' longest bus has a length of 40’ – 0’ and a capacity of 84 students.

Parking bays for full-service buses shall be a minimum of 15'
wide. Backing up of buses shall not be permitted.
A minimum turning radius of 35 feet shall be provided at bus driveways and parking
areas. Linear sidewalks shall be provided at each loading/unloading area.
Covered canopies shall be included at all drop-off areas for protection during inclement weather.

COURTYARDS: Interior courtyards should be designed as low maintenance as possible.

PLAYGROUNDS: Shall be provided as per program requirements.

- The playground shall be designed to accommodate children ranging either from two (2) to five (5) or five (5) to twelve (12) years of age on main playground as required, or both.
- The color theme should be chosen by the end user and should include appropriate signage to inform users of property safety requirements.
- All structural components, tubing, decks, ladders, etc. shall be constructed of galvanized steel or aluminum and finished with polyester dry powder coating, plastisol vinyl coating, or zinc plating.
- All bolts, nuts, screws, washers, and other hardware used for assembly of equipment must be corrosion resistant stainless steel.
- All play equipment shall have a maximum fall height not greater than eight feet (8’).
- All slides, roofs, and other plastic components shall be rotationally molded of a linear, low density, UV and color stabilized, polyethylene.
- Contractors shall meet manufacturers’ specifications and industry standards for installation.
- Systems shall meet current ADA accessibility requirements.
- Systems shall meet National Playground standards as referenced in the American Society for Testing and Materials (ASTM) document F1487-95; Standard Consumer Safety Performance Specification for Playground Equipment for Public Safety. Evidence of compliance shall be submitted and stamped on equipment as required.

· System shall meet National playground standards as referenced in the U.S. Consumer Product Safety Commission's publication No. 325 Handbook for Public Playground Safety. Evidence of compliance shall be submitted and stamped on equipment as required.
· The contractor shall supply a complete description of the length and type of parts the warranty covers on all pieces of equipment.
· Initial inspection of equipment shall be made within the week of installation.
· Twelve inches (12") (after compaction) of handicap accessible engineered safety surface, above ground with no drains, shall be provided and installed by the contractor. Mulch safety surface shall be certified playground mulch.
· A border system of durable material must enclose the protected play area.
· The safety surface and border system shall be constructed on top of existing grade.
· Replacement parts books and installation instructions shall be supplied for all proposed playground components.
· All vertical and horizontal climbers must have deck enclosures.
· The playground system will be a multi-colored system. Specific color combinations to be determined.

SCOPE OF WORK

The scope of work covers, and is not limited to the design, procurement, site preparation, and installation of play equipment, including safety surfacing and site amenities, demolition of existing structures, excavation, concrete work for footings, equipment assembly, border installation, drainage, fencing and final safety inspections to meet ASTM and ADA standards.

Preconstruction/Design Phase: Development of site plans, layout, and selection of equipment for specific age groups (e.g., 2-5 or 5-12 years).

Site Preparation & Demolition: Removal of existing structures, clearing, grubbing, topsoil stripping, and grading.

Civil & Infrastructure Work: Installation of drainage systems, underground utilities, stormwater management, fencing, concrete walkways and installing perimeter borders.

Equipment Installation: Assembly and installation of play structures, inclusive equipment, fitness equipment, or spray parks, often requiring certified installers.

Safety Surfacing: Installation of poured-in-place (PIP) rubber engineered wood fiber, rubber mulch or tiles in compliance with safety regulations. Requires 12 inches of loose-fill material or compliant rubber surfacing to cushion falls.

Site Amenities: Installation of benches, picnic shelters, trash receptacles, and signage as applicable.

Inspection & Certification: Final, post-installation inspection by a certified representative to ensure safety compliance and warranty issuance.

Accessibility: Must meet ADA requirements for access to and within the play area.

Compliance & Cleanup: Ensuring all work meets ADA, ASTM F1487-21, and CPSC safety standards, followed by site cleanup and restoration.

EXTERIOR MECHANICAL AREAS: Shall be enclosed with security fencing as noted in Section 02830. Provide reinforced concrete slab within the fenced area with proper sized pads/curbs for equipment mounting. Slope slab away from building. Zoning may require this equipment to be visually screened.

TREES: Deciduous trees are recommended for summer sun shading, winter sun penetration, and use of conifer trees for summer sun shading and winter wind breaks. Landscaping shall be as required by local planning ordinances. Tree species shall be considered in regards to location related so as not to interfere with security camera locations and potential maintenance issues.

DIVISION 31 31 16 - TERMITE CONTROL

RE-TREATMENT AND REPAIR: If subterranean termite activity is discovered during the warranty period, the Contractor will re-treat soil and repair or replace damage caused by termite infestation, without cost to the Owner.

The Contractor shall pay the entire cost of re-treatment if required to comply with these specifications including the cost of providing access to the soil, repair of resulting damage to concrete, and project delays.

SOIL TREATMENT SOLUTION: Use an emulsifiable concentrate termiticide for dilution with water, specially formulated to prevent infestation by termites. Provide a solution recommended by Applicator acceptable to the Architect and approved for intended application by the manufacturer and registered and approved by EPA and the Tennessee Department of Agriculture. Use only soil treatment solutions that are not injurious to planting.

DIVISION 32 12 00 & 32 13 00 - WALK, ROAD AND PARKING PAVING

FIRE DEPARTMENT ACCESS ROADS: Shall be coordinated with fire department authorities and MSCS for acceptable materials and locations.

CONCRETE WALKS: Shall be a minimum of 3500 psi concrete 4" thick and 5' wide with a broom finish. Preferred reinforcement is fiber reinforcement and admixture. A secondary preference is reinforcement with welded wire mesh and install construction joints at a maximum of 5' on center and expansion joints at a maximum of 30' on center. Use wider walkways at entrances and bus and parent drop off areas. Where sidewalks are adjacent to entrances or may be used for maintenance or delivery access they shall be reinforced and thickened to meet concrete paving requirements noted below. Walks along roads shall comply with Shelby County standards.

ASPHALT PAVING: Shall be a minimum of 1½" surfacing on 2" of binder on 10" min. compacted base course at heavy-duty driveways and bus parking areas. At car parking areas and driveways, paving shall be a minimum of 2” surfacing on 8" compacted base course.

Design and Engineering shall utilize the “Design/ Planning Principles & Construction Guidelines for Shelby County Schools”, latest edition.

Design fees are to include required due diligence services including, but not limited to those items as listed in Section III “Due Diligence” of the “Design/Planning Principles & Construction Guidelines for Shelby County Schools”, latest edition.

If required, design services shall include but not be limited to all design, sustainability, ADA compliance, estimating, phasing plans, demolition, civil, landscaping, life safety, and site utility.

The Basis of Design will be to remove/demo and replace all asphalt paving and speed bumps with new light duty and heavy-duty paving. See attached picture for heavy duty pavement in red and light duty pavement in blue.

Stabilize sub-base for new paving in all cases. Contractor will be responsible for all testing of subgrade, asphalt, etc. for a complete and functioning system, which includes corrective & preventive erosion control measures as well as grading modifications, as needed.

Repair of any concrete curbing and sidewalk modifications for ADA compliance.

Repairing/cleaning of all storm drainage grates, catch basin boxes, and curb inlets located in parking areas, clean outs, utility valves, utility covers such as but not limited to SA manhole covers if need of required repair/ replacement of vehicular concrete paving and on-site traffic and school signage.

Contractor is responsible for all storm drainage protection. Storm drainage protecting must be approved before installation.

Pour 2’ x 2’x 6“thick concrete apron around existing clean-outs, utility valves, etc. to ensure proper tie in, in all cases for complete and functioning system.

Striping of all parking areas, speed bumps, crosswalks, handicap areas, fire lanes, specified staff/admin parking areas, dumpster pad area, etc. Paint all concrete light pole bases, parking bumpers/wheel stops, pipe bollards, and all other hazards located in parking areas that extend more than 1in above any finished product with high traffic yellow paint.

Spoils must NOT be stored on site and should be removed daily.

CONCRETE CURB: Extruded concrete curb is acceptable where properly installed and back filled. Use of extruded curb on the surface of roadway is unacceptable. Rolled concrete curb locations shall be reviewed and discussed with Director of Grounds for implementation into the project.

CONCRETE WALKS: Flare out walk surfaces at intersections.
CONCRETE PAVING: Shall be provided 12' in front of dumpster pad locations, adjacent to entrances which may be used for maintenance or delivery access and service docks. Thickness and reinforcement shall be determined by Designer based on weight and type of dumpster removal vehicle.
CONCRETE CURB & GUTTER: Shall be provided at all concrete and asphalt paved areas as required.
GRAVEL SERVICE ROADS: Use of gravel surfaced roads is prohibited unless directed otherwise.
PARKING LOT STRIPING: Parking lot striping shall be painted in white. Blue lines may supplement white parking lot striping in parking spaces designated for use by persons with disabilities.

DIVISION 32 18 00 - ATHLETIC PAVING AND SURFACE

Grading and marking of athletic paving and surfaces shall be in compliance with National Federation High School Association Standards as adopted by the TSSAA. Copies of the standards are available by contacting the MSCS PM. Detail and specify striping of all play courts provided.

TENNIS COURT SURFACING: Basis of Design shall be 2" asphalt surfacing on 6" compacted stone base course.

TRACK SURFACING: Basis of design for High School tracks shall be rubberized latex surfacing on 2 inches I-2 asphalt surfacing on 6 inches of compacted stone base course. SBR (styrene-butadiene rubber) rubber particles or EPDM (ethylene-propylene-diene rubber) rubber may be used for the surfacing. Middle School tracks shall be 2" asphalt surfacing on 6" compacted stone base course. At Elementary Schools provide oval 220 yd. track with screenings for surface at elementary sites.

OUTDOOR BASKETBALL COURTS AND HARD SURFACE PLAY AREAS: Basis of Design shall be 4" asphalt surfacing on 6" compacted stone base course.
TRACK SURFACING: Track surfacing of new tracks shall slope 2% towards infield to a perimeter drainage system. At existing sites where drainage systems do not exist, it is acceptable to slope 2% away from infield. An alternate shall be provided to incorporate a perimeter drainage system. Two 4" diameter empty conduits with accessible termination boxes shall be provided under track installations for future water and power lines.

- The purpose of this project is to design, prepare, and install a new synthetic turf area that meets safety standards, enhances aesthetics, and provides a durable, low-maintenance surface for children. Construction of a new synthetic turf Area including site preparation, drainage, base construction, turf installation, field markings, and ancillary features to meet all Tennessee standards.
- MSCS will mandate a Design-Build delivery method to be used in construction where a single entity—known as the design-builder—is responsible for both the design and construction of the New Turf Area project.
- Single Point of Responsibility: The owner contracts with one entity for both design and construction, simplifying communication and accountability.
- Integrated Team: Designers and builders work collaboratively from the beginning, which can lead to better coordination and innovation.
- Faster Delivery: Because design and construction phases can overlap, projects often finish sooner.
- Cost Efficiency: Early collaboration can help control costs and reduce change orders
- Surveying and Layout: Confirm field dimensions and orientation. Survey and mark the designated area.
- Clearing and Grubbing: Remove vegetation, debris, and unsuitable materials. Remove existing surface materials (grass, soil, concrete, etc.).
- Excavation and Grading: Excavate to subgrade and grade for proper drainage. Excavate to required depth for turf system.

- Grade and compact sub-base to ensure proper drainage and stability

Drainage System
- Subsurface Drainage: Install perforated drainage pipes and gravel trenches.
- Stormwater Management: Connect to existing stormwater system or install retention/detention features as required.
- Install subsurface drainage if required
- Ensure proper slope for drainage
- Connect to existing stormwater system or provide alternative drainage solutions

Base Construction
- Subbase Layer: Install compacted crushed stone or aggregate base.
- Laser Grading: Ensure precise leveling for turf installation.
- Install geotextile fabric for weed control.
- Lay and compact crushed stone or aggregate base (typically 4–6 inches).
- Ensure proper slope for drainage

Synthetic Turf Installation
- Turf System: Supply and install approved synthetic turf system with infill (e.g., rubber, sand).
- Seaming and Adhesives: Secure turf panels with appropriate adhesives and seam tape.
- Infill Distribution: Evenly distribute infill material to manufacturer specifications.
- Supply and install synthetic turf designed for use.
- Include padding or shock-absorbing underlayment to meet ASTM F1292 impact attenuation standards.
- Seam and secure turf using industry-standard adhesives and techniques.
- Infill turf with appropriate materials (e.g., rubber granules, sand) as specified
- Install perimeter edging (e.g., concrete curbing, timber borders) to contain turf and infill.
- Ensure smooth transitions between turf and adjacent surfaces
- Construct pedestrian paths and ADA-compliant access

Field Markings and Accessories (alternate #1)
- Line Markings: Permanent inlaid markings for soccer field dimensions.
- Goals and Equipment: (alternate #1) Install soccer goals, nets, and corner flags. Install new playground, sports equipment/structures per manufacturer specifications. Ensure equipment is anchored securely and meets safety standards
- Perimeter Fencing: (alternate #1) Optional fencing for safety and security.

Ancillary Work (alternate #2)
- Lighting (if applicable): Install LED sports lighting system.
- Landscaping: Restore surrounding areas with grass, mulch, or other landscaping.

Quality Assurance and Testing
- Compaction Testing: Verify base compaction meets specifications.
- Drainage Testing: Confirm proper water flow and drainage.
- Turf Inspection: Ensure turf installation meets manufacturer and performance standards.
- Permitting, Landscaping outside the designated turf area, Lighting or irrigation systems unless specified. And inspection fees unless otherwise noted will be carried by Controlling Contractor in all cases.
- Clean up site and remove debris daily.

Closeout and Warranty
- Final Walkthrough: Conduct inspection with stakeholders Inspect turf and equipment installation for compliance with safety and quality standards.
- Documentation: Provide warranties, maintenance manuals, and as-built drawings.
- Training: Offer basic maintenance training to facility staff.
- Provide maintenance guidelines and warranty documentation.

DIVISION 32 31 00 - FENCING

Fencing is required for security around exterior mechanical equipment areas. It may be installed for security and sport function at tennis courts, high school baseball and softball fields. Where equipment enclosure fencing is adjacent to main buildings, it is desirable for fence construction to match building construction.

CHAIN LINK FENCING: Black LLDPE/PVC coated steel chain link fence and gates with all accessories, fittings, and fastenings, including bottom tension wire, to be obtained from the fence manufacturer. Fabric of fence shall have knuckled selvage at both top and bottom. Do not extend fabric above top rail. Install selvage at base of fence.
MECHANICAL EQUIPMENT AREAS: Shall be enclosed with a fence, a minimum of 6'-0 high. Provide clearance around equipment as required for service and operation. Gates shall be a minimum of 4'-0 wide. Fence posts shall be installed within the concrete slab provided around and under the equipment. Provide enclosure size sufficient for all required maintenance activities.

PRE-K PLAY AREA: Basis of Design shall be enclosed with a 4'-0" high chain link fence.

CLASSROOM/ AUXILIARY ADDITIONS: Walkways between buildings that are exposed to public access shall be secured with fencing and gates. Gates shall be controlled access and include gates for lawn care equipment and large vehicular access. Fence type may be monumental if fencing can be seen from public streets.

DIVISION 32 90 00 - LANDSCAPE PLANTING

Landscape planting offers a cost-effective means to enhance overall project appearance, provide privacy at outdoor learning areas and provide summer sun shading and winter wind breaks. All species shall be of hearty, durable variety, require minimum maintenance and designated to be native to the regain (do not use plants considered to be invasive). Do not use plants with thorns, thistles, or toxic foliage, flowers, or fruit. All landscaping design shall meet and exceed the requirements of the Uniform Development Code of Shelby County.

At renovation/addition projects, the Design shall require the Contractor to isolate and protect existing planting not involved in the new construction.

The Shelby County Government Tree Ordinance shall be specifically considered, but shrubbery and ground cover requirements may be subject to appeals. Note that the Grounds staff is not available for the up keep of landscaping therefore, native plant material that does not require maintenance is essential. Care should be taken to preserve existing trees as they are already established and require little maintenance. Wooded areas should be preserved as they can often reduce grass cutting. Steep banks should be developed with ground cover or other plant material that does not require grass cutting equipment. All new plant material should be specified with a 2- year warranty to include replacement of any dead plant material. All site work shall be scheduled to be completed prior to building occupancy. All trees shall be a minimum 2"-3" caliper or as county ordinance dictates.

IMPORTED FIRE ANT CONTROL: In order to limit importation of Fire Ants, MSCS prefers that local plants be used. However, whether local or imported from outside the area, plants shall be accompanied by a certificate stating "certified under all applicable state and federal quarantines." In addition, the specifications shall require that each shipment of plant materials shall be certified to be free of the presence of imported fire ants.

Where slopes exceed 1 in 3, it is recommended that ground cover such as Parson or Blue Pacific Juniper be planted and mulched with a minimum of 3" of pine straw. Another option is to plant a native grass i.e.:
(reclaim native grass mixture per Lofts Seed, Inc. or a mixture as follows:

Rumsey Indian Grass	39%
Little Bluestem	27%

Gramma Grass	17%
Virginia Wild rye	14%
Switchgrass	3%

Planted at a rate of 30 lbs. per acre.

NOTE: Shrubs and plant material requiring trimming shall not be specified unless required by zoning codes. Coordinate with requirements of Shelby County Zoning Code on tree planting and buffer yard requirements.

DIVISION 32 92 19 - GRASS SEEDING

The Designer shall require the contractor to stage construction, so all playground and athletic field grass seeding occurs early enough to allow grass to develop through one growing season prior to substantial completion. When substantial completion is scheduled for June through December, grass seeding shall occur prior to April 15. It will be the contractor's responsibility to fertilize, irrigate, and cut the maturing grass until substantial completion. The areas of playground and athletic grass seeding along with scheduled seeding date shall be shown on Designer's Landscape Planting Plans.

At renovation/addition projects, the Designer shall require the Contractor to isolate and protect existing lawn areas not involved in the new construction.

Sod shall be used within 2'-0" of all new sidewalks and concrete curbs. Seed and straw all other disturbed areas. LAWN GRASS SEEDING: Shall be 5 pounds of Kentucky 31 Tall Fescue and 1 pound of Kentucky bluegrass per

1,000 SF from September 15 through March 30. From April 1 through June 15 seeding shall be Hulled Common Bermuda at a rate of 2 pounds per 1000 SF.

ATHLETIC FIELD GRASS SEEDING: Shall be composed of sod forming grasses. The best variety for the Davidson County area is Bermuda. The first preference is hybrid Bermuda Tifton 419. The installation of sod has given the best results. Sprigging has been satisfactory when given enough time to establish. Hulled Common Bermuda is next and should be seeded at two (2) lb. per 1,000 SF. This seeding needs the entire growing season from April 15 through August 30 to develop. Annual Rye Grass can be planted during fall and winter months for temporary cover.

IRRIGATION: From time of seeding until grass is established, the Contractor shall keep maturing grass irrigated and cut on a regular basis. Fields shall be irrigated with 1-1.5 inches of water per week. Ideally the water should be applied in two increments, to avoid water run-off. Cutting shall occur when grass is a maximum of 3" tall.

DIVISION 33 05 13 - MANHOLES

CLEANOUTS: A concrete pad shall be set flush with top of surrounding paving or finish grade around all cleanouts; size of pad to be 24" x 24" x 4" thick. Cleanouts shall be set flush with pad and installed within 10' of building wall or downspout location at all underground storm drainage lines.

DIVISION 33 11 16 - STORM DRAINAGE PIPE & FITTINGS

A magnetic locator tape shall be installed at all underground non-metallic pipe installations. This tape shall be buried at a depth of 12" below top surface of earth and 12" below top of sub-grade at pavements and walks.

DIVISION 33 30 00 - SEWAGE DISPOSAL

PUBLIC SEWER LINES: Provide maintenance hole to make tie-in to 6" and larger sewer. Provide at least 1 maintenance hole on site.
Use 4' diameter precast eccentric maintenance holes with steps 15" on center. Minimum cover in non-traffic areas is 3 ft. Minimum cover in traffic area - 5' for PVC, 3 feet for ductile iron on class 1 bedding.

APPENDIX A - PROCESS IMPROVEMENT CHECKLIST

The “Process Improvement Checklist” is a quality control / quality assurance document used by the Designer involved in producing the Construction Documents to document compliance with the Design Guidelines. The Designer is responsible for completing this checklist and returning it to the Owner for review at each phase of design.

Unless specifically waived by Owner, items on this list and within these guidelines must be incorporated into the Construction Documents. Designers must be granted written permission from Owner to deviate.

DIVISION 0 00: GENERAL

SD	DD	CD	
☐	☐	☐	Design submittal conforms to Master Schedule or extensions have been granted by Owner for appropriate cause. Reason for nonconformance: _____
☐	☐	☐	Building design complies with all applicable building codes, including the American with Disabilities Act.
☐	☐	☐	The design drawings include room names, room numbers, and square footages for each space.
☐	☐	☐	The drawing set includes a Life Safety Floor Plan sheet with all code compliance information, occupancy calculations, UL assemblies and overall building summary including total and individual room square footages.
☐	☐	☐	Site data is listed in a box in the lower right corner of civil drawings and includes site area by acreage, total number of parking spaces, street address, and recorded book and parcel number.
☐	☐	☐	Fire walls are specified to receive stenciled wall rating labels above the ceiling.
☐	☐	☐	UL designs for floor and ceiling assemblies avoid the use of spray-on fire-proofing.
☐	☐	☐	All items to be demolished are noted on Demolition Plans.
☐	☐	☐	Downspouts are designed to drain into underground systems and have protection up to two feet above ground. Splash blocks are indicated in locations where underground systems are technically infeasible. Drains to daylight assure positive drainage away from building and prevention of erosion.
☐	☐	☐	Inter-discipline clashes are resolved and drawing sections are provided to clarify relationships of piping, ducts, etc.
☐	☐	☐	Unit Prices in the bid documents are coordinated with Owner.
☐	☐	☐	Drawings and specifications are fully coordinated between all disciplines involved in the design process.
☐	☐	☐	Interior roof drains and thru-wall scuppers, where applicable, are design approved by Owner.
☐	☐	☐	Roof penetrations – including vents, rooftop units, roof ladders, and flashings – are minimized and consolidated.
☐	☐	☐	Preferred materials are designed on exterior shell and EIFS is excluded above ground reach (12’-0” above grade).
☐	☐	☐	Code required assemblies are appropriately detailed in Construction Documents and avoid delegated design.
☐	☐	☐	Building design complies with radon exposure regulations.
☐	☐	☐	Elementary school playground areas are identified on site plans to be provided under a separate contract by Owner.
☐	☐	☐	Drawings and specifications do not contradict Owner provided front-end and Instructions to Bidders (ITB).
☐	☐	☐	High, flat sills and ledges are avoided in the design.
☐	☐	☐	Construction documents include design for 4’ x 8’ job site sign constructed of plywood and exterior wood trim painted to resist weather. Information on sign includes: • Name of the School

- Names of Contractor and Designers
- Names of the Board of Education members at the time of award of the design contract
- Name of the MSCS Superintendent
- Logo of Memphis-Shelby County Schools

☐ ☐ ☐ State Fire Marshal plan review fees are calculated at 50% of schedule for Memphis-Shelby County Schools.

☐ ☐ ☐ Section 01 32 16 – Construction Progress Schedule is included in specifications for all projects of over $1,000,000 in value.

☐ ☐ ☐ Spaces used by pre-kindergarten through first grade students including library, cafeteria, music, art and support spaces are located on the ground floor or are provided access by a dedicated stair.

☐ ☐ ☐ Asbestos-containing materials are specifically excluded in the construction project. A statement disallowing the use of such materials is included in the Construction Documents.

DIVISION 4 00: MASONRY

☐ ☐ ☐ Bullnose block is detailed at outside corners of interior concrete masonry unit walls (except for first course above the slab).

☐ ☐ ☐ Control joint locations are defined on floor plans or elevations.

☐ ☐ ☐ Brick design and specification utilizes readily available sizes, shapes, and colors.

☐ ☐ ☐ Wall cavities detail spray-applied insulation on exterior block continuous from footing to roof deck.

DIVISION 5 00: METALS

☐ ☐ ☐ Guardrails and handrails have vertical picket design and avoid horizontal ladder-type rungs.

☐ ☐ ☐ Concrete filled stair pans are detailed in lieu of steel stair treads.

☐ ☐ ☐ Acoustic roof decking is detailed at a minimum in Playrooms, Cafeteria / Dining Rooms, Band Rooms, Choir Rooms, and Gyms.

DIVISION 6 00: WOOD, PLASTICS, AND COMPOSITES

☐ ☐ ☐ Warp prevention is specified for tall laminate casework doors.

☐ ☐ ☐ Millwork and Casework are specified to be supplied by approved Division 12 or AWI approved Division 6 Cabinet Manufacturer according to guideline specifications.

☐ ☐ ☐ Rubber base is detailed to be installed on cabinet bases.

☐ ☐ ☐ Administrative mailboxes are minimum 12” wide x 6” high x 12” deep and are designed to allow for name tags. Mailbox quantity has been validated by principal and allows for expansion.

DIVISION 7 00: THERMAL AND MOISTURE PROTECTION

☐ ☐ ☐ Roof inspection is complete prior to warranty issue. Inspection report and warranty document are included in Close Out documents.

☐ ☐ ☐ High/Low roofs and exterior wall penetrations have adequate detailing.

☐ ☐ ☐ Roof structure is sloped a minimum of ¼” per for and tapered insulation is used minimally. Lightweight insulating concrete is avoided.

DIVISION 8 00: OPENINGS

☐ ☐ ☐ Standard glazing units are specified and utilize common shapes, colors, and sizes.

☐ ☐ ☐ Thermally broken aluminum frames are specified with insulating glass to meet current energy codes.

☐ ☐ ☐ Window sill heights in Media/Library are coordinated with furniture.

☐ ☐ ☐ View window between Kitchen and Kitchen Office has sill height of 44”.

☐ ☐ ☐ Window sills in Elementary classrooms with in-room lockers are coordinated with lockers, including base and countertop.

☐ ☐ ☐ Door hardware schedules and specifications are coordinated with Owner preferred hardware consultant.

☐ ☐ ☐ Specifications indicate locksets to be keyed to match between classrooms and storage

rooms inside classrooms.

☐ ☐ ☐ Specifications indicate locksets in building additions to be keyed to existing building master key system.

☐ ☐ ☐ All exterior doors are recessed or protected by canopy or structure from direct rain and snow exposure.

☐ ☐ ☐ Double doors include removable center mullion for latching and avoid vertical rod hardware.

☐ ☐ ☐ Door leaves are 3'-0" wide minimum.

☐ ☐ ☐ Heavy duty, vandal resistant door hardware and trim are specified.

☐ ☐ ☐ Combination door closer/magnetic hold open devices are excluded from hardware specification.

☐ ☐ ☐ Floor recessed door closers are excluded from hardware specification.

☐ ☐ ☐ Panic hardware locations are fully coordinated between view windows and kick plates.

☐ ☐ ☐ Path and doors to kitchen are wide enough to accommodate movement of kitchen equipment (min. 42" for single doors).

☐ ☐ ☐ Maneuvering paths and door clearances are appropriate for mechanical equipment in boiler and mechanical rooms.

☐ ☐ ☐ Path between Music Room and Auditorium or Gym is appropriate for maneuvering a Grand Piano. Double doors are permitted with removable (keyed) mullions.

☐ ☐ ☐ Exterior accessed lawn mower storage rooms have at least one 48" door.

☐ ☐ ☐ Fire rated coiling doors with manual resets are avoided in the design and specifications. Use of this type door must be approved in writing by MSCS.

☐ ☐ ☐ Wood doors with clear finish are specified as AWI premium grade plain sliced select white birch.

☐ ☐ ☐ A Doorbell is included, along with peep hole at kitchen delivery door.

DIVISION 9 00: FINISHES

☐ ☐ ☐ Finish boards are approved by Owner.

☐ ☐ ☐ Acoustic wall or ceiling panels are detailed in Play Rooms, Gyms, Band Rooms, Choir Rooms, Practice Rooms, and Cafeterias.

☐ ☐ ☐ Where ceilings are part of rated design, UL design numbers are noted on ceiling plans.

☐ ☐ ☐ Final facility cleaning and preparation of building, including sealing and waxing, is included in specifications to be performed by Contractor.

☐ ☐ ☐ Floor material spec addresses final clean and polishing such as burnishing, polishing or waxing. Wax brand and type is coordinated with Owner.

☐ ☐ ☐ Porous flooring spec addresses machine scrubbing floors and application of 2 coats of sealer. Sealer brand and type is coordinated with Owner.

☐ ☐ ☐ Quarry Tile spec indicates preferred grout joints.

☐ ☐ ☐ In building remodels, suspected asbestos containing materials are noted to follow Federal Guidelines for asbestos removal.

DIVISION 10 00: SPECIALTIES

☐ ☐ ☐ Toilet tissue dispensers, soap dispensers, and paper towel dispensers are specified as owner-provided, contractor-installed.

☐ ☐ ☐ Lockers are specified to receive metal bases.

☐ ☐ ☐ Toilet partitions are specified as with full height stainless steel hardware and 20 degree opening continuous hinges.

☐ ☐ ☐ Exterior building signage includes school name and building number in applied lettering mounted 12 feet or more above grade.

☐ ☐ ☐ Interior building dedication plaque is designed to include the following information:

- Month and year opened
- Name of the School
- Names of Contractor and Designers
- Names of the Board of Education members at the time of award of the design contract
- Name of the MSCS Superintendent

☐ ☐ ☐ Exterior marquee sign design includes school name and building address.

☐ ☐ ☐ Fire Extinguishers are located as required throughout the building and are in recessed or semi-recessed fire extinguisher cabinets.

DIVISION 11 00: EQUIPMENT

☐ ☐ ☐ Doors at kitchen tray returns specify type for the soiled dish run and backsplash.

☐ ☐ ☐ Kitchen equipment is specified to be connected by Contractor.

☐ ☐ ☐ Specified scoreboard manufacturer is confirmed to have a maintenance contract in place with MSCS Maintenance.

DIVISION 12 00: FURNISHINGS

☐ ☐ ☐ Window shades are specified and detailed with 6% perforated open area.

☐ ☐ ☐ Furniture layout is fully coordinated with window sill heights, floor or wall mounted devices, and power (where applicable).

DIVISION 13 00: SPECIAL CONSTRUCTION

☐ ☐ ☐ Bleachers

DIVISION 14 00: CONVEYING EQUIPMENT

☐ ☐ ☐ Emergency telephone with 24-hour monitoring service and keyed call stations are included in Elevator specification.

DIVISION 22 00: PLUMBING

☐ ☐ ☐ Hand sinks in kitchen are specified with splash guards.

☐ ☐ ☐ Floor sinks and drains are designed with positive slopes in kitchens and areas where quarry tile or ceramic tile is specified.

☐ ☐ ☐ Floor sinks in kitchen are specified minimum 12” x 12” stainless steel or brass body with stainless grate and 4” diameter drain.

☐ ☐ ☐ Vents through roof are designed at least 10’ from fresh air intakes.

☐ ☐ ☐ Fire hydrant location and Siamese fire hose connections are coordinated with State Fire Marshal.

☐ ☐ ☐ Discharge from grease trap is routed directly to public sewer or to building sanitary downstream as far as practical.

☐ ☐ ☐ Mop sinks in custodial closets are specified as floor mounted.

☐ ☐ ☐ Sprinkler valves and other accessible valves are designed with locks.

☐ ☐ ☐ At least one water cooler is provided in the Cafeteria.

☐ ☐ ☐ Gas lines are indicated on site plans and meter location is coordinated with gas company.

☐ ☐ ☐ Plumbing supply pipes and valves are located in accessible spaces.

☐ ☐ ☐ Emergency shower and eyewash station are located in the Central Receiving area.

☐ ☐ ☐ Drinking bubbler spouts, guards, sink faucets and similar items are specified to be chrome plated brass or solid metal.

☐ ☐ ☐ Metered faucets are specified for hand washing stations.

☐ ☐ ☐ In-sink drench hose spray and eye wash stations are specified in lieu of emergency shower units.

☐ ☐ ☐ MSCS HVAC personnel has provided water treatment requirements.

DIVISION 23 00: HEATING, VENTILATING, AIR CONDITIONING (HVAC)

☐ ☐ ☐ Cooling towers are enclosed with fence or other secure structures accessible to maintenance personnel only.

☐ ☐ ☐ Cooling towers are designed to gravity flow from tower to mechanical equipment.

☐ ☐ ☐ Heaters in boiler and equipment rooms are sized to prevent equipment from freezing.

☐ ☐ ☐ Mechanical systems utilizing boilers and cooling towers are designed with independent heat exchangers.

☐ ☐ ☐ Testing and Balancing is specified as Owner furnished. T&B reports are included in Close-Out documents.

☐ ☐ ☐ Separate HVAC system is designed for IT Head End room to maintain required set points.

☐ ☐ ☐ Cooling only is provided in all IDF distribution closets.

☐ ☐ ☐ Refrigeration pipe insulation exposed to the elements is detailed with aluminum or PVC cladding.

DIVISION 25 00: INTEGRATED AUTOMATION

☐ ☐ ☐ Energy Management systems include high temperature alarms for both walk-in cooler and walk-in freezers in Kitchen.

DIVISION 26 00: ELECTRICAL

☐ ☐ ☐ Plans have been submitted to NES and NES fees have been identified.

☐ ☐ ☐ Electrical disconnect boxes are located remote from water sources (such as hose reels) in Kitchen.

☐ ☐ ☐ Exterior luminaires are located remote from fresh air and condenser intakes.

☐ ☐ ☐ Powered equipment is coordinated in electrical drawings.

☐ ☐ ☐ Computer circuits are dedicated and panel has surge protection.

☐ ☐ ☐ Motor starters and necessary circuits are shown on drawings for all electric motors requiring starters.

☐ ☐ ☐ Fluorescent light fixtures specify electronic ballasts and T-8 lamps.

☐ ☐ ☐ Electrical outlets and other wall mounted devices are coordinated with casework, tack boards, and marker boards.

☐ ☐ ☐ Luminaires in Band, Chorus, Auditorium and other critical sound areas are appropriate for the functions of the space.

☐ ☐ ☐ Light fixtures in gym are specified with wire guards.

☐ ☐ ☐ Corridor circuits support 15-20 amp loads and are isolated from other rooms and appliances.

☐ ☐ ☐ Exterior disconnect switches are vandal proof and lockable.

☐ ☐ ☐ Each janitor closet includes at least one 110v outlet.

☐ ☐ ☐ Main janitor office includes 110v and 220/208v outlets.

☐ ☐ ☐ Mechanical rooms and Elevator Equipment rooms are designed with adequate lighting.

☐ ☐ ☐ Lighting design integrates combination emergency lights and fluorescent luminaires where required. Gyms and PE Rooms specify battery operated emergency lights detailed to mount at maximum code allowable elevation. Wire guards are specified in these locations.

DIVISION 27 00: COMMUNICATIONS

☐ ☐ ☐ Owner provided IT drawings are coordinated and integrated into electrical package.

☐ ☐ ☐ Data drop is located at energy management panel.

☐ ☐ ☐ Grounding buss bar is included for all IT equipment racks.

☐ ☐ ☐ Network cable is specified as Owner-furnished for coordination with General Contractor.

DIVISION 28 00: ELECTRONIC SAFETY AND SECURITY

☐ ☐ ☐ Tamper Detection Covers are specified for all fire alarm pull stations in Middle and High Schools.

☐ ☐ ☐ Fire alarm annunciator panel, pull station, and alarm silencing are included in the Administrative Office.

☐ ☐ ☐ Ionization type smoke detectors are specified in ductwork in lieu of photoelectric type.

☐ ☐ ☐ Fire alarm strobes and horns are detailed to mount at maximum code allowable elevation. Wire guards are specified in Middle and High Schools.

☐ ☐ ☐ Fire alarm system and branches are designed with surge protection.

☐ ☐ ☐ Fire Marshal Emergency Communication requirements are met with Owner furnished phone and intercom system.

DIVISION 31 00: SITE WORK

☐ ☐ ☐ Drawings clearly indicate extent and locations of sod, including Bio-swale areas.

☐ ☐ ☐ Landscape plans identify all known easements and utilities, both overhead and underground. Tall trees and significant plantings are avoided under power lines or near underground utilities.

☐ ☐ ☐ Landscape plans have been reviewed by the Shelby County.

☐ ☐ ☐ Fire hydrant locations are located near paved drives and accommodate fire engine access and maneuverability. Location has been coordinated with Fire Marshal's office.

☐	☐	☐	Critical points for site borings, rock cores, etc. are coordinated by designer and identified for Owner's testing agency.
☐	☐	☐	Slopes greater than 1:3 are designed with protective barriers along tops of locations and are specified with ground cover vegetation that requires minimal maintenance.
☐	☐	☐	Locations for utility meters, transformers, backflow preventers and fire line connections are coordinated with utility companies. Landscaping is designed to screen these utilities and maintains accessibility for maintenance.
☐	☐	☐	Areas designated for school bus maneuverability are designed with minimum turning radius of 35 feet.
☐	☐	☐	Bus and car staging areas are separate and adequate for school population.
☐	☐	☐	A maintenance hole, remote from the building, is indicated in the sanitary sewer line where the grease trap effluent line connects to the main line and at property line

Designer's Certification: *The design of The Project includes and complies with all owner preferences contained in the MSCS Design Guidelines and Process Improvement Checklist for the phase indicated below.*

Designer Signature, SD Phase	Designer Signature, DD Phase	Designer Signature, CD Phase

APPENDIX B - DATA DISTRIBUTION AND SECURITY SYSTEMS

I. PHONE SYSTEMS

These are the key areas where the Phone System shall have specific connections installed (see specifics below):

- Elevator
- Energy Management System
- Fire alarm panel
- Sprinkler / Fire Pump
- All administration personnel locations
- All classrooms and similar occupied spaces

A. General Information:

1. Phone systems are Owner furnished, Owner installed. The building contractor is responsible to provide empty conduits with pull strings and electrical power where located by the MSCS TIS drawings. The Designer must include this information on his plans and coordinate locations during design as needed.

2. Battery Backup power supply is needed (make sure it is provided by Beacon).

3. Caren Wiggins needs to be notified of service line requirements (MSCS DFM PM to submit form letter).

B. Specific information:

1. Locate telephones with the Owner's project manager at the Design Development stage. Each normally occupied space must have a telephone handset. Provide a phone outlet in the food service office with a remote bell in the kitchen.

2. Provide two continuous 4" diameter conduits, with pull strings, from the point of service directly to the "Head-In" room. The "Head-In" room is to be designated during design with input from the Owner's project manager. It will house all voice and data service line connections that enter the building.

3. Provide telephone jack and wiring to Head-In room at the following locations (phone set not required):

    a. Inside the Building Automation and Control System cabinet (usually in the boiler room) (verify dedicated analog line vs. VOIP).

    b. At the location required to serve the elevator (requires dedicated analog line).

    c. Inside the master fire alarm panel (requires dedicated analog line and one Essex line).

4. If the building requires a sprinkler booster pump, provide (2) RJ-11 jacks and wiring from sprinkler pump monitoring panel to Head-In room. This will require 2 dedicated analog lines.

5. The security system utilizes line seizure for off-site monitoring. The contracted security company connects to the punch down block independent of the building phone system.
6. Additionally, several specialized program functions may require additional analog lines for modem operation, etc. These can usually use one of the spare pairs in the normal telephone wiring. Coordinate the requirements with the Principal.

7. Determine the number of telephone handsets with the Owner's project manager.

8. Each classroom shall have an individual ceiling speaker in addition to the speakers in the halls and other rooms. These are for the purpose of announcements and general paging. These may be separated in up to three paging zones and should be coordinated with the principal. Zones may not be needed. The operation of these speakers is through the telephone handset of the principal or secretary. In order to accomplish zoned paging, a zone controller must be ordered with the phone system. In addition, an amplifier for each paging zone must be provided. A tone generator should be provided with the phone system. Paging and speakers are provided with the phone system by Beacon.

9. Provide a minimum of 64 SF of ¾" plywood on the walls of the Head-In room to facilitate mounting of phone system, wiring blocks, controllers and amplifiers, etc. Provide a minimum of (6) 110V duplex outlet for the phone system and amplifiers plus one outlet for security.

10. Coordinate the installation of telephone and data systems, they must be working prior to State Fire Marshall inspection.

11. Phones shall be in place and operational by Substantial Completion to facilitate training of Owner's personnel.

12. The installation of an elevator in any school requires that it be provided with an emergency communication device. This usually takes the form of a dedicated line telephone connected to a specific monitoring company. Verify that this device is provided and working at the time of Substantial Completion.

13. The School Security Department has an ongoing contract for security monitoring of our schools. The equipment installed in the building now uses a line-seizure device on a phone line to provide the connection to the monitoring contractor. No additional phone line is required. It is imperative that this company be contacted and made to understand the importance of schedule and proper installation, i.e. no exposed conduit or wiring.

14. If an Energy Management System is provided in the school, a phone line must be provided to the central processing unit so that our Maintenance Department can monitor and operate it from their office location. Coordination with the IT Department is important.

15. If a jockey pump is needed on the sprinkler system, it will require two phone lines (connected to the fire alarm panel) for monitoring. Wiring is required between the pump sensors and the alarm panel.

II. DATA SYSTEMS

1. Coordinate with Owner's project manager and Library and Media Services for the location of network connections in the Media Center.

2. If outlets occur in the floor, they must be specifically dimensioned on the electrical floor plans.

3. In general, three data drops are to be provided in each instructional space. Three ¾" conduits are to be provided above the ceiling from the corridor to the classroom.

4. The current concept for wiring the facility is that copper cable will run from each data drop to an IDF (intermediate distribution frame) where it will be converted to fiber optic cable which will run to the MDF (main distribution frame) in the Head-In room. The Owner's project manager shall coordinate the locations of each IDF throughout the facility. Each IDF will require an isolated 110 volt electric outlet. Any IDF should be inaccessible to student traffic and in a conditioned space.

5. Take precautions that IT sensitive equipment is in a dust free conditioned space.

6. If the plenum space will be used for return air, this condition must be specifically identified to the TIS project manager so that plenum rated cable can be specified.

III. CABLE SYSTEMS

1. The cable from the street into the "Head-In" room will be furnished and installed by the cable company through a building contractor provided 4" conduit as described in 88.

2. Provide a TV outlet in each classroom.

3. Provide TV outlets in the Principal's Office, Media Center, Conference Rooms, etc. as coordinated with the Owner's project manager.

4. Internal wiring for data, telephone, and television is to be installed prior to ceiling installation.

5. Provide surge protected 110V power in the "Head-In" room for cable equipment.

6. Data, telephone and television cabling is Owner furnished, Owner installed in building contractor supplied wire ways.

IV. SECURITY SYSTEMS

1. Jason Boyd, Director of Security, at 901-674-5542.

2. At Design Development, provide floor plans of the building to Security to identify locations for security keypads, Aiphones, cameras, detectors, and other security devices inside and on the exterior of the building. Standard details for boxes to be located for these devices are available and the electrical engineers need to incorporate these boxes into the construction documents. Keypads will typically be near the front entrance, kitchen entrance and custodian entrance. Other devices will be located as the design dictates. Coordinate these locations carefully with the Major Construction team. Keypad installation requires an empty gang box mounted at ADA compliant height A.F.F. with ¾" dia. conduit extended above ceiling. Other device requirements are available.

3. There shall also be a doorbell (ringer or buzzer) at the kitchen for deliveries. There can be more than one choice for its location, coordinate carefully on a school-by-school basis. There shall also be a door viewer at this location.

4. Security will advise you if they need additional electrical above ceiling for signal boosters.

5. Provide space for security equipment in the "Head-In" room along with surge protected 110V power and analog telephone lines seized from the FAX or other appropriate line. They will share a

backboard with others.

6. Contractor to provide a closeout schedule at 50% completion to allow MSCS and contractors to be prepared for building close-out.

7. Installing wiring in the hollow metal frames for security has been deleted from this scope of work.

APPENDIX C -SPRINKLER MONITORING REQUIRED BY FIRE DEPARTMENT

In schools which are sprinkled, monitoring of the sprinkler system by a fire department approved central station monitor is required.

The requirements for monitoring are as follows:
If the project is sprinkled but has no pump, monitor General Alarm, General Trouble, Water Flow and Sprinkler Tamper Switches.

Contractor to provide dry contacts in fire alarm control panel to monitor these functions.

If the project is sprinkled and requires a booster pump to provide water pressure, monitor General Alarm, General Trouble, Water Flow, Sprinkler Tamper Switches, Power Failure at Pump, Phase Reversal, and Pump Running.

Contractor to provide dry contacts in fire alarm control panel to monitor these functions.

Contractor to provide flow meters, tamper switches and other required devices at pumps or elsewhere as required. Provide conduits to building for monitor wiring if pumps are remotely located.

Provide adjacent to the fire alarm control panel: 110V surge protected power; one Analog cable drop per MSCS ISG Cabling Standards.

APPENDIX D - CAFETERIA AND KITCHEN DESIGN GUIDELINES

When applicable, a Kitchen Designer should be retained by the Architect and approved by MSCS to provide expert advice and design of the Kitchen. It is the responsibility of the Architect to select this consultant and coordinate his/her work with the Central Nutrition Center.

A. Docks

1. Elevated docks should be standard semi-trailer truck height.
2. Overhang should be provided for protection when unloading, but high enough to clear top of 18-wheeler. A moderate setback from the dock face is acceptable.
3. Overhang should not extend to the point that truck fumes could be trapped.
4. It is recommended that the school central receiving and cafeteria use a common unloading dock.
5. Do not allow garbage from building to go through the Kitchen to the dumpster locations.

B. Can Wash Area on Loading Dock

1. Area should have a floor drain.
2. Plumbing should include a permanent vacuum breaker and non-freeze mixing faucet.

C. Doors

1. The back door should be 48” wide with a small security glass and a doorbell to announce deliveries.
2. The storeroom door should be 42” wide.
3. All other doors in kitchen should be 36” wide.

D. Employee Restroom Facilities

1. Lockers should be full-length.
2. Number of lockers should be adequate for one per employee – see equipment list.
3. Hand sink may be in Restroom and right outside the door.
4. Restroom must have self-closing door.
5. Hand sink in Restroom should have mirror, towel dispenser, and soap dispenser.

E. Manager Office Area

1. Windows should allow for observation of both the receiving and food preparation areas while seated at the desk. Sill should be at approximately 44” AFF.
2. Space for one 5’ desk, one chair, one side chair, one legal 4-drawer file cabinet, one 5’ table, and one bookcase. (Furniture furnished by school system.)
3. Office should be wired for computer outlets.
4. Remote telephone bell should be in the kitchen area.
5. Floor should be the same as the kitchen or vinyl tile.
6. Heat/AC should be provided in the manager’s office.

F. Floors

1. Quarry tile with black grout for kitchen, serving and dish wash areas. Alternate finishes shall be considered.
2. Walk-in cooler/freezer floors shall be quarry tile at the same elevation as the kitchen floor.

G. Shelving

1. All shelving should have independent uprights. No starter/adder concept units.
2. Dry storage shelving to be epoxy coated wire. Dunnage shelving to be included in dry storage area.
3. Walk-in freezer/cooler shelving should be all stainless steel (posts, brackets, screws, etc.). Epoxy coated shelving may be used in lieu of stainless steel.
4. Wall shelves should be utilized on all available wall space in kitchen over tables and sinks. This shelving should be louvered with pot and pan rack.
5. Storage shelf width should be 24 inches – Wall shelves should be 12” –16”.

H. Walk-in units

1. Walk-in units shall be sealed to the ceiling.

2. Specify 48 inch high stainless steel kick plate on the inside and outside of the door and on all exposed outside walls.
3. Specify 3 hinges on door.
4. Specify adequate lighting in walk-in. This should be 4' two-bulb fluorescent fixtures (of the correct temperature rating) every 6-8 feet.
5. Ceiling to have white finish.
6. Factory installed temperature alarm system should be provided.
7. Condensate drain should run to a mechanical room or under a piece of equipment – not in an aisle.
8. Compressors may be mounted remote or adjacent to the unit (not on top). Service access is important. Remote units must be secure. Weather control must be provided for outdoor units. Interior compressors should be sized appropriately and secured to wall mounts with adequate drains.
9. Air-cooled compressors are preferred. Make sure the cooling system is correct for the installation. Do not tie the compressor to the cooling system of the school. Do not install 480-voltcompressors.
10. Floor of walk-in units should be level with kitchen floor and of same finish material to allow for use of carts.
11. Heater strips to be placed in the threshold and frame of the door on a freezer.
12. Threshold plate should be secured to floor.
13. Single aisle width of 36 to 42 inches with 24 inch shelving on both sides.
14. Provide a 6" air space between the face of walk-in panels and adjacent walls to prevent mildew. Provide a trim panel to cover the opening where exposed to the room.

I. Hoods

1. All stainless steel construction.
2. Automatic fire suppressant system should not be connected to a wall-mounted switch that looks like a light switch. It should be labeled as the fire suppressant pull station.
3. Use a mechanical gas valve system not an electrical system so that an interruption of electrical service will not cause the system to be activated.
4. The system shall be separate from the school's fire alarm.
5. System shall meet all applicable Codes.
6. The reset system should not be mounted in the ceiling.
7. Tanks should be mounted to the wall out of all traffic areas.
8. Hood construction should be specifically reviewed with the owner prior to bidding to ensure acceptability.

J. Under-Hood Equipment

1. Specify rear mount manifold and regulators on all gas equipment
2. Specify electronic spark ignition on all gas equipment except range tops.
3. Water should be supplied for filling and cleaning equipment under the hood (skillets, kettles, trunions). Specify flexible hose (T&S) in lieu of fixed spigots. Flexible hoses may be used to service multiple pieces of equipment. Verify to specify vacuum-breakers for these items.
4. Flue risers on gas equipment should be all stainless steel.
5. All equipment with hoses must have vacuum breakers.
6. Utility connections under the hood should be neat and easy to clean between equipment.

K. Drain Grates

1. Grate rails should be narrow to prevent splashing. Grates should be light enough for lifting and strong enough to keep from warping under daily traffic.
2. All floor grates should be positioned so that the grate and basket can be removed for cleaning.
3. Drainage system for equipment under the hood like the tilting skillet should be positioned so that any pour off hits the drain from any angle that the equipment may be tilted.
4. Grates perpendicular to the front of the equipment accommodate tilting pour off better than parallel grates.
5. Steam equipment blow down condensate should be drained to a common drain in the rear of the equipment, not to the front drains.
6. Exposed drains should have full covers so that mobile equipment can be rolled over the drain cover.
7. Position drains so that all floor areas are easily accessible to a drain.
8. Dishroom should have several floor drains.

9. Storage room should have at least one floor drain.
10. Ice machine should have copper drain pipe with 1-1/2 inch air gap to floor drain.
11. Review drains and locations with the owner prior to bidding.
12. Do not specify enamel-coated cast iron drains, grates or covers. Specify stainless steel or brass units.

L. Tables

1. Tables should not be specified with overshelves. Use wall shelving instead.
2. When possible, tables should be located for two-sided work.
3. Pot racks should be specified on several tables. Racks should be secured to table base rather than tabletop. Pot racks to be stainless steel.
4. Undershelves on tables shall be 16-gauge stainless steel. Legs on all tables to be stainless steel.
5. Drawers should be positioned so that each side of table has access to a drawer. Drawer pans to be 20-gauge stainless steel with roller bearings and recessed built-in handles. Front of drawers to be same finish as tabletop. Standard drawer size 15 x 20 or 20 x 20.
6. Bakers table to be sized to accommodate 3 mobile bins and a set of vertical drawers. This table must have a backsplash on the rear and both sides.
7. All corners on tables with backsplash are to have coved corners. Edges to be rolled to prevent injuries and the ends of the tables should be enclosed.

M. Sinks

1. Hand sinks should be accessible. All hand sinks to have a mixing valve. Show soap and towel dispensers over all hand sinks. Show towel dispenser so that space is not wasted (where a mirror is not required, put the towel dispenser over the sink).
2. Compartment sinks should accommodate 18 x 26 pans. Minimum compartment size should be 20 x 28. Water depth should be a maximum of 14 inches, unless there is a disposal in the sink, then the water depth may have to be adjusted to allow for height of disposal under the sink.
3. Overflow drains are not necessary in all compartment sinks if the compartment divider does not come all the way to the top of the sink. Compartment divider panels should be double thickness.
4. Specify twist waste drains on all compartments.
5. All sinks must meet NSF specifications.
6. Drain boards should be located on each end of all compartment sinks – 36-inch drain board minimum.
7. A vacuum breaker is required and must come through a tabletop, verify that a flange cover is provided. If the pipes exit on a surface with a 45-degree angle (like a backsplash top), specify a T&S B-455 unit so that the unit will be covered.

N. Hose Reels

1. Locate hose reels so that all areas of the kitchen are covered.
2. Hose reels to be enclosed type.
3. Position hose reels 60+” high on walls rather than under sinks.
4. Must be installed with vacuum breaker. Built in wall units are preferred.

O. Serving Line Area

1. The color of serving line and dining area should be coordinated with the dining room decor.
2. Height of line to be coordinated with age of child. Verify with MSCS Nutrition Services.
3. Cam lock to secure line components is better than lever locks.
4. Sneeze-guards should be designed to be easily cleaned.
5. Specify lights and heat lamps.
6. Drain hoses under serving lines should meet floor drains.
7. It is desirable for the serving line to have its electrical circuit run thru an accessible disconnect switch just inside the kitchen so that it can be shut down when not in use. The ice cream cooler and cash register should not be on this disconnect. Use load center with Serving Line

P. Electrical Information

1. Do not drop junction boxes from the ceiling for connection to equipment with exception of pass through refrigerators and freezers.
2. Provide extra electrical outlets for additional future equipment.

3. Electrical junction boxes on floor mounts or near water sources should have NEMA 12 rating.
4. The electrical panel for the kitchen equipment should be in the kitchen.
5. Where possible, provide space and outlets for future equipment to be added.

Q. Dishwashing Area

1. The pass-through window for soiled dishes should have a minimum 5-foot-wide opening. No tray shelves are needed. The wall below the window (and adjacent trash chutes) on the dining room side should be covered with a stainless-steel panel down to the base.
2. The pass-thru window should have a pull-down cover with locks. This window works better if the cover runs in channels that are fabricated as part of the dish table and its backsplash. Specify the pass-through window and rolling door to be provided by the kitchen equipment supplier.
3. Pass-thru edge should be slightly raised to prevent water from spilling onto floor on cafeteria side.
4. Window must be sealed to wall.
5. Dish machine shall be a high-temperature machine. Stainless steel interior and exterior. Specify vent covers on both ends and all sides of the dish machine (total of 4).
6. Pant leg type exhaust hood should be specified on each end of dish machine. Hood clearance should allow for dish machine maintenance. Hood should be 20-gauge stainless steel to ceiling. All surfaces should be designed with slope so that moisture cannot accumulate inside the hood. A good design will drain condensation to the soiled dish end of the dish machine.
7. Dirty dish table should have a 20 x 20 sink with tray glides, an in-sink disposal, and a spray hose.
8. Clean dish table to have under shelves for storage.
9. Table edges to have a backsplash with a 45-degree turn to wall – no rolled edge to wall.
10. A 24 inch high backsplash should be installed on the dirty dish table from the return window to the dish machine.
11. Water pressure should not exceed 20 psi to the dish machine. A pressure reducing valve may be required. Water pressure on other equipment must comply with the manufacturer's specifications.
12. Avoid turns in the clean dish table. The clean dish table needs a slight pitch to allow water to flow back into the machine. The floor sink for the dish machine must be sized to accept the water when the machine is emptied. This requires a rather large capacity.
13. Wall shelves for dish racks should be 24 inches wide and sloped. Position for easy reach by employees but high enough so that shelf does not interfere with work on the dish table. Specify a drain tube and locate it where it will not drip onto clean dishes.

R. Miscellaneous

1. Fire extinguishers should be recessed in the wall.
2. Lock on doors between the dining area and the kitchen should be positioned to lock from the kitchen side. All kitchen locks should be separated from the school locks.
3. The chemical storage area should have a lock.
4. Paint used in the kitchen should be epoxy and easy to clean.
5. No more than 1/4 inch food service rated silicone caulking is acceptable in any location.
6. Locate a clock in the kitchen.

S. Commissioning

The Following Schedule Should Be Implemented When Turning Over a Kitchen Facility:

1. Kitchen should be completed four weeks before the first serving day of the facility. All equipment should be tested and completely operational.
2. Architect and Construction Office to prepare a preliminary punch list.
3. Items on preliminary punch list to be corrected before Food Service equipment demonstration.
4. Food Service Department to participate in the demonstration and training of all equipment two weeks before the opening of the facility. At this time, the following to be turned over to the Owner:
   a. Two (2) sets of operational manuals with warranties, parts list, etc.
   b. All keys.
   c. List of equipment costs for depreciation schedule and inventory.

5. Any additional problems found during the Food Service Demonstration must be corrected one week before the first serving day of the facility.

EQUIPMENT REQUIREMENT LIST

ITEM	SCHOOL SIZE (Number of Students) <400	401-600	601-900	901-1,200	1,201-1,500	COMMENTS
Convection Oven, Double	1	1	2	2	2	
Stack Convection Steamer, 2 compartment	1	1	2	2	2	Door may hinge either side; specify
Steam kettle, 40 gal.	0	0	1	1	1	W/ Water fill station
Tilting skillet, 40 gal.	1	1	1	2	2	W/ Water fill station
Range	1	1	1	1	1	

	ITEM	SCHOOL SIZE (Number of Students) <400	401-600	601-900	901-1,200	1,201-1,500	COMMENTS
Baking Area	Baker's table	1	1	2	2	2	
	Mixer, 60 qt.	0	0	0	1	1	
	Mixer, 30 qt.	1	0	0	1	1	Floor mount
	Mixer, 20 qt.	1	1	1	1	1	Bench mount
	Mixer Stand	1	1	1	1	1	
	Proofer	1	1	2	2	2	
	Open Rack	1	2	2	3	3	
Salad Area	Work table	1	2	2	2	2	
	Sink, 2 compartment	1	1	1	1	1	W/ drain boards
	Slicer, electric	1	1	1	1	1	W/ stand
	Food processor	1	1	1	1	1	W/ stand
	Garbage disposal	1	1	1	1	1	
	Wall shelves	1	1	2	2	2	
	Refrigerator, 2 section	0	1	1	1	1	
Gen. Kitchen	Work table	1	1	2	3	4	Backsplash only when against walls
	Work table w/ pot rack	2	2	2	2	2	
	Sink, 3 compartment	1	1	2	2	2	W/ drain boards
	Pot & pan mobile rack	1	1	2	2	2	Next to pot & pan sink
	Wall shelves	1	1	2	2	2	Overall sinks & tables next to walls
	Hose reel	1	1	2	2	2	Serves entire kitchen
Storage Areas	Dry storage w/ shelving	270	300	400	500	600	Square feet
	Walk-in cooler w/ shelving	100	150	175	200	225	Square feet
	Walk-in freezer w/ shelving	150	200	300	350	400	Square feet
	Non-food storage	30	30	30	30	30	
Serving Area	Pass-thru, cold, 2 section	1	1	0	0	1	*Size according to school population
	Pass-thru, cold, 3 section	0	0	1	1	1	
	Pass-thru, hot, 2 section	1	1	1	1	2	
	Pass-thru, hot, 1 section	0	0	1	1	1	

	Ice machine	1	1	1	1	1	
	Beverage table	1	1	1	1	1	Depends on serving line
	Milk box	1	1	2	2	2	
	Tray dispenser	1	2	2	4	4	**
	Hot section	1	2	2	4	4	**
	Cold section w/ solid top	1	2	2	4	4	**
	Cashier stand	1	2	2	2	2	**

	ITEM	SCHOOL SIZE (Number of Students) <400	401-600	601-900	901-1,200	1,201-1,500	COMMENTS
Dishwash Area	Soiled dish table	1	1	1	1	1	
	Silverware chute	1	1	1	1	1	
	Silver soak sink	1	1	1	1	1	Beneath dish return window
	Pre-rinse sink	1	1	1	1	1	Built into soiled dish table
	Garbage disposal	1	1	1	1	1	In drain of pre-rinse sink
	Dishwash machine	1	1	1	1	1	Capacity according to school population
	Wall rack	1	1	1	1	1	
	Clean dish table	1	1	1	1	1	Minimum 9'; more preferred
	Hose reel	1	1	1	1	1	Serves dishwash only
	Clean dish carts	1	1	1	1	1	
Misc.	Telephone	1	1	1	1	1	In office
	Clock	1	1	1	1	1	Owner furnished, battery type
	Utility carts	2	3	4	4	5	
	Hand sinks	2	2	2	3	3	Serve all portions of kitchen
	Lockers	4	5	7	10	12	Full-length lockers

APPENDIX E - KEYING SYSTEM FOR NEW CONSTRUCTION

The following guidelines should be used in developing the keying system at the new school. Pass it along to the hardware consultant/supplier so that he can work out the plan for how the doors will be keyed. It is strongly suggested that once that plan is completed you schedule a meeting between the hardware consultant and yourself to go over it in detail while referencing it to a plan of the building.

GRAND MASTER KEYS: Opens every door in the school, will be highly restricted. Only about 2 should be produced and should be distributed as follows:

- 3 for school – Principal (for him/her, the Assistant Principal, and a spare for the cabinet)
- 3 for Security Department
- 1 for Maintenance Department
- 3 for Operations Department

CLEANING MASTER KEYS: Provide 10 – give to head custodian or Principal; opens all doors except:

- Kitchen area (define a "secure" perimeter to secure food stuffs)
- Media Center A/V Storage room (only)
- Office "records storage" room
- Any classroom closets

KITCHEN MASTER: Provide 6 – give to the Kitchen Manager only; opens all doors in the kitchen area. Provide 2 individual keys for all individual doors, but give these to the manager also. The loading dock entry door to the kitchen shall be operable by the kitchen master.

MEDIA CENTER A/V STORAGE ROOM: Shall be on its own key and not on any master except the Grand Master. Provide 6 keys for these doors. They should be distributed by the Principal to his/her choice of staff persons.

OFFICE RECORDS STORAGE ROOM: Shall be on its own key and not on any master except the Grand Master. Provide 6 keys for this door. They should be distributed by the Principal to his/her choice of staff persons.

MECHANICAL MASTER: Provide 1 per door using the system master Electrical/Mechanical key for all Mechanical, Electrical, and Custodian rooms. No individual keys are therefore needed for individual doors.

ADMINISTRATION OFFICES (Principal, Assistant Principal, etc.): keys should also open the corridor doors to the area. The keys to the corridor doors do not open any additional interior doors. They should be distributed by the Principal to the corresponding staff members.

Any classrooms with storage closets shall have the room door key also operate the storage closet, but where the Custodian's key will not open the closet. If the classroom key cannot be made to do this, then key the closet independently (provide 2 keys for each) and not operable by any other key except the Grand Master. These should be in the key cabinet and issued along with the corresponding classroom key.

Individual doors not otherwise restricted are to have two keys provided for each door. They should be distributed by the Principal to the corresponding staff members.

The exterior door to the main Mechanical Room shall be keyed to the Mechanical Master Key. Provide 2 keys. These should be kept in the key cabinet if the Maintenance Department has been issued Mechanical Master Keys.

Exterior (corridors and lobby) doors shall be keyed individually with two keys each provided. They should be distributed by the Principal as needed.

Have the individual classroom keys also open the teacher's workroom doors and the teacher lounge door. If this is not possible, have sufficient copies made for all staff members to be issued one key each to the lounge and the appropriate workroom.

The contractor should be required to completely set up the key cabinet, including hanging the keys on tags in the cabinet, and the control record book. He should be required to set up the system according to the room numbering system that the school will be using and to provide a small-scale plan to correlate the numbers and the doors. The contractor should be required to provide training for the Principal on how the system works to keep records of who has been issued keys. This is in excess of what the key sub is used to doing and it must be emphasized in the contract documents as to what is being required.

If a “control key” is used in setting up and installing the lock cylinders, possession of it should be careful controlled by the contractor and then turned over to the P.M. when the installation is complete.

APPENDIX F - ARTS AND MUSIC DESIGN CONSIDERATIONS

The Art and Music rooms are defined on whether the Project is an Elementary, Middle or High School. Careful consideration of the location of these rooms is required. The Art classroom benefits from good natural light and outdoor views. The Music Room produces high noise levels.

The art classroom requires more casework than a normal classroom. A two-compartment sink at ADA height as well as a large basin sink are required. Both sinks must have plaster traps. The Art storage room and the Kiln room shall have storage shelving. The Art room will not be furnished with lockers.

The Art room shall have only one eight-foot marker board but as many tack boards as can conveniently be arranged in the space. An art room furniture package has been developed by the Art Coordinator and will come to the site as part of the IDS furniture package for the Project. This furniture will be paid for out of the regular furniture budget.

The Kiln is furnished as a part of the furniture package for the Art room. It will be a part of the furniture package. The Kiln usually requires a 208-volt, 30 amp, single phase circuit. (Check voltage etc. before design is complete) The Kiln room should be exhausted by a separately switched fan. No hood is required. Provide Air Conditioning in this space to match the CFM of the supplied exhaust fan. Under cut the door for the return of the Air Conditioning CFM when the exhaust fan is not running.

The Music classroom will be provided without lockers other than a TV cabinet and lockable teacher's wardrobe and cabinet. (A TV bracket may be used in the interest of space savings). Music storage should have wooden shelves sized for musical instrument storage. Verify shelving clearance requirements with the Music Teacher or MSCS Music Department. These shelves shall be built of plywood with hardwood edges, painted.

Consideration should be given the acoustics of the Music room and suitable acoustic panels provided as required. The space shall be carpeted.

APPENDIX G - PHYSICAL EDUCATION DESIGN REQUIREMENTS

These spaces are defined whether it is an Elementary, Middle or High School space.

Middle schools require a formal gymnasium configuration with a regulation court on the main axis and cross-courts on each half of the floor. A retractable curtain should be provided to divide the gym in half for independent use of each side.

The following equipment shall be part of the construction contract:

SOUND CONTROL: Acoustical metal deck should be used as a primary measure, but additional acoustic panels on the walls are needed. “Tectum” type products do not seem to be very effective on the walls even if it is a good material for abuse resistance and should not be used.

APPENDIX H - MAINTENANCE AND OPERATIONS CONSIDERATIONS

APPENDIX I - COMMISSIONING REQUIREMENTS

APPENDIX J – PREFERRED HVAC MANUFACTURERS

No Substitutions without prior written approval from MSCS Facilities Management

Equipment	Manufacturer	Manufacturer	Manufacturer
Pumps	B&G	Grundfos	Armstrong
Boilers	Lochinvar	Patterson-Kelley	Cleaver Brooks
Cooling Towers	Reymsa	Marley	Evapco
Variable Frequency Drives	ABB	Emerson	Siemens
Plate Frame Heat Exchangers	B&G	Armstrong	Evapco
Controls	**Siemens Talon/Desigo Automation**	**JCI, Metasys**	**Trane, Tracer**
Chillers	Daikin	Carrier	Trane
Unit Ventilators/ SCUV	Daikin	Magic Aire	Trane
Roof Top Units	Lennox	Carrier	Trane
Dedicated Outdoor Air Unit	Daikin	Carrier	Trane
Split Systems DX	Daikin	Mitsubishi	Carrier
Fan Coil Units	Daikin	Carrier	Trane