SECTION 01 1000
SUMMARY OF CONTRACT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 PROJECT

A. Project Name: Auditorium Upgrades and Exterior Bleacher Replacement

B. Owner's Name: Yonkers Public Schools.

C. Architect's Name: Fuller and D'Angelo, P.C., Architect and Planners

D. The Project consists of the Auditorium Upgrades and Exterior Bleacher Replacement, Lincoln High School, 375 Kneeland Avenue, Yonkers, NY 10704, Yonkers, NY 10701

1.3 PROJECT

A. The work includes but not limited to:

1. Interior removals rehabilitation and new construction as shown in the contract drawings.
2. Removal and replacement of exterior field bleacher system and related construction as shown in the construction documents.

1.4 CONTRACT DESCRIPTION

A. Contract Type: Multiple contracts are separate contracts, representing significant construction activities, between Owner and separate contractors. Each contract is performed concurrently and coordinated closely with construction activities performed on Project under other contracts. Contracts for this Project include the following

1. General Construction Site - Contract 1
2. General Construction Building - Contract 2
3. HVAC - Contract 3
4. Plumbing - Contract 4
5. Electrical - Contract 5

B. The work of each Contractor is identified in this Project Manual and on the Drawings.

C. Local custom and trade-union jurisdictional settlements do not control the scope of Work included in each prime contract. When a potential jurisdictional dispute or similar interruption of work is first identified or threatened, the affected contractor(s) shall promptly negotiate a reasonable settlement to avoid or minimize the pending interruption and delays.

D. If it becomes necessary to refer to the contract documents to determine which prime Contract includes a specific element of required work, begin by referring to the prime Contracts, themselves; then, if a determination cannot be made from the prime Contracts, refer, in the following order, to the Supplementary Conditions, if any, this section of the Specifications, followed by the other Division-l sections and finally with the Drawings and other Sections of the Specifications.

E. If, after referring to the contract documents, it cannot be clearly determined which prime Contractor will perform a specific item of required work, then, that item of work will be brought to the Owner's Representative, Architect's, or Construction Manager's attention in writing for determination.

F. Summary by References: Work of the Contract can be summarized by reference to the School Facilities Management Contract Manual And Specifications, Specification Sections, Drawings, or Addenda to Contract Documents issued subsequent to the initial printing of this Project Manual, and including but not necessarily limited to printed material referenced by any of these. It is recognized that the work of the

Contract is unavoidably affected or influenced by governing regulations, natural phenomenon, including weather conditions, and other forces outside the contract documents.

1.5 RELATED REQUIREMENTS

A. School Facilities Management Contract Manual And SpecificationsYPS Front End Documents or Generall Engineering Agreement.

B. Attachment B including, Division 01 General Requirements and Technical Specification.

1.6 JURISDICTIONAL DISPUTES

A. If the Contractor has engaged the services of workers and/or subcontractor who are members of trade unions, the Contractor shall make all necessary arrangements to reconcile, without delay, damage or cost to the Owner and without recourse to the YPS Office of Facilities Management, any conflict between its agreement with the Owner and any agreements or regulations of any kind at any time in force among members or councils which regulate or distinguish what activities shall not be included in the work of any particular trade.

B. The Contractor shall ensure that its work continues uninterrupted during the labor dispute and will be liable to the Owner for all damages suffered by the Owner occurring as a result of work stoppages, slowdowns, disputes or strikes

1.7 SUBCONTRACTORS/SUPPLIERS

A. All subcontractors shall be submitted to YPS Office of Facilities Management and Fuller and D'Angelo, P.C.for approval.

1.8 DESCRIPTION OF ALTERATIONS WORK

A. Scope of removal work is shown on drawings.

B. Scope Refer to paragraph 1.3 for general scope of project.

C. Maintain all building systems in operation when the Facility is occupied during construction until acceptance of the project.

D. Plumbing: Alter existing system and add new construction, keeping existing in operation.

E. HVAC: Alter existing system and add new construction, keeping existing in operation.

F. Electrical Power and Lighting: Alter existing system and add new construction, keeping existing in operation.

G. Fire Alarm: Alter existing system and add new construction, keeping existing in operation.

1.9 WORK BY OWNER

A. Yonkers Public Schools has awarded a contract for supply and installation of Auditorium Seating which will be scheduled to coordinate with work under these contracts..

1.10 OWNER OCCUPANCY

A. Refer to School Facilities Management Contract Manual and Specifications for occupancy and hours building is available during constructions.

B. Yonkers Public Schools intends to partially occupy adjacent portions of the existing building during the entire construction period.

C. Cooperate with YPS Office of Facilities Management to minimize conflict and to facilitate Yonkers Public Schools's operations.

D. Schedule the Work to accommodate Owner's occupancy.

1.11 CONTRACTOR USE OF SITE AND PREMISES

A. Refer to School Facilities Management Contract Manual and Specifications for additional requirements.

B. Construction Operations: Limited to areas noted on Drawings.

C. Arrange use of site and premises to allow:

1. Yonkers Public Schools occupancy.

2. Work by Others.
3. Work by Yonkers Public Schools.

D. Provide access to and from site as required by law and by YPS Office of Facilities Management:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

E. Existing building spaces may not be used for storage unless approved by the YPS Office of Facilities Management.

F. Contractors shall comply with Local Noise Ordinance. Work disrupting the community must be performed with the following hours:
   1. Monday thru Friday: 8 AM to 8 PM.
   2. Weekends/ Holidays: 9 AM to 6 PM.

G. Construction deliveries shall not occur during the hours of 7:30 AM and 9:00 AM and 2:00 PM and 3:00 PM, when school buses are arriving or leaving the school grounds.

H. During the entire construction period the Contractor(s) shall only have the use of designated portions of the premises for construction operations, including use of the site as indicated in schedule of work and work time included in this section.
   1. General: Limitations on site usage as well as specific requirements that impact utilization are indicated on the drawings and/or by other contract documents. In addition to these limitations and requirements, the Construction Contractor shall administer allocation of available space equitably among the separate prime and other entities needing access and space, so as to produce the best overall efficiency in performance of the total work of the project. Each Prime Contractor shall schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on site.
   2. Each Prime Contractors shall limit their use of the premises to the work indicated, so as to allow for Owner occupancy and use by the public during the period when the Owner occupies the building.
   3. Each Prime Contractors shall to maintain clear and unobstructed paths of exit discharge from all existing exits.
   4. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the Owner at all time. Do not use these areas for parking or storage of materials.
   5. Lock automotive type vehicles such as passenger cars and trucks and other types of mechanized and motorized construction equipment, when parked and unattended, to prevent unauthorized use. Do not leave such vehicles or equipment unattended with the motor running or the ignition key in place.

I. Only materials and equipment, which are to be used directly in the work, shall be brought to and stored on the project site by the Contractor. After equipment is no longer required for the work, it shall be promptly removed from the project site. Protection of construction materials and equipment stored at the project site from weather, theft, damage and all other adversity is solely the responsibility of the Contractors.

J. Site work shall be scheduled and coordinated with School Facilities Management Contract Manual and Specifications and the YPS Office of Facilities Management whose decisions shall be final and binding on all contractors.
   1. Confine operations at the site to the areas permitted under the Contract. Portions of the site beyond areas on which work is indicated are not to be disturbed. Conform to site rules and regulations affecting the work while engaged in project construction

K. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas designated by YPS Office of Facilities Management. If additional storage is necessary obtain and pay for such storage off-site.

L. The Contractor(s) and any entity for which the Contractor is responsible shall not erect any sign on the Project site without the prior written consent of the YPS Office of Facilities Management which may be withheld in the sole discretion of the Owner.

M. Contractor shall ensure that the work, at all times, is performed in a manner that affords reasonable access, both vehicular and pedestrian, to the site of the work and all adjacent areas. The work shall be performed, to the fullest extent reasonably possible, in such a manner that public areas adjacent to the site of the work shall be free from all debris, building materials and equipment likely to cause hazardous conditions. Without limitation of any other provision of the Contract Documents, each contractor shall use its best efforts to minimize any interference with the occupancy or beneficial use of:

1. Any areas and buildings adjacent to the site of the work or;
2. The Building in the event of partial occupancy as more..

N. Without prior approval of the YPS Office of Facilities Management, the Contractor shall not permit any workers to use any existing facilities at the Project site, including, without limitations, lavatories, toilets, entrances and parking areas other than those designated by the YPS Office of Facilities Management. Without limitation of any other provision of the Contract Documents, the Contractor shall use its best efforts to comply with the rules and regulations promulgated by the YPS Office of Facilities Management in connection with the use and occupancy of the Project Site, and the Building, as amended from time to time. The Contractor shall immediately notify the YPS Office of Facilities Management in writing if during the performance of the Work, the Contractor finds compliance with any portion of such rules and regulations to be impracticable, setting forth the problems of such compliance and suggesting alternatives through which the same results intended by such portions of the rules and regulations can be achieved. The YPS Office of Facilities Management may, in the YPS Office of Facilities Management's sole discretion, adopt such suggestions, develop new alternatives or require compliance with the existing requirements of the rules and regulations. The Contractor shall also comply with all insurance requirements, applicable to use, and occupancy of the Project Site and the Building.

O. Maintain the existing building in a safe and weathertight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period. When work is scheduled after hours clean and remove all temporary barriers and protection so that the building can be occupied the following day when normal building occupancy will occur.

P. Keep public areas such as hallways, stairs, elevator lobbies, and toilet rooms free from accumulation of waste material, rubbish or construction debris.

Q. Smoking, drinking of alcoholic beverages or open fires will not be permitted on the project site.

R. Utility Outages and Shutdown:

1. Limit disruptions, shut downs, switch overs, etc. of utility services to hours the building is unoccupied, Saturdays, Sunday and/or holidays.
2. Do not disrupt or shut down life safety systems, including but not limited to fire alarm system, electrical, data, and heatiing system, without 7 days notice to Owner's Representative and Construction Manager and authorities having jurisdiction.
3. Prevent accidental disruption of utility services to other facilities.

1.12 AVAILABILITY OF EXISTING BUILDING

A. Refer to School Facilities Management Contract Manual and Specifications for additional requirements.

B. Upon request by the Contractor, the building may be made available, at the discretion of the YPS Office of Facilities Management and at the Cost to the Contractor, during such times as are allowed by local noise ordnance, in addition to the above listed hours. A request for use during these off-regular hours must be made at least two (2) days before the use. Such off-hours may include Saturdays, and Holidays.

1. If the Contractor requests the use of the facility for off-hours to maintain the scheduled completion date, the Contractor shall pay all additional costs in connection with opening, providing security and project management expenses incurred with no costs to the Owner. All expenses shall be deducted from the Contractors contract price. Comply with other portions of this Section.

2. Weekend, Holiday and Night Work:
   a. The contractor shall make no claim for delay for the inability of the YPS Office of Facilities Management to make the site available for off-hours work. Should the YPS Office of Facilities Management make the site available during these hours at the contractor's request, the cost will be borne by the Contractor.

C. ALL CONTRACTORS SHALL BE REQUIRED TO PERFORM SCHEDULED WORK WITHIN THE EXISTING BUILDING ONLY DURING THE TIME PERIODS INDICATED AND SHALL INCLUDE IN THE BID ALL COSTS FOR LABOR, MATERIAL, ETC. INCLUDING PREMIUM TIME TO PERFORM THE WORK, PER PHASE PER TIME PERIOD.

1.13 COMPLETION OF WORK AFTER SCHEDULED COMPLETION DATE

A. Refer to School Facilities Management Contract Manual and Specifications for additional requirements.

B. Contractor(s) shall perform work only within these limitations and all manpower, equipment, etc., shall be provided as required to complete the work as per schedule. In the event the contractor does not complete the work as scheduled all work to be performed shall be performed after 4:30 PM when the building is unoccupied and approved by the YPS Office of Facilities Management. All costs shall be borne by the Contractor.

C. Each Contractor shall prepare a progress schedule in detail listing items of work, sections of building and the time required for each.

D. Each Contractors shall provide necessary manpower, equipment, etc., as required to maintain schedule developed within the time limitations as described above.

1.14 COVID-19

A. Refer to Notice to Bidders for additional Information.Refer to Notice to Bidders for additional Information.

B. Due to the ongoing COVID-19 pandemic and the resulting uncertainty with regard to (a) when the Owner's schools will be in session during 2021, (b) what restrictions, if any, will be applicable to construction activities on the Owner's property due to State, Federal or Local orders, laws, regulations or rules related to the COVID-19 pandemic (including but not limited to social distancing, cleaning and disinfection requirements) and (c) the duration of any restrictions imposed on construction activities, the Owner may modify the construction schedule set forth in the Contract Documents and the Contractor acknowledges and agrees that there shall be no additional compensation paid by the Owner for schedule modifications caused directly or indirectly by the COVID-19 pandemic. The Contractor further acknowledges and agrees that the sole remedy for any schedule modifications caused directly or indirectly by the COVID-19 pandemic shall be an extension of time, if warranted.

1.15 SPECIFICATION SECTIONS

A. Unless otherwise noted, all provisions of Division 1 General Requirements the sections listed below apply to all contracts.

DIVISION 01 - GENERAL REQUIREMENTS

1. 01 1000 SUMMARY OF CONTRACT
2. 01 2000 PRICE AND PAYMENT PROCEDURES
3. 01 2005 PARTIAL RELEASE OF LIEN
4. 01 3000 ADMINISTRATIVE REQUIREMENTS
5. 01 3307 SED SPECIAL REQUIREMENTS
6. 01 3553 SITE SAFETY AND SECURITY PROCEDURES
7. 01 4000 QUALITY REQUIREMENTS
8. 01 4100 REGULATORY REQUIREMENTS
9. 01 4216 DEFINITIONS
10. 01 5000 TEMPORARY FACILITIES AND CONTROLS
11. 01 6000 PRODUCT REQUIREMENTS

12. 01 7000 EXECUTION
13. 01 7419 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
14. 01 7800 CLOSEOUT SUBMITTALS
15. 01 7900 DEMONSTRATION AND TRAINING

1.16 GENERAL CONSTRUCTION SITE - CONTRACT 1

A. In addition to the General Requirements, Division 1, included in this bid package the General Construction Contractor shall provide for proper completion of all exterior general construction and site work, generally as indicated on drawings CC1, AR10, A10 through A41 and all work indicated and described in the following specification sections:

1. 03 0100 MAINTENANCE OF CONCRETE
2. 03 3000 CAST-IN-PLACE CONCRETE
3. 03 4100 PRECAST STRUCTURAL CONCRETE
4. 05 5000 METAL FABRICATIONS
5. 05 5213 PIPE AND TUBE RAILING (Exterior Railings)
6. 07 9200 JOINT SEALANTS (Revised)
7. 09 9113 EXTERIOR PAINTING
8. 31 2316 EXCAVATION
9. 32 1216 ASPHALT PAVING
10. 32 1714 TRAFFIC SIGNS
11. 32 17 23 PAINTED PAVEMENT MARKINGS
12. 32 12731 STEEL GUARDRAIL
13. 32 3113 CHAIN LINK FENCES AND GATES
14. 32 3300 SITE FURNISHINGS
15. 32 9220 RESTORATION OF TURF AREAS

1.17 GENERAL CONSTRUCTION BUILDING - CONTRACT 2

A. In addition to the General Requirements, Division 1, included in this bid package the General Construction Contractor shall provide for proper completion of all interior general construction work, generally as indicated on drawings ASB-100,101 and 102; A-101 through A-825 and all work indicated and described in the following specification sections:

1. 02 8201 ASBESTOS REMOVAL AND DISPOSAL
2. 03 5400 CAST UNDERLAYMENT
3. 04 2000 UNIT MASONRY
4. 04 2616 ADHERED MASONRY VENEER
5. 05 4000 COLD FORMED METAL FRAMING
6. 05 5000 METAL FABRICATIONS
7. 05 5213 PIPE AND TUBE RAILING (Interior railings)
8. 06 1000 ROUGH CARPENTRY
9. 06 2000 FINISH CARPENTRY
10. 07 5010 MODIFICATIONS TO EXISTING ROOFING
11. 07 8400 FIRESTOPPING
12. 07 9200 JOINT SEALANTS
13. 08 1113 HOLLOW METAL DOORS AND FRAMES
14. 08 1416 FLUSH WOOD DOORS
15. 08 7101 DOOR HARDWARE
16. 08 8000 GLAZING
17. 09 2116 GYPSUM BOARD ASSEMBLIES.
18. 09 2400 CEMENT PLASTERING
19. 09 3000 TILING

20. 09 5100 ACOUSTICAL CEILINGS
21. 09 6500 RESILIENT FLOORING
22. 09 7700 PLASTIC WALL SURFACES
23. 09 9123 INTERIOR PAINTING
24. 09 9300 STAINING AND TRANSPARENT FINISHING
25. 10 1200 DISPLAY CASES
26. 10 1400 SIGNAGE
27. 10 2113 PLASTIC TOILET COMPARTMENT
28. 10 2800 TOILET AND BATH ACCESSORIES
29. 11 6010 STAGE CURTAINS AND RIGGING
30. 12 3600 SOLID SURFACING SILLS AND COUNTERTOPS

1.18 HVAC - CONTRACT 3

A. In addition to the General Requirements, Division 1, included in this bid package the HVAC Contractor shall provide for proper completion of all interior heating, ventilating and air conditioning construction work, generally as indicated on drawings H-101 through H-301 and all work indicated and described in the following specification sections:

1. 07 8400 FIRESTOPPING
2. 23 0100 GENERAL CONDITIONS
3. 23 0110 SCOPE OF WORK
4. 23 0115 DUCTWORK CLEANING
5. 23 0236 INDOOR STATIC PLATE ENERGY RECOVERY VENTILATORS
6. 23 0240 COMMERCIAL AIR-COOLED CONDENSING UNITS
7. 23 0265 VARIABLE REFRIGERANT FLOW INDOOR UNITS
8. 23 0267 VARIABLE REFRIGERANT FLOW OUTDOOR UNITS
9. 23 0290 DIRECT EXPANSION COILS
10. 23 0400 SHEETMETAL WORK AND RELATED ACCESSORIES
11. 23 0420 SUPPORTS, SLEEVES AND PLATES
12. 23 0430 INSULATION AND COVERINGS
13. 23 0440 DAMPERS AND MISCELLANEOUS
14. 23 0460 AUTOMATIC TEMPERATURE CONTROLS
15. 23 0470 TESTING, START-UP AND ADJUSTMENTS
16. 23 0480 GENERAL LABELING, VALVE CHARTS AND PIPING IDENTIFICATION
17. 23 0485 HVAC SYSTEMS COMMISSIONING
18. 23 0490 GUARANTEE

1.19 PLUMBING - CONTRACT 4

A. In addition to the General Requirements, Division 1, included in this bid package the Plumbing Contractor shall provide for proper completion of all interior plumbing work, generally as indicated on drawings P-101 and P-201 and all work indicated and described in the following specification sections:

1. 07 8400 FIRESTOPPING
2. 22 0125 SCOPE OF WORK
3. 22 0130 WATER SUPPLY SYSTEM
4. 22 0160 SANITARY AND STORM DRAINAGE SYSTEMS
5. 22 0300 PLUMBING FIXTURES AND EQUIPMENT
6. 22 0420 SUPPORTS, SLEEVES AND PLATES
7. 22 0430 INSULATION
8. 22 0470 TESTS AND ADJUSTMENTS
9. 22 0480 TAGS, CHARTS AND IDENTIFICATION
10. 22 0490 GUARANTEE

1.20 ELECTRICAL - CONTRACT 5

A. In addition to the General Requirements, Division 1, included in this bid package the Electrical Contractor shall provide for proper completion of all interior electrical construction work, generally as indicated on drawings E-001 through E-701 and all work indicated and described in the following specification sections:

1. 07 8400 FIRESTOPPING
2. 26 0100 GENERAL CONDITIONS
3. 26 0125 SCOPE OF WORK
4. 26 0150 APPROVED MANUFACTURERS
5. 26 0200 CONDUIT
6. 26 0300 WIRE AND CABLE
7. 26 0320 OVERCURRENT PROTECTIVE DEVICES
8. 26 0350 BOXES
9. 26 0400 WIRING DEVICES
10. 26 0425 LIGHTING CONTROL SYSTEM
11. 26 0426 DIGITAL LIGHTING CONTROL SYSTEM
12. 26 0450 CABINETS AND ENCLOSURES
13. 26 0500 SUPPORTING DEVICES
14. 26 0550 GENERAL LABELING AND IDENTIFICATION
15. 26 0575 INTERIOR LUMINAIRES
16. 26 0600 DISCONNECT SWITCHES
17. 26 0650 GROUNDING
18. 26 0700 PANELBOARDS
19. 26 0800 FIRE ALARM SYSTEM
20. 26 0825 PUBLIC ADDRESS SYSTEM
21. 26 0890 ELECTRICAL SYSTEMS COMMISSIONING
22. 26 0900 GUARANTEE

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Procedures for preparation and submittal of application for payments.

1.3 RELATED REQUIREMENTS

A. Article 28 Partial Payments and Article 79 Payments of the General Engineering Agreement for additional requirements.

B. Article 47 General Engineering Agreement for allowances requirements.

C. Section 01 5000 - Temporary Facilities and Controls.

D. Section 01 7800 - Closeout Submittals for additional requirements for Final Payment.

E. Section 01 2100 - Allowances: Payment procedures relating to allowances.

F. Section 01 2300 - Alternates for bid alternates.

G. Section 01 7800 - Closeout Submittals: Additional requirements for project record documents.

1.4 SCHEDULE OF VALUES

A. Form to be used: AIA G702/703.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Fuller and D'Angelo, P.C. for approval.

C. Forms filled out by hand will not be accepted.

D. Submit Schedule of Values in PDF Format within 10 days after date Letter of Intent to Award.

E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify Bonds and Sub-contractors.

F. Include in each line item, the amount of each Allowances. specified. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.

G. Revise schedule to list approved Change Orders, with each Application For Payment.

H. Sub-schedules: Where the Work is separated into phases provide separate payment applications, or provide sub-schedules showing values correlated with each phase.

1. Identify each application with the SED Project number and Fuller and D'Angelo's project number.

I. Provide a separate line item for the following: (where applicable)

1. Bonds. (Bond premium may be paid when invoice of premium is provide).
2. Labor and materials, when payment is anticipated for material not installed.
3. Submittals. (1% Minimum of contract amount).
4. Each allowance.
5. Meeting attendance.
6. As-built Drawings.
7. Testing, HVAC balancing reports. Minimum 5% of contract amount.
8. Coordination Drawings: Minimum 5% of contract amount

9. Punch list.
10. Final Cleaning.
11. Closeout Documents (5% Minimum of contract amount).
12. Authorized change orders.

1.5 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement but not more than one per month.

B. Form to be used: Approved Schedule of Values form.

C. Forms filled out by hand will not be accepted.

D. For each item, provide a column for listing each of the following:
1. Item Number.
2. Description of work.
3. Scheduled Value.
4. Previous Applications.
5. Work in Place and Stored Materials under this Application.
6. Authorized Change Orders.
7. Total Completed and Stored to Date of Application.
8. Percentage of Completion.
9. Balance to Finish.
10. Retainage.

E. Execute certification by signature of authorized officer.

F. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

G. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

H. Submit one (1) electronic "pencil copy", in PDF format, of each Application for Payment to YPS Office of Facilities Management and Fuller and D'Angelo, P.C. for approval.

I. After Architect's approval of the "pencil copy" submit three hard copies of approved Application for Payment to Construction Manager

J. Include the following with each application:
1. Transmittal letter as specified for submittals in Section 01 3000.
2. Construction progress schedule, revised and current as specified in Section 01 3216.
3. Partial Waivers of Mechanic's Lien: With each Application for Payment, submit partial waivers of mechanic's liens from contractor, subcontractors, sub-subcuncontractors, and suppliers for construction period covered by the previous application.
   a. Waiver Forms: Submit waivers of lien on forms, provided by the Architect in Section 01 2005.
4. When an application shows completion of an item, submit final or full waivers.
5. Owner reserves the right to designate which entities involved in the Work must submit waivers.
6. Submit Final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
7. Certified Payrolls: All Applications for Payment must be accompanied with certified payrolls for all Contract Work performed. **Each contractor and sub-contractor shall submit to the Owner within thirty days after issuance of its first payroll, and every thirty days thereafter**, a transcript of the original payroll record subscribed and affirmed as true under penalties of perjury. The Owners shall be required to receive and maintain such payroll records. The original payrolls or transcripts shall be preserved for three years from the completion of the work on the awarded project.

a. Submit certification that all personnel listed on certified payrolls have successfully completed an OSHA construction safety and health course of at least 10 hours prior to performing any work on the project.

K. Liens: No Payment will be made when a lien is filed against Owner by contractor or any subcontractor, or supplier or other entities until such lien is removed, bonded or similar action acceptable to the Owner

L. Project record documents as specified in Section 01 7800, shall be available for review by Yonkers Public Schools as a prerequisite for approval of payment.

M. Payment for stored materials (whether on-site but not installed, or stored in secured warehouse) will require a bill of lading showing the exact value. In no case will more than 90% be approved if the item is not installed. Insurance certificates will be provided specific to materials stored (for on-site or offsite items)

N. When YPS Office of Facilities Management or Fuller and D'Angelo, P.C. requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

O. The Owner shall retain Five (5) percent of the amount of each payment.

1.6 INITIAL APPLICATION FOR PAYMENT:

A. Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. Executed contract.
2. Approved bonds.
3. Approved insurance certificates.
4. Names of full time project manager, on site superintendent, and foreman.
5. Approved Schedule of Values.
6. Contractor's Construction Schedule (preliminary if not final).
7. Contractor's Submittal Schedule.
8. Emergency Phone Numbers and Contacts.
9. Health and Safety Manual

1.7 APPLICATION FOR PAYMENT AT SUBSTANTIAL COMPLETION

A. Comply with Requirements of Section 01 7800

1.8 MODIFICATION PROCEDURES

A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in its employ or subcontractors of changes to Contract Documents.

B. For minor changes not involving an adjustment to the Contract Sum or Contract Time, YPS Office of Facilities Management and Owner's Representative will issue instructions directly to the contractor.

C. For other required changes,YPS Office of Facilities Management will issue a document signed by Yonkers Public Schools instructing the Contractor to proceed with the change, for subsequent inclusion in a Change Order.

1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
2. Promptly execute the change.

D. YPS Office of Facilities Management may issue a document which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change . The Contractor shall prepare and submit a fixed price quotation within ten (10) days.

E. Contractor may propose a change by submitting a request for change to YPS Office of Facilities Management, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation

and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01 6000.

F. Computation of Change in Contract Amount:
   1. Refer to Article 21 and 22 of General Engineering Agreement.

G. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by Fuller and D'Angelo, P.C. for work falling under a fixed price contract, the amount will be based on Contractors's price quotation.
   2. For change requested by the contractor, the amount will be based on the Contractor 's request for a Change Order as approved by Fuller and D'Angelo, P.C. .
   3. For pre-determined unit prices, unit costs, allowance and quantities, the amount will based on the fixed unit prices, unit costs, allowance.
   4. For change ordered by Fuller and D'Angelo, P.C. without a quotation from , the amount will be determined by Fuller and D'Angelo, P.C. based on the Contractor's substantiation of costs as specified for Time and Material work.

H. Substantiation of Costs: Provide full information required for evaluation.
   1. On request, provide the following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. Support each claim for additional costs with additional information:
      a. Origin and date of claim.
      b. Dates and times work was performed, and by whom.
      c. Time records and wage rates paid.
      d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
   3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.
      a. If the contractor is directed to perform work on a “Time and Material” basis he will notify the YPS Office of Facilities Management and Owner's Representative prior to starting and will present an itemized T&M sheet daily for YPS Office of Facilities Management signature at the end of the shift. No payments will be made for any T&M work without daily signed worksheets.

I. Execution of Change Orders: YPS Office of Facilities Management will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

J. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

K. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

L. Promptly enter changes in Project Record Documents.

1.9 APPLICATIONS FOR PAYMENT WHEN BEHIND SCHEDULE

A. When the project falls behind schedule the contractor shall demonstrate the actions to be taken to put the project back on schedule.
   1. Payments will not be approved until satisfactory evidence is presented to put the project on schedule.

1.10 APPLICATION FOR PAYMENT AFTER SCHEDULED COMPLETION DATE

A. In the event the work is not completed by the schedule date, listed in Agreement and in addition to the other remedies described, the YPS Office of Facilities Management and Fuller and D'Angelo, P.C. will not review progress payment requisitions submitted after the construction completion date, and the District will not issue any progress payments after that date, until all work is completed.

1. Only one requisition for work performed, after the construction completion date, may be submitted, and it may be submitted only when all work is complete and a Punch List inspection is conducted; said requisition may be submitted when the work at 100% complete, less 5% retainage.

1.11 APPLICATION FOR FINAL PAYMENT

A. Comply with Section 01 7800 - Closeout Submittals.

B. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

C. Application for Final Payment will not be considered until the following have been accomplished:

1. All closeout procedures specified in Section 01 7800 - Closeout Submittals are submitted and approved.
2. All "punch list" items have been completed.

D. It is understood by the Contractor that the maximum payment due the contractor prior to final payment shall be Ninety (95%) of the Contract amount and the final Five (5%) will be due only after the above is satisfied.

END OF SECTION

SECTION 01 2005
PARTIAL RELEASE OF LIEN

CONTRACTOR/SUBCONTRACTOR/VENDOR'S LETTERHEAD

Name of Facility: Lincoln High School

Address: 375 Kneeland Avenue, Yonkers, NY 10704

Name of Owner: Yonkers Public Schools

Name of the Contractor/Subcontractor/Vendor: _____

Address: _____

Trade/Vendor:_____

Application # _____ Dated _____.

We certify that we have completed _____% of our Contract.

Prior to this requisition we have received payment equal to _____ % of of our contract amount.

The undersigned, upon receipt of the above requisition payment hereby releases and discharges the Owner of and from any liability or obligation in any way related to or arising out of this project up to and including the date of this document.

The undersigned further covenants and agrees that it shall not in any way claim or file a mechanic's or other lien against the premises of the above designated project, or any part thereof, or against any fund applicable thereto for any of the work, labor, materials heretofore furnished by it in connection with the improvement of said premises.

The undersigned further warrants that, in order to induce the Owner to release this partial payment, they have paid all claims for labor, material, .insurance, taxes, equipment, etc., employed in the prosecution of the work above, to date of this requisition.

The undersigned hereby releases and agrees to hold the Owner harmless from any and all claims in connection with the furnishing of such labor and materials, etc., for the construction of the aforementioned project.

The undersigned further guarantees that all portions of the work furnished .and/or provided by them are in accordance with the contract and that the terms of the contract with respect to these guarantees will hold for the period specified in said contract. Refer to ARTICLE 79 PAYMENTS GENERAL ENGINEERING AGREEMENT for additional requirements.

IN WITNESS WHEREOF, we have executed under seal this release on the above date and to be legally bound hereby:

WITNESS: _____FIRM: _____

BY: _____

_____

State of New York, County of _____ subscribed and sworn to before me this ____ day of _____ 201____

Notary public

My commission expires _____

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepencies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. General administrative requirements.

B. Preconstruction meetings.

C. Coordination drawings.

D. Submittals for review, information, and project closeout.

E. Number of copies of submittals.

F. Requests for Interpretation (RFI) procedures.

G. Submittal procedures.

1.3 RELATED REQUIREMENTS

A. General Engineering Agreement.

B. Section 01 3216 - Construction Progress Schedule: Form, content, and administration of schedules.

C. Section 01 6000 - Product Requirements: General product requirements.

D. Section 01 3553 - Site Safety and Security Procedures.

E. Section 01 7000 - Execution: Additional coordination requirements.

F. Section 01 7800 - Closeout Submittals:

1.4 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 7000 - Execution for coordination of execution of administrative tasks with timing of construction activities.

B. Make the following types of submittals to YPS Office of Facilities Management and Fuller and D'Angelo, P.C.:

1. Requests for Interpretation (RFI).
2. Requests for substitution.
3. Shop drawings, product data, and samples.
4. Test and inspection reports.
5. Design data.
6. Manufacturer's instructions and field reports.
7. Applications for payment and change order requests.
8. Progress schedules.
9. Coordination drawings.
10. Correction Punch List and Final Correction Punch List for Substantial Completion.
11. Closeout submittals.

1.5 PROJECT COORDINATOR

A. Project Coordinator: YPS Office of Facilities Management.

B. Coordination: The contractor shall coordinate its construction operations with those of other subcontractors and entities to ensure efficient and orderly installation of each part of the Work. The

contractor shall coordinate its operations with operations, included in different Sections that depend on each other for proper installation, connection, and operation

C. Coordinate installation of different components with other contractors and/or subcontractor to ensure maximum accessibility for required maintenance, service, and repair

D. Cooperate with the Project Coordinator in allocation of mobilization areas of site, access, traffic, parking facilities, field offices, and sheds.

E. Comply with YPS Office of Facilities Management and Fuller and D'Angelo, P.C. procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

F. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 1000 - Summary of Contract.

G. Make the following types of submittals to YPS Office of Facilities Management and Fuller and D'Angelo, P.C.
1. Requests for Interpretation.
2. Requests for substitution.
3. Shop drawings, product data, and samples.
4. Test and inspection reports.
5. Design data.
6. Manufacturer's instructions and field reports.
7. Applications for payment and change order requests.
8. Progress schedules.
9. Correction Punch List and Final Correction Punch List for Substantial Completion.
10. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PRECONSTRUCTION MEETING

A. YPS Office of Facilities Management will schedule a meeting after Notice of Award.

B. Attendance Required:
1. YPS Office of Facilities Management.
2. Fuller and D'Angelo, P.C.
3. Consultants.
4. Contractor(s) and field superintenden(s)t.

C. Agenda:
1. Status of Yonkers Public Schools - Contrator(s) Agreement.
2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
5. Submission of initial Submittal schedule.
6. Designation of personnel representing the parties to Contract: YPS Office of Facilities Management, Fuller and D'Angelo, P.C., and Contractor(s), .
7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
8. Scheduling.
9. Use of premises by Contractor(s).
10. Yonkers Public Schools's requirements and occupancy prior to completion.
11. Construction facilities and controls provided by YPS Office of Facilities Management.

12. Temporary utilities provided by YPS Office of Facilities Management.
13. Survey existing facilities prior to staring construction.
14. Security and housekeeping procedures.
15. Procedures for maintaining record documents.

D. Fuller and D'Angelo, P.C. will record minutes and distribute copies within five days after meeting to all participants. Contactor shall distribute to all entities of the Contractor affected by decisions made.

3.2 WEEKLY COORDINATION MEETINGS

A. The Contractor for General Construction shall schedule and hold weekly general project coordination meetings at regularly scheduled times that are convenient for the attendance of other prime contractors and other parties involved. These meetings are in addition to specific meetings held for other purposes, such as regular project meetings and special pre-installation meetings. Required attendance includes General Construction Contractor, HVAC,, Plumbing, and Electrical Contractor and every other entity identified by any prime contractor as being currently involved the coordination or planning for the work of the entire project. Conduct meetings in a manner that resolve coordination problems. The Contractor for General Construction shall preside at each meeting, and shall record meeting results. The Contractor for General Construction shall distribute copies of the meeting result to everyone in attendance, the YPS Office of Facilities Management and Fuller and D'Angelo, P.C. and to others affected by the decisions and actions resulting from each meeting.

3.3 CONSTRUCTION PROGRESS SCHEDULE - See Section 01 3216

3.4 DAILY CONSTRUCTION REPORTS

A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.

B. Transmit electronically a copy to YPS Office of Facilities Management and Fuller and D'Angelo, P.C.

C. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
1. Date.
2. High and low temperatures, and general weather conditions.
3. List of subcontractors at Project site.
4. List of separate contractors at Project site.
5. Approximate count of personnel at Project site.
   a. Include a breakdown for supervisors, laborers, journeymen, equipment operators, and helpers.
6. Major equipment at Project site.
7. Material deliveries.
8. Safety, environmental, or industrial relations incidents.
9. Meetings and significant decisions.
10. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (listed in most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
11. Testing and/or inspections performed.
12. Signature of TBD's authorized representative.

3.5 PROOF OF ORDERS AND DELIVERY DATES

A. Within two (2) weeks after the approval of shop drawings, samples, product data and the like, the Contractor(s) shall provide copies of purchase orders for all equipment and materials which are not readily available in local stock. The Contractor(s) shall submit written statements from suppliers confirming the orders and stating promised delivery dates. Dates shall be indicated and coordinated with the Construction Schedule.

3.6 COORDINATION DRAWINGS

A. Provide information required for preparation of coordination drawings.

B. Review drawings prior to submission to Fuller and D'Angelo, P.C.

C. Indicate all existing and proposed lighting fixtures, smoke detectors, and sprinkler heads.

D. Show location of all valves, dampers (fire, smoke, volume, and automatic), coils, humidifiers, smoke detectors, etc. requiring access for service and maintenance.

E. Show all registers, grilles, diffusers, radiators and convectors, and other terminal elements.

F. Locate all access doors.

G. Include large-scale details and sections as required to fully delineate the conditions in congested areas, leaving space for the work of the other trades.

H. Show plan layout of all equipment and anchoage and fasteners

3.7 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:
   1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
   2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
      a. Approval of submittals (use procedures specified elsewhere in this section).
      b. Approval of substitutions (see Section - 01 6000 - Product Requirements)
   2. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
   3. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
      a. The Yonkers Public Schools reserves the right to assess for the costs (on time-and-materials basis) incurred by the Fuller and D'Angelo, P.C. , and any of its consultants, due to processing of such RFIs.

C. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
   1.

3.8 SUBMITTAL SCHEDULE

A. Submit to YPS Office of Facilities Management and Fuller and D'Angelo, P.C. for review a schedule for submittals in tabular format.
   1. Submit at the same time as the preliminary schedule specified in Section - 01 3216 - Construction Progress Schedule.
   2. Coordinate with construction schedule and schedule of values.

3.9 SUBMITTALS FOR REVIEW

A. All submittals are the product and the property of the Contractor. The YPS Office of Facilities Management and Fuller and D'Angelo, P.C. shall not be responsible for the contractor's construction means, methods or techniques: safety precautions or programs; Acts or admissions; or failure to carry out the work in accordance to the contract documents

B. Refer to "Article 76 General Engineering Agreement Shop Drawings, Product Data and Samples" for additional requirements.

C. Shop Drawing Submittal Log no later than ten (10) days after award of contract.

D. Shop Drawing Submittals shall be submitted no later than twenty (20) days after Letter of Award of Contract. No further payments will be made to the contractor after twenty (20) until all major submittals are made.

E. When the following are specified in individual sections, including but not limited to the following, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Templates.

F. Submit to YPS Office of Facilities Management and Fuller and D'Angelo, P.C. for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
   1. Submittals for roofing or others requiring consultant review submit directly to consultant with copy to YPS Office of Facilities Management and Fuller and D'Angelo, P.C.

G. Samples will be reviewed only for aesthetic, color, or finish selection and for record documents purposes described in Section 01 7800 - Closeout Procedures.

H. After review, provide copies and distribute in accordance with Submittal Procedures article below .

I. The Architect shall review and approve or take other appropriate action on the Contractor submittals, such as shop drawings, product data, samples and other data, which the Contractor is required to submit, but only for the limited purpose of checking for conformance with the design concept and the information shown in the Construction Documents. This review shall not include review of the accuracy or completeness of details, such as quantities, dimensions, weights or gauges, fabrication processes, construction means or methods, coordination of the work with other trades or construction safety precautions, all of which are the sole responsibility of the Contractor. The Architect's review shall be conducted with reasonable promptness while allowing sufficient time in the Architect's judgment to permit adequate review. Review of a specific item shall not indicate that the Architect has reviewed the entire assembly of which the item is a component. **The** YPS Office of Facilities Management and Fuller and D'Angelo, P.C. **shall not be responsible for any deviations from the Construction Documents not brought to the attention of the Architect, in writing, by the Contractor.** The Architect shall not be required to review partial submissions or those for which submissions of correlated items have not been received.

J. Marking or comments on shop drawings shall not be construed as relieving the Contractor from compliance with the contract project plans and specifications, nor departure therefrom. The contractor remains responsible for details and accuracy for conforming and correlating all quantities, verifying all dimensions, for selecting fabrication processes, for techniques of assembly and for performing their work satisfactorily and in a safe manner.

K. **Architect will review the original submittal and one (1) re submittal. Additional reviews will be additional services provided to the Owner and charged accordingly. The Owner will back charge the contractor accordingly.**

L. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

M. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

3.10 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.

2. Certificates.
3. Inspection reports.
4. Manufacturer's instructions.
5. Manufacturer's field reports.
6. Other types indicated.

B. Submit for YPS Office of Facilities Management and Fuller and D'Angelo, P.C.'s knowledge as contract administrators. for. No action will be taken.

3.11 SUBMITTALS FOR PROJECT CLOSEOUT

A. Refer to Section 01 7800 - Closeout Submittals and General Engineering Agreement.

3.12 NUMBER OF COPIES OF SUBMITTALS

A. Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected. All submittals shall be in electronic format and conforming to the following:
1. Each item shall be in a separate file.
2. Each file name shall start with the specification section number and contain an abbreviated explanation of what it contains; for example:
a. 03 3000 Concrete; 07 5323 EPDM.pdf; 07 5323 Bond Adh.pdf ; 07 7100 Drain.pdf; 07 7100 Hatch.pdf; 09900 Painting;
3. Add Revision number (Rev2 Rev3, etc) to the file name when resubmitting items, for example:
a. 07 5323 EPDM Revl.pdf 07 5323 Bond AdhRevl.pdf
4. Use capital letters and spaces to make the names "readable" do not use special characters, underscores, hyphens, etc.
5. Keep the file names short, no more than 25 characters.
6. Provide a transmittal with each electronic submittal and list each item that's included.
7. Provide a Cover Sheet with each item - in the same file as the technical submittal.
8. Do not add dates to the file names, the files are automatically dated when created..
9. Do not zip the files, and do not put the files in Folders.
10. Do not email electronic submittal attachments larger than 5 MB.
11. Do not email multiple electronic submittals- rather bum the submittals on a CD and send the CD via FedEx or other overnight mail.
12. Make all technical submittals at one time per trade- refer to the specification for additional submittal requirements for example:
a. Concrete; Masonry; Miscellaneous Fabrications; Roofing; etc.
13. Do not send MSDS with the technical submittals; collate all of the MSDS needed for the entire project in three ring binders, organized by specification section, and submit the binders to the YPS Office of Facilities Management, with copy of Transmittal to the Architect, and maintain one copy at the project site.

B. Samples: Submit the number specified in individual specification sections; one of which will be retained by YPS Office of Facilities Management.
1. After review, produce duplicates.
2. Approved sample will be retained at the project site.
3. Retained samples will not be returned to TBD unless specifically so stated.
4. Submit with each sample, in electronic PDF, data, cuts, photos, color, charts, etc.

3.13 SUBMITTAL PROCEDURES

A. General Requirements:
1. Use a separate transmittal for each item.
2. Transmit using approved form.

B. Identify Project, TBD, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

1. Contractor's submittal of shop drawings certifies that the contractor has reviewed and coordinated this shop drawing and they are in conformance to the plans, specifications, applicable codes and other provisions of the Contract Documents.

C. All submitted shop drawings shall be stamped and signed by the Contractor with the following note:

1. "We the undersigned certify that we have reviewed and coordinated this shop drawing and they are in conformance to the plans, specifications, applicable codes and other provisions of the Contract Documents."

D. Deliver submittals to Fuller and D'Angelo e-mail address and/or Consultants when directed.

E. Resubmittals: Contractor shall resubmit within 5 working days after receiving submittal.

F. Allow 5 working days for processing each re submittal.

3.14 SUBMITTAL REVIEW

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Submittals for Review: Fuller and D'Angelo, P.C. will review each submittal, and approve, or take other appropriate action.

C. Submittals for Information: Fuller and D'Angelo, P.C. will acknowledge receipt and review. See below for actions to be taken.

D. Fuller and D'Angelo, P.C. 's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.

3.15 ARCHITECT'S ACTION

A. Fuller and D'Angelo, P.C. 's and Consultants' actions on items submitted for review:

1. Final Unrestricted Release: The work covered by the submittal may proceed provided it complies with the requirements of the contract documents; acceptance of the work will depend upon that compliance.
   a. "No Exception Taken".
2. Final-But-Restricted Release: When the submittals are marked as follows, the work covered by the submittal may proceed provided it complies with both the Architect's/Engineer's notations or corrections on the submittal and with the requirements of the contract documents; acceptance of the work will depend on that compliance.
   a. "Make Corrections Noted" Resubmission not required.
3. Returned for Re-submittal: When the submittal is marked as follows, do not proceed with the work covered by the submittal, including purchasing fabrication, delivery or other activity. Revise the submittal or prepare a new submittal in accordance with the Architect's/Engineer's notations stating the reasons for returning the submittal; resubmit the submittal without delay. Repeat if necessary to obtain a different action marking. Do not permit submittals with the following marking to be used at the project site, or elsewhere where work is in progress.
   a. "Revise and Resubmit".
   b. "Rejected".
      a) Submit item complying with requirements of Contract Documents.
   c. "Submit Specified Item".

B. Fuller and D'Angelo, P.C. 's actions on items submitted for information:

1. Items for which no action was taken:

a. "Examined and Reviewed" - to notify the Contractor that the submittal has been received for record only.

SUBMITTAL COVERSHEET

Yonkers Public Schools

Auditorium Upgrades and Exterior Bleacher Replacement

Lincoln High School

ARCHITECT:
Fuller and D'Angelo, P.C.
45 Knollwood Rd.
Elmsford, NY10523

OWNER:
Yonkers Public Schools
1 Larkin Center
Yonkers, NY 10701

CONTRACTOR: _____ CONTRACT: _____

ADDRESS: _____

TELEPHONE: _____FAX: _____EMAIL: _____

Facility Name: Lincoln High School

Type of Submittal: Re-submittal: [ ] No [ ] Yes

[ ] Shop Drawings [ ] Product Data [ ] Schedule [ ] Sample

[ ] Test Report [ ] Certificate [ ] Color Sample [ ] Warranty

SUBMITTAL DESCRIPTION: _____

PRODUCT NAME: _____

MANUFACTURER: _____

SUBCONTRACTOR/_____

SUPPLIER: _____

SPEC. SECTION NO.: _____ DRAWING NO(S): _____

PARAGRAPH: _____ RM. OR DETAIL NO(S): _____

CONTRACTOR'S REVIEW STAMP

Contractor Review Statement: These documents have been checked for accuracy and coordinated with job conditions and Contract requirements by this office and have been found to comply with the provisions of the Contract documents.

Remarks:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

NAME: _____ DATE: _____

END OF SECTION

SECTION 01 3307
SED SPECIAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SUMMARY

A. This Section specifies special requirements of State Education Department, including Commissioner's Regulation Part 155.5, 155.7

1. Copies of Commissioner's Regulation Part 155.5, 155.7 are available on the State Education Department's web site.www.p12nysed.gov

1.3 CERTIFICATE OF OCCUPANCY

A. The occupied portion of any school building shall always comply with the minimum requirements necessary to maintain a Certificate of Occupancy.

1.4 GENERAL SAFETY AND SECURITY DURING CONSTRUCTION

A. All construction materials shall be stored in a safe and secure manner.

B. Fences around construction supplies or debris shall be maintained.

C. Gates shall always be locked unless a worker is in attendance, to prevent unauthorized entry.

D. During exterior renovation work, overhead protection shall be provided for any sidewalks or areas immediately beneath the work site or such areas shall be fenced off and provided with warning signs to prevent entry.

E. Workers shall be required to wear photo-identification badges at all times for identification and security purposes while working at occupied sites.

1.5 SEPARATION OF CONSTRUCTION

A. Separation of construction areas from occupied spaces. Construction areas that are under the control of a contractor and therefore not occupied by district staff or students shall be separated from occupied areas. Provisions shall be made to prevent the passage of dust and contaminants into occupied parts of the building. Periodic inspection and repairs of the containment barriers must be made to prevent exposure to dust or contaminants. Metal stud and gypsum board (Type X) must be used in exit ways or other areas that require fire rated separation. Heavy duty plastic sheeting may be used only for a vapor, fine dust or air infiltration barrier, and shall not be used to separate occupied spaces from construction areas.

1. A specific stairwell and/or elevator may be assigned for construction worker use during work hours, when approved by the Owner. Workers may not use corridors, stairs or elevators designated for students or school staff.
2. Large amounts of debris must be removed by using enclosed chutes or a similar sealed system. There shall be no movement of debris through halls of occupied spaces of the building. No material shall be dropped or thrown outside the walls of the building.
3. All occupied parts of the building affected by renovation activity shall be cleaned at the close of each work day. School buildings occupied during a construction project shall maintain required health, safety and educational capabilities at all times that classes are in session.
4. A plan detailing how exiting required by the applicable building code will be maintained.
5. A plan detailing how adequate ventilation will be maintained during construction.

1.6 FIRE PREVENTION

A. There is no smoking on school property for fire prevention and conformancce to New York State Law.

B. Any holes in floors or walls shall be sealed with a fire resistant material.

C. Owner shall maintain existing fire extinguishers.

D. Fire alarm and smoke detection systems shall remain in operation at all times.

1.7 CONSTRUCTION DIRECTIVES

A. Construction Noise. Construction and maintenance operations shall not produce noise in excess of 60 dba in occupied spaces or shall be scheduled for times when the building or affected building spaces are not occupied or acoustical abatement measures shall be taken.

B. Construction Fume Control: The Contractor shall be responsible for the control of chemical fumes, gases, and other contaminates produced by welding, gasoline or diesel engines, roofing, paving, painting, etc. to ensure they do not enter occupied portions of the building or air intakes.

C. Off-Gassing Control. The Contractor shall be responsible to ensure that activities and materials which result in "off-gassing" of volatile organic compounds such as glues, paints, furniture, carpeting, wall covering, drapery, etc., are scheduled, cured or ventilated in accordance with manufacturer's recommendations before a space can be occupied.

1.8 ASBESTOS

A. Asbestos/Lead Test Asbestos Letter. Indication that all school areas to be disturbed during renovation or demolition have been or will be tested for lead and asbestos.

B. Asbestos Code Rule 56. Large and small asbestos abatement projects as defined by 8 NYCRR 155.5(k) shall not be performed while the building is occupied. Note: It is SED's interpretation that the term "building" as referenced in this section, means a wing or major section of a building that can be completely isolated from the rest of the building with sealed non combustible construction. The isolated portions (the occupied portion and the portion under construction) of the building must contain separate code compliant exits. The ventilation systems must be physically separated and sealed at the isolation barrier(s).

1. Asbestos TEM. The asbestos abatement area shall be completely sealed off from the rest of the building and completely cleaned and tested by TEM prior to re-entry by the public.
2. Lead Abatement Projects. A project that contains materials identified to be disturbed which tests positive for lead shall include that information in the Construction Documents. The Construction Documents must address the availability of lead testing data for the building and include a statement that the OSHA regulations be followed and that cleanup and testing be done by HUD protocol.

1.9 VENTILATION

A. The work, as scheduled in the existing building, is to be performed when the facility is unoccupied. In the event that work is required to be performed during times when the building is occupied, all existing ventilation system between areas of work and areas of occupancy shall be disconnected, separated and code complying ventilation requirements be provided the occupied area. Prior to such work commencing the contractor shall submit a plan, for review indicating procedure to be taken. Also see paragraph 1.5 above for additional requirements."

1.10 ELECTRICAL CERTIFICATION:

A. The electrical subcontractor shall obtain UL Certification or Inspection from a Certified Electrical Organization for electrical installation.

1.11 EXITING

A. Exiting: Work will be performed when school is not in session or after school hours. All exiting will be clear and usable at all times.

B. All exits shall be clear and usable at all times.

C. All modifications or changes to the exiting plan shall be approved by the Architect.

1.12 CONSTRUCTION WORKERS IN OCCUPIED AREAS

A. No worker shall be permitted in areas occupied by students. If access is required by the contractor's personnel they will be supervised by District personnel. Contractor shall provided 24 hour notice to the Owner when such access will be required.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 3553
SITE SAFETY AND SECURITY PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepencies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. The safety requirements, which must be followed by each Contractor during the execution of this contract.

B. Each Contractor agrees that the work will be completed with the greatest degree of safety and:

1. To conform to the requirements of the Occupational Safety and Health Act (OSHA) and the Construction Safety Act including all standards and regulations that have been or shall be promulgated by the governmental authorities which administer such acts, and shall hold the Owner, Owner's Representative, the Architect, and all their employees, consultants and representatives harmless from and against and shall indemnify each and everyone of them for any and all claims, actions, liabilities, costs and expenses, including attorneys fees, which any of them may incur as a result of non-compliance.

C. Security measures including entry control, personnel identification, and miscellaneous restrictions.

1.3 REFERENCES:

A. Code of Federal Regulations OSHA Safety and Health.

1.4 RELATED REQUIREMENTS

A. Articles 68 and 73 of General Engineering Agreement for additional requirements.

B. Section 01 1000 - Summary of Contract: Use of premises and occupancy .

1.5 DEFINITIONS

A. Public shall mean anyone not involved with or employed by the contractor to perform the duties of this contract.

B. Site shall mean the limits of the work area.

C. Contractor shall mean the contractor, his/her subcontractors and any other person related to the contract execution.

1.6 SECURITY PROGRAM

A. Security and Protection Facilities and Services shall be the responsibility of the Contractor and all costs shall be included in their bid.

B. Protect Work, existing premises and Yonkers Public Schools's operations from theft, vandalism, and unauthorized entry.

C. Coordinate with Yonkers Public Schools's security program.

D. Initiate program in coordination with YPS Office of Facilities Management 's existing security system at project mobilization.

E. Maintain program throughout construction period until directed by YPS Office of Facilities Management .

1.7 ENTRY CONTROL

A. The existing building contains a security alarm system maintained and operated by the Owner. Access into the existing building shall not be permitted unless the Owner is notified and arrangements made to deactivate the system

B. Restrict entrance of persons and vehicles into Project site and existing facilities.

C. Allow entrance only to authorized persons with proper identification.

D. YPS Office of Facilities Management will control entrance of persons and vehicles related to Yonkers Public Schools's operations.

E. Coordinate access of Yonkers Public Schools's personnel to site in coordination with YPS Office of Facilities Management and Yonkers Public Schools and security forces.

F. Traffic Control
   1. Contractor shall maintain access for emergency vehicles, fireman and pedestrians and protect from damage all persons and property within the limits of and for the duration of the contract;
   2. Conduct construction operations so that the traveling public and pedestrian safety is subjected to a minimum of hazard and delay.
   3. Contractor shall perform the following minimum requirements as directed byYPS Office of Facilities Management.
      a. Keep the surface of the traveled way free from mounds, depressions, and obstructions of any type which could present hazards or annoyance to traffic.
      b. Keep the surface of all pavements used by the public free and clean of all debris, masonry, stucco, and concrete or other obstructions to provide safe traveled ways.
      c. Control dust and keep the traveled way free from materials spilled from hauling and construction equipment.
      d. Provide all cones, barricades, signs and warning devices as may be required and/or as ordered by YPS Office of Facilities Management to safely carry out the foregoing. All such signs and devices shall be fabricated and placed in accordance with the latest “Federal Manual on Uniform Control Devices”. Use of Open Flares Is Prohibited.
   4. Ingress and Egress
      a. Contractor shall provide and maintain at all times safe and adequate ingress and egress to and from site at existing or at new access points consistent with work, unless otherwise authorized by the YPS Office of Facilities Management.
   5. If, upon notification by YPS Office of Facilities Management, and the contractor fails to correct any unsatisfactory condition within 24 hours of being so directed, YPS Office of Facilities Management will immediately proceed with adequate forces to properly maintain the project and the entire cost of such maintenance shall be deducted (back charged) from any moneys due the contractor
   6. All traffic control costs shall include the base bid of furnishing all labor, material and equipment including the cost of any and all incidental required by job conditions as ordered by YPS Office of Facilities Management .

1.8 FIRE PREVENTION AND CONTROL

A. Each Contractor shall provide Fire Extinguishers as follows: Provide type "A" fire extinguishers for temporary offices and similar spaces where there is minimal danger of electrical fires or grease-oil-flammable liquid fires. In other locations provide either type "ABC" dry chemical extinguishers, or a combination of several extinguishers of NFPA recommended types for the exposures in each case.
   1. All required exits, fire alarm, security, automatic temperature control, PA, sprinkler and similar systems shall be maintained and operable throughout the entire construction contract.
      a. Contractor(s) will be back-charged for all fines imposed for false alarms or service calls.

B. Free access to fire hydrants and standpipe connections shall be maintained at all times during construction operations. Portable fire extinguishers shall be provided by the the Contractor and made conveniently available throughout the construction site. Contractor(s) shall notify their employees of the location of the nearest fire alarm box at all locations where work is in progress.

C. Each Contractor shall take all possible precautions for the prevention of fires. Where flame cutting torches, blow torches, or welding tools are required to be used within the building, their use shall be as approved by the Construction Manager at the site. When welding tools or torches of any type are in use,

have available in the immediate vicinity of the work a fire extinguisher of the dry chemical 20 lbs. Type. The fire extinguisher(s) shall be provided and maintained by the Contractor doing such work.

D. Fuel for cutting and heating torches shall be gas only and shall be contained in Underwriters laboratory approved containers.

E. Storage of gas shall be in locations as approved by the Owner and subject to Fire Department regulations and requirements.

F. No volatile liquids shall be used for cleaning agents or as fuels for motorized equipment or tools within a building except with the express approval of the Owner and/or Architect and in accordance with local codes. On-site bulk storage of volatile liquids shall be outside the buildings at locations directed by the Owner, who shall determine the extent of volatile liquid allowed within the building at any given time.

1.9 PERSONNEL IDENTIFICATION

A. Provide identification badge or other approved identification to each person authorized to enter premises.
   1. Badge To Include: Personal photograph, name and employer.

B. Maintain a list of accredited persons, submit copy to Yonkers Public Schools on request.

1.10 RESTRICTIONS

A. Do not allow cameras on site or photographs taken except by written approval of YPS Office of Facilities Management.

PART 2 PRODUCTS -

2.1 MATERIALS

A. Refer to Section 01 5000 - Temporary Facilities and Controls for additional barrier requirements.

B. Signs shall be made of sturdy plywood of 1/2" minimum thickness and shall be made to legible at a distance of 50 feet.

PART 3 EXECUTION

3.1 GENERAL

A. In the performance of its contract, each Contractor shall exercise every precaution to prevent injury to workers and the public or damage to property.
   1. Each Contractor shall, at their own expense, provide temporary structures, place watchmen, design and erect barricades, fences and railings, give warnings, display such lights, signals and signs, exercise such precautions against fire, adopt and enforce such rules and regulations, and take such other precautions as may be necessary, desirable or proper or as may be directed.
   2. Each Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work to be done under this contract. The Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss including but not limited to:
      a. All employees working in connection with this contract, and other persons who may be affected thereby.
      b. All the work materials and equipment to be incorporated therein whether in storage on or off site; and including trees, shrubs, lawns, walks, pavements, facilities not designated for removal, relocation or replacement in the course of construction.

B. Each Contractor's duties and responsibilities for the safety and protection of the work: shall continue until such time as all the work is completed and contractor has removed all workers, material and equipment from the site, or the issuance of the certificate of final completion, whichever shall occur last.

C. Each Contractor shall use only machinery and equipment adapted to operate with the least possible noise, and shall so conduct his operations that annoyance to occupants of the site and nearby homes and facilities shall be reduced to a minimum

D. It shall be the responsibility of the Contractor to insure that all employees of the contractor and all subcontractors, and any other persons associated with the performance of their contract shall comply with the provisions of this specification.

E. Each Contractor shall clean up the site daily and keep the site free of debris, refuse, rubbish, and scrap materials. The site shall be kept in a neat and orderly fashion. Before the termination of the contract. The Contractor shall remove all surplus materials, falsework, temporary fences, temporary structures, including foundations thereof.

F. Each Contractor shall follow all rules and regulations put forth in the Code of Federal Regulations (OSHA Safety and Health Standards).

END OF SECTION

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepencies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Submittals.

B. Quality assurance.

C. References and standards.

D. TBD's construction-related professional design services.

E. Control of installation.

F. Mock-ups.

G. Tolerances.

H. Manufacturers' field services.

I. Defect Assessment.

1.3 RELATED REQUIREMENTS

A. "Artical 12 General Engineering Agreement" for additional requirements.

B. Section 01 3000 - Administrative Requirements: Submittal procedures.

C. Section 01 4216 - Definitions.

D. Section 01 6000 - Product Requirements: Requirements for material, product quality and substitution procedures.

1.4 REFERENCE STANDARDS

A. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2015a, with Editorial Revision (2016).

B. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2015.

1.5 DEFINITIONS:

A. Refer to "Article 7 and Article 47 of the General Engineering Aggreement".

1.6 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:

1. Temporary scaffolding.
2. Temporary hoist(s) and rigging.

1.7 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Design Data: Submit for YPS Office of Facilities Management and Fuller and D'Angelo, P.C.'s knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

C. Test Reports: After each test/inspection, promptly submit two copies of report to YPS Office of Facilities Management and Fuller and D'Angelo, P.C..
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of inspector.
      d. Date and time of sampling or inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of test/inspection.
      h. Date of test/inspection.
      i. Results of test/inspection.
      j. Compliance with Contract Documents.
      k. Provide YPS Office of Facilities Management and Fuller and D'Angelo, P.C., interpretation of results.
   2. Test report submittals are for YPS Office of Facilities Management and Fuller and D'Angelo, P.C.'s knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and installation/application subcontractor to YPS Office of Facilities Management and Fuller and D'Angelo, P.C. in quantities specified for Product Data.

E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the YPS Office of Facilities Management's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

F. Manufacturer's Field Reports: Submit reports for YPS Office of Facilities Management and Fuller and D'Angelo, P.C.'s benefit as contract administrator or for Yonkers Public Schools.
   1. Submit report in duplicate within 30 days of observation to YPS Office of Facilities Management and Fuller and D'Angelo, P.C. for information.

1.8 QUALITY ASSURANCE

A. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor(s) by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in State of New York.

1.9 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Fuller and D'Angelo, P.C. before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of YPS Office of Facilities Management and Fuller and D'Angelo, P.C. shall be altered from Contract Documents by mention or inference otherwise in any reference document.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Fuller and D'Angelo, P.C. before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.2 MOCK-UPS

A. Before installing portions of the Work where mock-ups are required, for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

B. Accepted mock-ups establish the standard of quality the YPS Office of Facilities Management and Fuller and D'Angelo, P.C. for the work and they will be the sole judge the Work.

C. Notify YPS Office of Facilities Management and Fuller and D'Angelo, P.C. seven (7) working days in advance of dates and times when mock-ups will be constructed.

D. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.

E. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

F. Obtain Fuller and D'Angelo, P.C.'s approval of mock-ups before starting work, fabrication, or construction.

G. Accepted mock-ups shall be a comparison standard for the remaining Work.

H. Where mock-up has been accepted by Fuller and D'Angelo, P.C. and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by YPS Office of Facilities Management.

3.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Fuller and D'Angelo, P.C. before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.4 TESTING AND INSPECTION

A. See individual specification sections for testing and inspection required.

B. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of the Contractor.

4. Agency has no authority to stop the Work.

C. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
3. Provide incidental labor and facilities:
a. To provide access to Work to be tested/inspected.
b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
c. To facilitate tests/inspections.
d. To provide storage and curing of test samples.
4. Notify YPS Office of Facilities Management and Fuller and D'Angelo, P.C. and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
6. Arrange with YPS Office of Facilities Management's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Fuller and D'Angelo, P.C..

E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

F. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by YPS Office of Facilities Management. Payment for re testing will be charged to the Contractor by deducting testing charges from the Contract Price.

3.5 OWNER'S TESTING AND INSPECTIONS

A. YPS Office of Facilities Management will engage a qualified testing agency or special inspector to conduct tests and inspections as the responsibility of and paid for by Owner as follows:
1. Asbestos inspection and air monitoring
2. Commissioning.

B. Contractor shall perform the work in an efficient manner consistent with industry standards. Excessive testing resulting from the contractor's inability to perform efficiently will result in back charges to the contractor.

C. All re-inspections required for work not properly installed shall be paid for by the contractor.

D. The Owner will not be liable for any costs or delay claims due to the testing agency or special inspector failure to provide inspection without proper and sufficient notification.

E. All requests by the contractor for inspection that are cancelled and result in charges to the Owner will be back charged to the contractor.

3.6 CONTRACTOR'S TESTING AND INSPECTION

A. Testing and Inspections shall be conducted by a qualified testing agency or special inspector, approved by the YPS Office of Facilities Management and as indicated in individual Specification Sections.

B. Contractor's responsibility including:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying YPS Office of Facilities Management, Fuller and D'Angelo, P.C., and Contractor promptly of irregularities and deficiencies observed in the work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to YPS Office of Facilities Management and Fuller and D'Angelo, P.C. with copy to Contractor and to authorities having jurisdiction.

4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and re-inspecting corrected work.
7. Testing and balancing of all mechanical and plumbing.
8. Testing Fire Alarm
9. Electrical Certification: The contractor shall obtain UL Certification or Inspection from a Certified Electrical Organization for electrical installation.

3.7 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, concrete repairs and traffic coatings as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.8 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

B. If, in the opinion of YPS Office of Facilities Management and Fuller and D'Angelo, P.C., it is not practical to remove and replace the work, Fuller and D'Angelo, P.C. will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 4100
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepencies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SUMMARY OF REFERENCE STANDARDS

A. The YPS Office of Facilities Management shall file and obtain the Building Permit.

B. The Contractor shall furnish and pay for all other permits, fees and other installation costs required for the various installations by governing authorities and utility companies; prepare and file drawings and diagrams required; arrange for inspections of any and all parts of the work required by the authorities and furnish all certificates necessary to the YPS Office of Facilities Management and Fuller and D'Angelo, P.C. as evidence that the work installed under this Section of the Specifications conforms with all applicable requirements of the State Codes and Municipal Codes.

C. Regulatory requirements applicable to this project are the following:

D. 29 CFR 1910 - Occupational Safety and Health Standards; current edition.

E. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. New York State Uniform Fire and Building Codes known as the “Building Codes of the State of New York” and consist of the following:

1. Building Code of New York State.
2. State Education Department Planning Standards, including Commissioner's Regulation Part 155.5, 155.7.
3. Energy Conservation Construction Code of New York State
4. Fire Code of New York State
5. Fuel Gas Code of New York State
6. Mechanical Code of New York State
7. Plumbing Code of New York State
8. Utility Company Regulations and Requirements.
9. Classification of Construction: Type I.
10. Occupancy Classification:Education E
11. State Education Department: Planning Standards is applicable to the work. Any conflicts between the Building Codes of New York and the State Education Department Planning Standards, the most restrictive shall apply. Copies of the Planning standards are available at the SED web site. www.p12.nysed.gov/facplan/documents/mps

G. Electrical Certification: The Electrical sub-contractor shall obtain UL Certification or Inspection from a Certified Electrical Organization for certification of electrical installations.

H. Any items of work specified herein and shown on the drawings which conflict with aforementioned rules, regulations and requirements, shall be referred to the Fuller and D'Angelo, P.C. for decision, which decision shall be final and binding.

I. The work shall not be deemed to have reached a state of completion until the certificates have been delivered.

J. EPA - Environmental Protection Agency.

K. OSHA Part 1926 Safety and Health Regulations for Construction.

L. Federal Regulation for Asbestos Abatement
   1. Title 30 CFR Part 61, Subpart G; The Transport and Disposal of Asbestos Waste
   2. The Transport and Disposal of Asbestos Waste]
   3. Title 40 CFR, Part 763 Asbestos Containing Materials in Schools; Final Rule and Notice
   4. Title 49 CFR Parts 106, 107, and 171-179.The Transportation Safety Act of 1974 and the Hazardous Material Transportation Act..
   5. Public Law 101-637 ASHARA

M. New York State Official Compilation of Codes, Rules and Regulations
   1. Title 12 Part 56
   2. Title 10 Part 73
   3. Title 6 Parts 360-364
   4. Labor Law - Article 30 and Sections 900-912
   5. All applicable Additions, Addenda, Variances and Regulatory Interpretation Memoranda

1.3 MANDATORY OSHA CONSTRUCTION SAFETY AND HEALTH TRAINING

A. Pursuant to NYS Labor Law §220-h - All laborers, workers and mechanics working on the site are required to be certified as having successfully completed an OSHA construction safety and health course of at least 10 hours prior to performing any work on the project.

B. All contractors and their subcontractor's project superintendent, employees, directly or indirectly employed by the contractor to work on the project must at all times, whenever on the school property, wear an ID badge, safety vest, hard hat, etc. and all other required personal protective equipment as required by OSHA

1.4 RELATED REQUIREMENTS

A. Section 01 4000 - Quality Requirements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 4216
DEFINITIONS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This section supplements the definitions contained in the General Conditions.

B. Other definitions are included in individual specification sections.

1.3 DEFINITIONS

A. Owner: The term “Owner shall mean Yonkers Public Schools and their duly authorized representative.
   1. The word “Owner” and the words “School Board”, “City School District”, “Board of Education”, “Union Free School District”, “Central School District”, etc., shall have the same meaning.

B. Architect: The term "Architect" or “Engineer” or the words “Architect/Engineer” shall mean the Professional Architect responsible for the contract documents Fuller and D'Angelo, P.C., Architect and Planners.

C. Owner's Representative: The term Owner's Representative shall mean YPS Office of Facilities Management

D. Construction Manager: The term Construction Manager shall mean

_____

E. MEP Consultant shall mean Barile Gallagher Associates, 35 Marble Avenue, Pleasantville, New York 10570

F. Environmental Consultant shall mean Warrenpanzer, 228 East 45th Street New York, NY 10017

G. Contractor for Construction: The term “Contractor for Construction”, “General Contractor” “Contractor for General Work” “Construction Contractor” shall have the same meaning.

H. Contractor for Plumbing: The term “Plumbing Contract”, “Plumbing Contractor” “Contractor for Plumbing” shall have the same meaning.

I. Contractor for HVAC: The term “HVAC Contract”, “HVAC Contractor” “Contractor for HVAC”, "Mechanical Contractor" "Ventilation Contractor" shall have the same meaning.

J. Contractor for Electrical: The term “Electrical Contract”, Electrical Contractor” “Contractor for Electric” shall have the same meaning.

K. Contractor(s): Shall include all separate contractor(s) have contracts with the Owner for the same project and may include but not limited to: General Construction, Plumbing, HV, HVAC, Electrical, Site and others

L. "Approved": The term "approved," when used in conjunction with Architect's action on Contractor's submittals, applications, and requests, is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract and Section 01 3000 - Administrative Requirements.

M. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by Architect, requested by Architect, and similar phrases.

N. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on Drawings; or to other paragraphs or schedules in Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference.

O. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

P. "Installer": An installer is Contractor or another entity engaged by Contractor, as an employee, subcontractor, or contractor of lower tier, to perform a particular construction operation, including installation, erection, application, and similar operations.

Q. The term "experienced," when used with the term "installer," means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.

R. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.

S. "Project site" is the space available for performing construction activities, either exclusively or in conjunction with others performing other work as part of Project. The extent of Project site is shown on the Drawings and may or may not be identical with the description of the land on which Project is to be built.

T. The term “Building Code” shall mean the Building Code of the State of New York including all amendments and reference standards to date.

U. "Work" - Labor, materials, equipment, apparatus, controls, accessories, and all other items customarily furnished and/or required for proper and complete disconnection and reconnection, installation of new work.

V. "Wiring" - Conduit, fittings, wire, junction and outlet boxes, switches, cutouts, and receptacles and all items necessary or required in connection with or relating to such wiring.

W. "Concealed" - Embedded in masonry or other construction, installed behind wall furring, within double partitions, or hung ceilings, in trenches, or in crawl spaces.

X. "Exposed" - Not installed underground or "Concealed" as defined above.

Y. Furnish: The term "furnish" means to supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations..

Z. Install: The term "install" describes operations at Project site including unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

AA. 'Noted' - as indicated on the drawings and/or specifications.

AB. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.

AC. Provide: To furnish and install complete and ready for the intended use.

AD. Supply: Same as Furnish.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Temporary water.

B. Temporary electric power and light.

C. Temporary telephone service.

D. Temporary sanitary facilities.

E. Temporary Controls: Barriers and fencing.

F. Vehicular access and parking.

G. Waste removal facilities and services.

H. Construction aids and miscellaneous services and facilities.

I. Enclosure fence for the construction site.

1.3 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements for submittals.

B. Section 01 3553 - Site Safety and Security Procedures

C. Section 01 7000 - Execution progress cleaning.

D. Divisions 2 through 40 temporary heat, ventilation, and humidity requirements for products in those Sections.

1.4 SITE PLAN:

A. Show exiting fencing, staging areas, and parking areas for construction personnel.

1.5 REPORTS AND PERMITS:

A. Submit copies of reports of tests, inspections, and similar procedures performed on temporary utilities before, during and after performance of work. Submit copies of permits, easements and similar documentation necessary for installation, use and operation of temporary utility services.

1.6 QUALITY ASSURANCE

A. Regulations: Each contractor shall comply with industry standards and with applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
   1. Building code requirements.
   2. Health and safety regulations.
   3. Police, fire department and rescue squad rules.
   4. Environmental protection regulations

B. Standards: Each prime contractor shall comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."

1.7 PROJECT CONDITIONS

A. General: Each contractor shall provide each temporary service and facility ready for use at each location, when first needed to avoid delays in performance of work. Maintain, expand as required, and modify as needed throughout the progress of the work. Do not remove until services or facilities are no longer needed, or are replaced by the authorized use of completed permanent facilities.

B. Temporary Use of Permanent Facilities: Regardless of previously assigned responsibilities for temporary services and facilities, the Installer of each permanent service or facility shall assume responsibility for its operation, maintenance and protection during use as a construction service or facility prior to the YPS Office of Facilities Management's acceptance and operation of the facility.

C. Conditions of Use: Operate temporary services and facilities in a safe and efficient manner. Do not overload, and do not permit temporary services and facilities to interfere with the progress of work, or occupancy of existing facility by owner. Do not allow unsanitary conditions, public nuisances or hazardous conditions to develop or persist on the site.

D. Temporary Construction and Support Facilities: Maintain temporary facilities in a manner to prevent discomfort to users. Take necessary fire prevention measures. Maintain temporary facilities in a sanitary manner so as to avoid health problems.

E. Security and Protection: Maintain site security and protection facilities in a safe, lawful, publicly acceptable manner. Take measures necessary to prevent site erosion.

1.8 TEMPORARY UTILITIES

A. YPS Office of Facilities Management will provide the following:
   1. Electrical power, consisting of Contractor's connection to existing facilities.
   2. Water supply, consisting of Contractor's connection to existing facilities.

B. Use trigger-operated nozzles, with back flow devices, for water hoses, to avoid waste of water.

1.9 DIVISION OF RESPONSIBILITIES

A. Each contractor is responsible for the following:
   1. Installation, operation, maintenance, and removal of each temporary facility usually considered as its own normal construction activity, as well as the costs and use charges associated with each facility.
   2. Plug-in electric power cords and extension cords.
   3. Supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
   4. Special power requirements for installation of its own work such as welding.
   5. Its own field office complete with necessary furniture, utilities, and telephone service, if required.
   6. Its own storage and fabrication sheds, if required.
   7. All hoisting and scaffolding for its own work.
   8. Collection and disposal of all major equipment removed such as heaters, fans, and light fixtures.
   9. Collection of general waste and debris and disposing into containers provided by the General Construction.Site Contractor
   10. Secure lockup of its own tools, materials and equipment.
   11. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.
   12. Containerized bottled-water drinking-water units.
   13. First Aid Station and Supplies.
   14. Barricades, warning signs, and lights.
   15. Temporary Protection for existing flooring, from altered areas to exits.
   16. Temporary dust control.

B. Temporary Lighting: Electrical Contractor shall provide and pay all costs to provide temporary lighting, in all areas were existing light fixtures are scheduled to be removed, spaced to allow lighting to be turned

off in patterns to conserve energy, retain light suitable for work-in-progress, access traffic, security check and project lock-up except for Site Contractor(who shall be resonsible for their own) .

C. Temporary light and power shall be provided 15 minutes before the normal scheduled daily start of any trade and 15 minutes after the normal schedule daily completion of the last trade.

1.10 ELECTRIC WELDERS

A. Separate Power Sources Required: Power for electric welders and for other loads larger than the maximum allowable sizes shall be taken from portable power sources provided, paid for and operated by each Contractor or Sub-Contractor requiring the use of such equipment. Remove such power sources when no longer needed.

1.11 USE CHARGES

A. General: Cost or use charges for temporary facilities are not chargeable to the Owner or the Architect, Engineer or the Owner's Representative. The Owner and Architect will not accept a contractor's cost or use charges for temporary services or facilities as a basis of claim for an adjustment in the Contract Sum or the Contract Time.
   1. Water Service Use Charges: Water from the Owner's existing water system may be used without metering, and without payment for use charges.
   2. Electric Power Service Use Charges: Electric power from the Owner's existing system may be used without payment of use charges. Contractor and Sub-Contractors shall exercise measures to conserve energy usage.

1.12 TELECOMMUNICATIONS SERVICES

A. Each Contractor shall provide and pay for its own telephone service.
   1. Provide mobile phone service for all field superintendents and foreman.

1.13 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

C. Sanitary Facilities: Sanitary facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with governing regulations including safety and health codes for the type, number, location, operation and maintenance of fixtures and facilities; provide not less than specified requirements. Install in locations which will best serve the project's needs.
   1. Responsibilities: The General Construction Contractor is responsible for temporary sanitary facilities and their maintenance, including supplies. for all contractors except for the Site Construction Contractor (who shall be resonsible for their own).
   2. Install self-contained toilets to the extent permitted by governing regulations.
   3. Supply and maintain toilet tissue, paper towels, paper cups and other disposable materials as appropriate for each facility for full contract duration. Provide covered waste containers for used material.
   4. Provide separate toilet facilities for male and female construction personnel where required by law.

1.14 FENCING

A. Enclosure Fence: General: Prior to start of excavation or other substantial elements of work begin, install a general enclosure fence with suitable lockable entrance gates. Locate where indicated, or if not indicated, enclose the entire site or the portion of the site determined to be sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs and other animals from easily entering the site, except through entrance gates.
   1. The Site Construction Contractor shall provide, maintain and pay all costs for temporary fencing enclosing the bleacher construction area until directed to remove fence from the site.
   2. Each Contractor shall be responcible for enclosure fencing around it's stored equiment and materials.

B. Construction: Commercial grade chain link fence.

C. Provide 6 foot high fence around any materials or equipment stored on-site.; equip with vehicular and pedestrian gates with locks.

D. Locate where indicated, or if not indicated, as agreed with YPS Office of Facilities Management and Fuller and D'Angelo, P.C.. Provide enclosed portions of the site determined to be sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs and other animals from easily entering the site, except through entrance gates.

1.15 INTERIOR ENCLOSURES

A. The General Construction Contractor shall provide temporary dustproof partitions as indicated or required to separate work areas from Yonkers Public Schools-occupied areas, to prevent penetration of dust and moisture into Yonkers Public Schools-occupied areas, and to prevent damage to existing materials and equipment.

B. Contractor shall remove and reinstall any devices impacted by temporary partition installation. At conclusion of project electrician will again remove and reinstall these devices onto the permanent locations

1.16 SITE SAFETY AND SECURITY PROCEDURES- See Section 01 3553

1.17 VEHICULAR ACCESS AND PARKING

A. Responsibilities: Each Contractor is responsible for vehicular access and parking and all costs shall be included in their bid.

B. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

C. Coordinate access and haul routes with governing authorities and Yonkers Public Schools.

D. Provide and maintain access to fire hydrants, free of obstructions.

E. Existing parking areas may not be used for construction parking unless designated and approved by the YPS Office of Facilities Management.

1.18 WASTE REMOVAL

A. The General Construction Contractor shall provide containers, at grade, for use by all Contractors, except for the site contractor , who shall provide his own, and shall remove such waste materials from project site as required or directed by the Owner's representative.
   1. Provide specific containers for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
   2. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
   3. Contractors shall not utilize the Owner's bins or dumpsters.

B. The General Construction Contractor shall broom clean the work area at the end of each work day.
   1. If the contractor fails to clean areas at the end of each work day the YPS Office of Facilities Management shall perform the cleaning and back charge the contractor accordingly.

C. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

D. Provide containers with lids. Remove trash from site periodically.

E. Each prime contractor shall be responsible for daily cleaning up of spillage and debris resulting from its operations and from those of its subcontractors; and shall be responsible for complete removal and disposition of hazardous and toxic waste materials.
   1. Remove liquid spills promptly.
   2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

F. Burying or burning of waste materials on the site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

G. Provide rodent proof containers located on each floor level to encourage depositing of garbage and similar wastes by construction personnel.

H. Site: Each Contractor shall maintain Project site free of waste materials and debris.

I. Installed Work: Keep installed work clean. The Contractor shall clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

J. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

K. Work Areas: The Contractor shall clean areas daily where work is in progress to the level of cleanliness necessary for proper execution of the Work.
   1. Remove liquid spills promptly.
   2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

L. Each Prime Contractor is responsible to provide dust protection for their construction-related activities.

M. If daily cleaning and dust protection is not provided the Contractor will be back charged for cleanup performed by employees of the Owner or a separate contractor retained by the Owner.

1.19 HOISTS AND OWNER'S ELEVATOR USE

A. Each Contractor shall provide facilities for hoisting materials and employees. Do not permit employees to ride hoists which comply only with requirements for hoisting materials. Selection of type, size and number of facilities is the Contractor's option. Truck cranes and similar devices used for hoisting are considered tools and equipment and not temporary facilities

B. Elevator Use: Owner's existing elevator may not be used by the Contractor.

1.20 MISCELLANEOUS PROVISIONS

A. Snow Removal: The Site Construction Contractor shall be responsible for the removal of snow from the work area, to included access roads, excavations, staging and work areas as required to continue thier work schedule.

1.21 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Clean and repair damage caused by installation or use of temporary work.

B. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION -

3.1 STORAGE FACILITIES

A. Each Contractor and each subcontractor shall provide temporary storage facilities as required for his own use. Temporary structures shall be located at the fenced staging area, and shall be removed upon completion of the work or when directed.
   1. All temporary storage facilities and location shall be subject to the approval od YPS Office of Facilities Management

B. Materials delivered to the site shall be safely stored and adequately protected against loss or damage. Particular care shall be taken to protect and cover materials that are liable to be damaged by the elements.

C. Due to limited on site storage space, each Contractor shall coordinate delivery of his materials with the YPS Office of Facilities Management who will determine when large deliveries shall be made and shall be designate storage locations on site for delivered materials. All stored materials must be stored in locked, watertight trailers, paid for by applicable contractor.

3.2 SCAFFOLDING AND STAGING

A. All scaffold, staging and appurtenances thereto shall comply in total to the requirements of Safety and Health Regulations for Construction Chapter XVII of OSHA, Part 1926 and all related amendments.

3.3 ROOF PROTECTION

A. The General Construction Contractor shall provide temporary protection on any existing roof surface when it is necessary for work to take place on completed sections.

B. Upon such notification as required in subparagraph A, the Contractor shall assume responsibility for damages, if any, to the roofing system caused by the work of other trades, except that financial liability for any and all damages rests with the offending trade.

3.4 DISCONTINUE, CHANGES AND REMOVAL

A. Each Contractor(s) shall:

1. Discontinue all temporary services required by the Contract when so directed by the YPS Office of Facilities Management .
2. The discontinuance of any such temporary service prior to the completion of the work shall not render the Owner liable for any additional cost entailed thereby and the Contractor shall thereafter furnish, at no additional cost to the Owner, any and all temporary service required by such Contractors work.
3. Remove and relocate such temporary facilities as directed by the YPS Office of Facilities Management without additional cost to the Owner, and shall restore the site and the work to a condition satisfactory to the Owner.

3.5 VENTILATION AND HUMIDITY CONTROL FOR CONSTRUCTION

A. Each Prime Contractor shall be responsible for its own temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity.

B. Ventilate enclosed area to dissipate humidity, and to prevent accumulation of dust, fumes, vapors or gases.

C. Provide equipment as necessary for air and fresh exchange for the work area per OSHA standards.

D. Remove temporary ventilation equipment prior to the completion of construction.

E. Each Contractor will provide negative air machines of sufficient size/qty for square footage of work areas to exhaust any dust / fumes through flexible duct hose to exterior to eliminate any odors/smoke etc. caused by thier construction operations.

F. The Contractor(s) who allows water infiltration into the building is responsible for cleanup and commercial dehumidifiers of sufficient size and quantity to prevent mold growth. Failure to immediately address will result in owner hiring others and back charging in order to insure safe school environment

3.6 TRAFFIC CONTROLS

A. The Contractor shall provide temporary traffic controls at junction of temporary roads with public roads. Include warning signs for public traffic and “STOP” signs for entrance onto public roads, barricades, flagmen, etc. Comply with requirements of authorities having jurisdiction.

3.7 ENVIRONMENTAL PROTECTION:

A. Each Prime Contractor shall provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near Project site.

3.8 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.

1. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

END OF SECTION

SECTION 01 5713
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 DESCRIPTION OF WORK

A. Site Construction Contractor shall provide all labor, materials, equipment and services to install all temporary erosion or water pollution control measures as specified herein or as specified on the drawings including:
   1. Site Preparation and Protection
   2. Excavation and backfill.
   3. Exterior concrete.
   4. Restoration of site.

B. Temporary measures shall include silt fences, inlet protections, berms, sedimentation basins, silt screens, mulches, grasses, or other erosion control devices or methods as required.

C. In the event of conflict between these specifications and the regulation of other Federal, State, or local jurisdictions, the more restrictive regulations shall apply

D. The Site Construction Contractor shall have on site a person that has completed the NYSDEC Certificate of Completion course for “Protecting New York’s Natural resources with Better Construction Site Management” to conduct daily inspections of the site to insure all sediment and erosion controls are being maintained

1.3 SECTION INCLUDES

A. Prevention of erosion due to construction activities.

B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.

C. Restoration of areas eroded due to insufficient preventive measures.

D. Compensation of Yonkers Public Schools for fines levied by authorities having jurisdiction due to non-compliance by the Contractor(s).

1.4 RELATED REQUIREMENTS

A. Section 01 5000 - Temporary Facilities and Controls.

B. Section 01 5500 - Vehicular Access and Parking.

C. Section 03 3000 - Cast-in-Place Concrete: Concrete for temporary and permanent erosion control structures indicated on drawings.

D. Refer to Division 31, 32 and 33

1.5 REFERENCE STANDARDS

A. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus; 2014.

B. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity; 1999a (Reapproved 2014).

C. ASTM D4533/D4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 2015.

D. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 2015a.

E. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile; 2016.

F. ASTM D4873/D4873M - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples; 2017.

G. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit; Current Edition.

H. All erosion control measures shall be as specified herein, or detailed on the drawings, and as described in the New York State guidelines for Urban Erosion and Sediment Control, and shall conform to the standards of Westchester County Soil and Erosion Control Commission and to standards and details of the N.Y.S.D.E.C.

1.6 PERFORMANCE REQUIREMENTS

A. Comply with requirements of EPA (NPDES) for erosion and sedimentation control, as specified by the NPDES, for Phases I and II, and in compliance with requirements of Construction General Permit (CGP), whether the project is required by law to comply or not.

B. Comply with all more stringent requirements of State of New York Erosion and Sedimentation Control Manual.

C. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.

D. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.

E. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
   1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
   2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 25 years.

F. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
   1. Control movement of sediment and soil from temporary stockpiles of soil.
   2. Prevent development of ruts due to equipment and vehicular traffic.
   3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Yonkers Public Schools.

G. Open Water: Prevent standing water that could become stagnant.

H. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.7 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Erosion and Sedimentation Control Plan:
   1. Submit not less than 30 days prior to anticipated start of clearing, grading, or other work involving disturbance of ground surface cover.
   2. Include:
      a. Outline description of erosion and sediment containment program complete with implementation drawings, if requested.
      b. Material samples and product data as applicable to the particular products.
      c. Material safety data sheets on all products, as necessary.
   3. Obtain the approval of the Plan by YPS Office of Facilities Management.

C. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.

D. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

E. Maintenance Instructions: Provide instructions covering inspection and maintenance for temporary measures that must remain after Substantial Completion.

F. Silt fencing, straw bale sediment barrier, sediment basin or trap, stabilized construction entrance and dust control shall be as detailed in the N.Y.S. Manual.

G. Topsoil Stockpile
1. Stockpiles of soil shall be protected from wind and water erosion. Stockpile shall be located on level, dry ground.
2. Cover stockpiles with tarps or erosion control fabric.
3. All stockpiles shall be surrounded by straw bale sediment barriers and silt fencing properly installed.

H. Storm Drain Inlet Sediment Trap
1. Gravel shall be clean sized ½”- ¾”.

1.8 OWNER'S AUTHORITY

A. The YPS Office of Facilities Management has the authority to limit the surface area of erodible earth exposed by earthwork operations and to direct the Contractor to provide immediate temporary or permanent erosion or pollution control measures to minimize damage to property and contamination of watercourses and water impoundments.

1.9 COORDINATION AND SCHEDULING

A. Schedule the work so as to minimize the time that raw earth areas will be exposed to erosive conditions.

B. Coordinate the use of temporary controls with the permanent erosion control features or finish materials shown.

C. Incorporate permanent control features into the work at the earliest practical time.

PART 2 PRODUCTS

2.1 MATERIALS

A. Sedimentation control system shall complete including silt fence, hardwood or metal posts, etc. as manufactured by:
1. Marafi Inc/Carlisle – “Envirofence System"

B. Substitutions: 01 2500 - Substitution Procedures..

C. Erosion Control Mats: Knitted construction containing natural wood mulch similar and equal to that as manufactured by:
1. Erosion Control Systems (1020-03).
2. Synthetic Industries ("Polyjute").
3. Substitutions: 01 2500 - Substitution Procedures..

D. Mulch: Use one of the following:
1. Straw or hay.

E. Bales: Air dry, rectangular straw bales.
1. Cross Section: 14 by 18 inches, minimum.
2. Bindings: Wire or string, around long dimension.

F. Bale Stakes: One of the following, minimum 3 feet long:
1. Steel U- or T-section, with minimum mass of 1.33 pound per linear foot.
2. Wood, 2 by 2 inches in cross section.

G. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:

1. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D4751.
2. Permittivity: 0.05 sec^-1, minimum, when tested in accordance with ASTM D4491.
3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.
4. Tensile Strength: 100 pounds-force, minimum, in cross-machine direction; 124 pounds-force, minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
6. Tear Strength: 55 pounds-force, minimum, when tested in accordance with ASTM D4533/D4533M.
7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.

H. Silt Fence Posts: One of the following, minimum 5 feet long:

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

3.2 PREPARATION

A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

B. The YPS Office of Facilities Management may limit the area of clearing and grubbing and earthwork operations in progress commensurate with the Contractor's demonstrated capability in protecting erodible earth surfaces with temporary or permanent erosion control measures

3.3 SCOPE OF PREVENTIVE MEASURES

A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.

B. Construction Entrances: Traffic-bearing aggregate surface.
1. Width: As required; 20 feet, minimum.
2. Length: 50 feet, minimum.
3. Provide at each construction entrance from public right-of-way.
4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.

C. Storm Drain Curb Inlet Sediment Trap: Protect each curb inlet using one of the following measures:
1. Straw bale row blocking entire inlet face area; anchor into pavement.

3.4 INSTALLATION

A. Silt Fences:
1. Store and handle fabric in accordance with ASTM D4873/D4873M.
2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch high barriers with minimum 36 inch long posts spaced at 6 feet maximum, with fabric embedded at least 4 inches in ground.
3. Install with top of fabric at nominal height and embedment as specified.
4. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches, with extra post.
5. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches high with post spacing not more than 4 feet.

B. Straw Bale Rows:
1. Install bales in continuous rows with ends butting tightly, with one bale at each end of row turned uphill.

2. Install bales so that bindings are not in contact with the ground.
3. Embed bales at least 2 inches in the ground.
4. Anchor bales with at least two stakes per bale, driven at least 18 inches into the ground; drive first stake in each bale toward the previously placed bale to force bales together.
5. Fill gaps between ends of bales with loose straw wedged tightly.
6. Place soil excavated for trench against bales on the upslope side of the row, compacted.

3.5 MAINTENANCE

A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall.

B. Repair deficiencies immediately.

C. Silt Fences:
1. Promptly replace fabric that deteriorates unless need for fence has passed.
2. Remove silt deposits that exceed one-third of the height of the fence.
3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.

D. Straw Bale Rows:
1. Promptly replace bales that fall apart or otherwise deteriorate unless need has passed.
2. Remove silt deposits that exceed one-half of the height of the bales.
3. Repair bale rows that are undercut by runoff or otherwise damaged, whether by runoff or other causes.

E. Clean out temporary sediment control structures weekly and relocate soil on site.

F. Inlet traps and inlet protection devices shall have all sediment removed when the volume of storage is half full. Gravel filter shall be replaced following significant events and when flow begins by-passing structure.

G. Storm Water Quality Structure shall have sediment cleaned out of sedimentation chamber when it reaches more than 6 inches (6”) in depth. Prior to final approval, all trash, sediment, and debris removed, and all silt/sediment shall be removed from filter beds.

H. Place sediment in appropriate locations on site; do not remove from site.

3.6 CLEAN UP

A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Fuller and D'Angelo, P.C. .

B. Clean out temporary sediment control structures that are to remain as permanent measures.

C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepencies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations and procedures.

F. Maintenance materials, extra materials.

1.3 RELATED REQUIREMENTS

A. Section 01 1000 - Summary of Contract.

B. Section 01 4000 - Quality Requirements: Product quality monitoring.

C. Section 01 7419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.4 REFERENCE STANDARDS

A. ISO 21930 - Sustainability in buildings and civil engineering works -- Core rules for environmental product declarations of construction products and services; 2017.

B. NEMA MG 1 - Motors and Generators; 2017.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.5 DEFINITIONS

A. Refer to "Article 7 General Engineering Agreernent" for additional requirements

B. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

C. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.

D. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.

E. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

F. Substitutions: Changes in products, materials, equipment, and methods of construction from those required or specified by the Contract Documents and proposed by Contractor.

G. Basis-of-Design Or Equal Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," or "or equal", including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers **shall be submitted as substitutions**.

H. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

1.6 SUBMITTALS

A. Refer to Section 01 3000 - Administrative Requirements for additional requirements

B. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 10 days after date of Notice of Award.
   2. For products specified only by reference standards, list applicable reference standards.

C. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

D. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

E. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

1.7 ASBESTOS

A. Asbestos: All products, materials, etc., used in conjunction with this Project shall be Asbestos-Free.
   1. Contractor shall provide a certified letter to the YPS Office of Facilities Management stating that no asbestos containing material has been used in this project. Refer to Section 01 7800 - Closeout Submittals.

B. Contractor(s) and sub contractors must provide test results upon completion from a New York State accredited testing lab certifying that all pipe insulation and joints on this project contain no asbestos.
   1. This certification shall be based on a sampling of 10% of all linear feet of pipe insulation, (unless manufacturer's certificate is submitted).

PART 2 PRODUCTS

2.1 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Yonkers Public Schools, or otherwise indicated as to remain the property of the Yonkers Public Schools, become the property of the Contractor(s); remove from site.

2.2 NEW PRODUCTS

A. Provide new products for all unless otherwise specifically required or permitted by the Contract Documents.

B. Use of products having any of the following characteristics is not permitted:
   1. Made outside the United States, its territories, Canada, or Mexico.
   2. Made using or containing CFC's or HCFC's.
   3. Made of wood from newly cut old growth timber.
   4. Containing lead, cadmium, or asbestos.

2.3 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named. Submit on form attached.

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 3000 - Administrative Requirements. All products, **other than "Basis of Design"**, shall be submitted as a substitution. Show compliance with requirements. Submit on form attached.

2.4 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

1. Deliver to YPS Office of Facilities Management; obtain receipt prior to final payment.

PART 3 EXECUTION

3.1 SUBSTITUTION LIMITATIONS

A. **Fuller and D'Angelo, P.C. will consider requests for substitutions only within 30 days after date** Letter of Award**.**

B. Substitutions will not be considered during the bidding phase.

C. A request for substitution constitutes a representation that the bidder:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
2. Agrees to provide the same warranty for the substitution as for the specified product.
3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extension that may subsequently become apparent.
5. Agrees to reimburse YPS Office of Facilities Management, Fuller and D'Angelo, P.C., and Consultant for review or redesign services associated with re-approval by authorities.

3.2 SUBSTITUTION SUBMITTAL PROCEDURE AFTER BIDDING PHASE

A. Substitution Request Form: Use form provided in this Section.

B. Submit in electronic PDF format one copy of request for substitution for consideration. Limit each request to one proposed substitution.

C. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.

D. Fuller and D'Angelo, P.C.'s Action: If necessary, Fuller and D'Angelo, P.C. will request additional information or documentation for evaluation within one week of receipt of a request for substitution. Fuller and D'Angelo, P.C. will notify Contractor of acceptance or rejection of proposed substitution within 30 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

1. Use product specified if Fuller and D'Angelo, P.C. cannot make a decision on use of a proposed substitution within time allocated.

3.3 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.4 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Arrange storage of materials and products to allow for visual inspection for the purpose of determination of quantities and unit counts.

E. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

F. Provide off-site storage and protection when site does not permit on-site storage or protection.
   1. Execute a formal supplemental agreement between Owner and Contractor allowing off-site storage, for each occurrence.

G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

H. Comply with manufacturer's warranty conditions, if any.

I. Do not store products directly on the ground.

J. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

K. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

L. Prevent contact with material that may cause corrosion, discoloration, or staining.

M. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

N. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

SUBSTITUTION REQUEST FORM

SUBSTITUTION REQUEST No. _____

(After the Bidding Phase)

Project: Auditorium Upgrades and Exterior Bleacher Replacement

Substitution Request Number: _____

From: _____ Tele #. _____

Date: _____

A/E Project Number: 19356.00

Specification Title: _____Description: _-_____

Section:_____ Page:_____ Article/Paragraph: _____

Proposed Substitution:

Manufacturer: _____ Address: _____ Phone:_____

_____model no.: _____

Installer:_____ Address: _____ Phone: _____

History: _____New product _____2-5 years old _____ 5-10 yrs old _____ More than 10 years old

Differences between proposed substitution and specified product:

_____

Point-by-point comparative data attached - REQUIRED

Reason for not providing specified item: _____

Similar Installation:

Project: _____ Architect: _____

Address:_____ Owner: _____

Date Installed: _____

Proposed substitution affects other parts of Work: ____ No ____Yes; explain

_____

Savings to Owner for accepting substitution: _____ ($)

Proposed substitution changes Contract Time: ____ No ____ Yes Add _____Deduct _____days.

Supporting Data Attached: ____ Drawings ____ Product Data ____ Samples _____ Tests Reports

The Undersigned certifies:

Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.

Same warranty will be furnished for proposed substitution as for specified product.

Same maintenance service and source of replacement parts, as applicable, is available.

Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.

Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.

Proposed substitution does not affect dimensions and functional clearances.

Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

Attachments:

A/E's REVIEW AND ACTION

____ Substitution approved - Make submittals in accordance with Specification Section 01330

____ Substitution approved as noted - Make submittals in accordance with Specification Section 01330.

____ Substitution rejected - Use specified materials.

____ Substitution Request received too late - Use specified materials.

:_____Date:_____

Additional Comments: __ Contractor __ Subcontractor __ Supplier __ Manufacturer __ A/E

_____

_____

_____

_____

_____

END OF SECTION

SECTION 01 7000
EXECUTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective removals .

C. Pre-installation meetings.

D. Cutting and patching.

E. General installation of products.

F. Progress cleaning.

G. Protection of installed construction.

H. Correction of the Work.

I. Dust control

J. Cleaning and protection.

K. Starting of systems and equipment.

1.3 RELATED REQUIREMENTS

A. YPS General Engineering Aggrement for additional requirements.

B. Section 01 3000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.

C. Section 01 4000 - Quality Requirements: Testing and inspection procedures.

D. Section 01 3553 - Site Safety and Security Procedures .

E. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties .

F. Section 01 7900 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections

G. Section 07 8400 - Firestopping.

H. Section 07 9200 - Joint Sealants.

I. Individual Product Specification Sections:
   1. Advance notification to other sections of openings required in work of those sections.
   2. Limitations on cutting structural members.

1.4 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:

1. Structural integrity of any element of Project.
2. Integrity of weather exposed or moisture resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Include in request:
   a. Necessity for cutting or alteration.
   b. Description of proposed work and products to be used.

1.6 PROJECT CONDITIONS

A. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
   1. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Lincoln High School.

B. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations when thr building is occupieed..
   1. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes jackhammers.
   2. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.
   3. Indoors: Limit conduct of especially noisy interior work to the hours of 6 pm to 7 am.

1.7 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Contract Manual and Specification to ensure efficient and orderly sequence of installation of interdependent construction elements.

B. In finished areas, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

C. Coordinate completion and clean-up of work of separate sections.

D. After Yonkers Public Schools occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Yonkers Public Schools's activities.

E. General: The Contractor includes general coordination of the entire work of the project, including preparation of general coordination drawings, diagrams and schedules and control of site utilization from the beginning of construction activity through project closeout and warranty periods.

1.8 CODES, PERMITS, FEES

A. Refer to Section 01 4100 - Regulatory Requirements.

1.9 MANDATORY OSHA CONSTRUCTION SAFETY AND HEALTH TRAINING

A. Pursuant to NYS Labor Law §220-h - On all public work projects all laborers, workers and mechanics working on the site are required to be certified as having successfully completed an OSHA construction safety and health course of at least 10 hours prior to performing any work on the project.

PART 2 PRODUCTS

2.1 MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

D. Barriers shall be constructed of sturdy lumber having a minimum size of 2 x 4.

1. Signs shall be made of sturdy plywood of 1/2" minimum thickness and shall be made to legible at a distance of 50 feet.

PART 3 EXECUTION

3.1 EXAMINATION

A. Prior to start of construction take photographs, video's or similar documentation as evidence of existing project conditions as follows:
   1. Interior views: Each room and areas of outside work area which could be construded as damaged caused by the contractor.
   2. Exterior views: Each area of work and areas of outside work area which could be construded as damage caused by the contractor.

B. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.3 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site **prior to commencing work of the section.**

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify YPS Office of Facilities Management and Fuller and D'Angelo, P.C. four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to YPS Office of Facilities Management and Fuller and D'Angelo, P.C., participants, and those affected by decisions made.

3.4 LAYING OUT THE WORK

A. Promptly notify YPS Office of Facilities Management and Fuller and D'Angelo, P.C.of any discrepancies discovered.

3.5 REMOVAL AND DUST CONTROL

A. The following procedures shall be followed when removals will create dust:
   1. Interior:
      a. Floor surfaces shall be provided with a minimum of one layer of six mil plastic from work area to exits..
      b. All air vents in the room shall be closed, shut off and sealed.
      c. Access to all rooms undergoing removals shall be restricted to prevent unauthorized entry.

d. All moveable objects will be moved away from the vicinity of the removals by the Contractor. The Contractor shall cover with a drop cloth.

e. All corridors used by Contractors shall be mopped and left clean daily prior to occupancy.

2. Contractor shall provide labor for daily cleanup on the interior and the exterior of the building as required or directed by the Owner's Representative. Any visible debris shall be removed prior to occupancy the following day.

3. All debris shall be disposed of properly in accordance with Federal, State and Local Regulations. Refer to Section 01 5000 - Temporary Facilities and Controls and asbestos and lead abatement sections for containers required.

4. Do not leave any openings unprotected at end of work day or during periods of excessive cold weather or precipitation.

5. At completion of each work area HEPA vacuumed and wet wipe.

3.6 CHEMICAL FUMES AND OTHER CONTAMINATES

A. The Contractor shall be responsible for the control of chemical fumes, gases and other contaminates produced by welding, gasoline or diesel engines, roofing, paving, painting, etc., to ensure they do not enter occupied portions of the building or air intakes.

B. The Contractor shall be responsible to ensure that activities and materials which result in “off-gassing” of volatile organic compounds such as glues, paints, furniture, carpeting, wall covering, drapery, etc., are scheduled, cured or ventilated in accordance with manufacturer’s recommendations before a space can be occupied.

3.7 GENERAL INSTALLATION REQUIREMENTS

A. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.

B. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

D. Saw cut all concrete slabs and asphalt paving.

E. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

F. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

G. Make neat transitions between different surfaces, maintaining texture and appearance.

3.8 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.

1. Verify that construction and utility arrangements are as indicated.

2. Report discrepancies to YPS Office of Facilities Management and Fuller and D'Angelo, P.C. before disturbing existing installation.

3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Keep areas in which alterations are being conducted separated from other areas that are still occupied or unoccupied.

C. Remove existing work as indicated and as required to accomplish new work.

1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.

2. Remove items indicated on drawings.

3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.

4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

D. Services (Including but not limited to HVAC, Plumbing, and Electrical): Remove, relocate, and extend existing systems to accommodate new construction.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
      a. Identify new equipment installed, but not in service, with appropriate signage or other forms of identification. indicating "Not in Service".
      b. Disable existing systems only to make switchovers and connections; minimize duration of outages.
      c. Provide temporary connections as required to maintain existing systems in service.
      d. Perform all switchovers, shutdowns, etc after hours, weekends, holidays or times when the building is not occupied. All switchover scheduling shall be approved by the Owner.
   3. Verify that abandoned services serve only abandoned facilities.
   4. Remove conduits; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

E. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch as specified for patching new work.

F. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

G. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

H. Refinish existing surfaces as indicated:

I. Remove debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

J. Do not begin new construction in alterations areas before removals are complete.

K. Comply with all other applicable requirements of this section.

3.9 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
   1. Complete the work.
   2. Fit products together to integrate with other work.
   3. Provide openings for penetration of electrical and other services.
   4. Match work that has been cut to adjacent work.
   5. Repair areas adjacent to cuts to required condition.
   6. Repair new work damaged by subsequent work.
   7. Remove samples of installed work for testing when requested.
   8. Remove and replace defective and non-complying work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing.

E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

F. Restore work with new products in accordance with requirements of Contract Documents.

G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. Patching:
   1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
   2. Match color, texture, and appearance.
   3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

I. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.

3.10 SPECIAL REQUIREMENTS

A. All existing systems are required and shall remain operational during the performance of the work.

B. Notwithstanding anything contained in the Contract Documents to the contrary, the contractor shall not be permitted to disrupt operation of any building system or any of the services without YPS Office of Facilities Management's prior written consent, which shall not be unreasonably withheld. Any request to perform such work shall be in writing, received by YPS Office of Facilities Management no less than 5 working days prior to the commencement of the request for disruption, and shall detail:
   1. The exact nature and duration of such interruption;
   2. The area of the Building affected, and;
   3. Any impact upon the Construction Schedule caused by such proposed temporary disruption. All Work shall be performed during the hours and on the days set forth in the Specifications.

3.11 FIRE PREVENTION AND CONTROL Refer to Section 01 3553

3.12 WATCHMAN

A. The YPS Office of Facilities Management will not provide watchman. The Contractor will be held responsible for loss or injury to persons or property or work where his work is involved and shall provide such watchman and take such precautionary measures as he may deem necessary to protect his own interests.

3.13 SECURITY SYSTEM Refer to 01 3553 - Security Procedures

A. The existing building contains a security alarm system maintained and operated by the Owner. Access into the existing building shall not be permitted unless the owner is notified and arrangements made to deactivate the system.

3.14 VERIFICATION OF CONDITIONS

A. All openings, measurements, door frames, existing conditions and other similar items or conditions shall be field measured prior to submission of any shop drawings or manufacturers literature for approval.
   1. The Contractor shall investigate each space into and through which equipment must be moved. Equipment shall be shipped from manufacturer in sections, of size suitable for moving through restricted spaces. Where sectional fabrication and or delivery cannot be achieved, openings, enlargements etc shall be provided by each contractor whose equipment requires access, at no additional cost to the Owner.

3.15 PROGRESS CLEANING

A. The Contractor is responsible for their own daily debris removal into containers provided by the Contractor. Working areas are to be broom swept on a daily basis by the Contractor.

B. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

C. Remove debris and rubbish from pipe chases, plenums, and and other closed or remote spaces, prior to enclosing the space.

D. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

E. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

F. If daily cleaning and dust protection is not provided the Contractor will be back charged for cleanup performed by employees of the Owner or a separate contractor retained by the Owner.

3.16 PROTECTION OF INSTALLED WORK

A. The Contractor shall be responsible for the protection of all his work and shall make good all damage to the Owners property, adjoining property, and/or to any work or material in place in the premises, or included in his contract, which is caused by his work or workmen. which may occur to his work prior to the date of the final acceptance.

1. From the commencement to the completion of the Project, the Contractor shall keep the parts of the work and the buildings free from accumulation of water no matter what the source or cause.

B. The Contractor shall be held responsible for and be required to make good at his own expense any and all damage done to the Owners property, adjoining property, and/or to any work or material in place in the premises, or included in his contract, which is caused by his work or workmen.

C. Mechanical and electrical equipment delivered and stored at the site, properly packed and crated. Each piece of equipment shall remain packed and crated at location until final installation. Uninstalled and installed equipment and materials shall be protected against damage by weather, water, paint, plaster, moisture, fumes, dust or physical damage.

D. Protect installed work from damage by construction operations.

E. Provide special protection where specified in individual specification sections.

F. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

G. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

H. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

I. Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace protective coverings.

J. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

K. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.17 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify YPS Office of Facilities Management and Fuller and D'Angelo, P.C.seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of Contractor's personnel and manufacturer's representative in accordance with manufacturers' instructions.

G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.18 DEMONSTRATION AND INSTRUCTION

A. See Section 01 7900 - Demonstration and Training.

3.19 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

B. Refer to Individual Sections for Testing, adjusting, and balancing of system .

3.20 FINAL CLEANING

A. Final cleaning shall be the responsibility of the Contractor and all costs for final cleaning shall be included in the Base Bid. Final cleaning responsibility shall be limited to all new additions and areas where renovations occur.

B. Execute final cleaning prior to Substantial Completion.

C. Use cleaning materials that are nonhazardous.

D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

F. Clean filters of operating equipment.

G. Clean site; sweep paved areas, rake clean landscaped surfaces.

H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

I. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

J. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

K. Remove snow and ice to provide safe access to building.

L. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

M. Touch up and otherwise repair and restore marred, exposed finishes and surfaces evidence of repair or restoration. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show

N. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

O. Leave Project clean and ready for occupancy.

3.21 CLOSEOUT PROCEDURES Refer to Section 01 7800

3.22 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the YPS Office of Facilities Management.

END OF SECTION

SECTION 01 7419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepencies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 WASTE MANAGEMENT REQUIREMENTS

A. Yonkers Public Schools requires that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
   1. Aluminum and plastic beverage containers.
   2. Corrugated cardboard.
   3. Wood pallets.
   4. Clean dimensional wood.
   5. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
   6. Gypsum drywall and plaster.
   7. Plastic buckets.
   8. Paint.
   9. Mechanical and electrical equipment.
   10. Fluorescent lamps (light bulbs).
   11. Acoustical ceiling tile and panels.

E. Each Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.

F. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.
   2. Burying on the project site.
   3. Dumping or burying on other property, public or private.
   4. Other illegal dumping or burying.
   5. Incineration, either on- or off-site.

G. Regulatory Requirements: Each Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.3 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. Section 01 5000 - Temporary Facilities and Controls: Additional requirements related to trash/waste collection and removal facilities and services.

C. Section 01 6000 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.

D. Section 01 7000 - Execution: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

E. Section 31 1000 - Site Preparation and Clearing: Handling and disposal of land clearing debris.

1.4 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.

1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
2. Submit Report on a form acceptable to YPS Office of Facilities Management.
3. Landfill Disposal: Include the following information:
    a. Identification of material.
    b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
    c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.

d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.

4. Recycled and Salvaged Materials: Include the following information for each:
   a. Identification of material, including those retrieved by installer for use on other projects.
   b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
   c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
   d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
   e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
5. Material Reused on Project: Include the following information for each:
   a. Identification of material and how it was used in the project.
   b. Amount, in tons or cubic yards.
   c. Include weight tickets as evidence of quantity.
6. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION

3.1 WASTE MANAGEMENT PROCEDURES

A. See Section 01 3000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. See Section 01 5000 for additional requirements related to trash/waste collection and removal facilities and services.

C. See Section 01 6000 for waste prevention requirements related to delivery, storage, and handling.

D. See Section 01 7000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.2 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, YPS Office of Facilities Management and Fuller and D'Angelo, P.C..

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings.
   1. Prebid meeting.
   2. Preconstruction meeting.
   3. Regular job-site meetings.

E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
   1. Provide containers as required.
   2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
   3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepencies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Substantial Completion.

B. Final Completion.

C. Project Record Documents.

D. Operation and Maintenance Data.

E. Warranties and bonds.

1.3 RELATED REQUIREMENTS

A. Refer to Article 81 YPS General Engineering Agreement for additional requirements.

B. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

C. Individual Product Sections: Specific requirements for operation and maintenance data.

D. Individual Product Sections: Warranties required for specific products or Work.

1.4 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion:
   1. Prepare a list of items to be completed and corrected, the value of items on the list, and reasons why the Work is not complete.
   2. Advise YPS Office of Facilities Management and Fuller and D'Angelo, P.C. of pending insurance changeover requirements.
   3. Obtain and submit releases permitting YPS Office of Facilities Management and Fuller and D'Angelo, P.C. unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

B. Prior to issuance of the Certificate of Substantial Completion, submit, in writing, a request to the YPS Office of Facilities Management and Fuller and D'Angelo, P.C. to perform site inspection for the purpose of preparing a "punch list".

C. On receipt of request the YPS Office of Facilities Management and Fuller and D'Angelo, P.C. will schedule and prepare a punch list.

D. Certificate of Substantial Completion will be issued **only after completion of all punch list items** or YPS Office of Facilities Management and Fuller and D'Angelo, P.C. will notify Contractor of items, either punch list or additional items identified by Architect, **that must be completed or corrected before a certificate will be issued.** After completion of **all punch list items** submit the following:
   1. Application for Payment showing 100 percent completion for portion of the Work claimed as substantially completed.
   2. Manufacturer's Warranties/guarantees.
   3. Contractor's Warrantee Two (2) years minimum and extended warrantees.
   4. Maintenance agreements, if any.
   5. Manifest for disposal of Hazardous Material.
   6. Manifest for disposal of material.

7. Test/adjust/balance reports and records.
8. Maintenance Manuals and Instructions Manuals
9. Signed Receipt by YPS Office of Facilities Management of spare parts and attic stock.
10. Start-up performance reports.
11. Changeover information related to Owner's occupancy, use, and maintenance.
12. Advice on shifting insurance coverage.
13. List of incomplete Work, recognized as exceptions to Architect's "punch list".
14. Removal of temporary facilities and services.
15. Removal of surplus materials, rubbish and similar elements.
16. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
17. As Built Drawings.
18. Project Record Documents.
19. DOL Final Completion Form. (PW 200).

E. Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
1. If necessary re-inspection will be repeated and the contractor shall pay for all additional inspections.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.5 FINAL PAYMENT

A. Refer to School Facilities Management Contract Manual and Specifications for additional requirements.

B. Following issuance of the Substantial Completion of work submit the following:
1. Architect's punch list certifying all punch list items have been completed with each item signed off by the YPS Office of Facilities Management and Contractor**.**
2. Update final statement, accounting for final changes to the Contract Sum.
3. Release of liens from contractor and all entitles of the contractor.
4. Consent of Surety to Final Payment, AIA Document G707.
5. Final Liquidated Damages settlement statement.
6. Contractor's Affidavit of Release of Liens (AIA G706A).
7. Contractors Affidavit of Payment of Debts and Claims (AIA G706).
8. Contractor's Certification of Payment of Prevailing Wage Rates.
9. Contractor's Certification of Compliance that products comply with VOC requirements stated in Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
10. Contractor's Certified Statement that no asbestos containing material was incorporated into the project.
11. Asbestos manifest.
12. Underwriters Certificate or authorized third party Certificate.

1.6 SUBMITTALS

A. Contractor shall submit all documentation identified in this section within thirty (30) working days from the time the Contractor submits the list of items to be corrected, in addition to other rights of the Owner set forth elsewhere in the Contract Documents, to include but not limited to withholding of final payment. If the documentation has not been submitted within Thirty (30) day period, the Owner will obtain such through whatever means necessary. The Contractor shall solely be responsible for all expenses incurred by the Owner, provided the Owner has advised the Contractor of this action seven7 days prior to the culmination date by written notice

B. Project Record Documents: Submit documents to Fuller and D'Angelo, P.C. with claim for final Application for Payment.

C. Warranties and Bonds:

1. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by YPS Office of Facilities Management.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Field changes of dimension and detail.
   2. Details not on original Contract drawings.

3.2 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and approved Shop Drawings at the project site.

B. Each Prime Contractor is responsible for marking up Sections that contain its own Work and for submitting the complete set of record Specifications as specified.

C. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

D. Content: Types of items requiring marking include, but are not limited to, the following:
   1. Revisions to details shown on Drawings.
   2. Revisions to electrical circuitry.
   3. Changes made by Change Order or Construction Change Directive.
   4. Changes made following YPS Office of Facilities Management's written orders.
   5. Details not on the original Contract Drawings.

E. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.

F. Mark important additional information that was either shown schematically or omitted from original Drawings.

G. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

H. **Provide three copies of final record contract drawings, specifications and approved shop drawings on CD in PDF format.**

3.3 FORMAT

A. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Contractor shall certify and sign.

B. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

C. Identify Record Drawing as follows:
   1. Project name.
      a. Date.
      b. Designation "PROJECT RECORD DRAWINGS."
      c. Name of Owner, YPS Office of Facilities Management, Fuller and D'Angelo, P.C., and Contractor(s)
      d. Contractor(s) shall certify and sign each drawing

3.4 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.5 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.6 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Include color coded wiring diagrams as installed.

E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
   1. Include HVAC outdoor and exhaust air damper calibration strategy.

a. Include provisions which ensure that full closure of dampers can be achieved.

2. Include Carbon Dioxide Monitoring Protocol.

3. Include Carbon Monoxide Monitoring Protocol.

G. Provide servicing and lubrication schedule, and list of lubricants required.

H. Include manufacturer's printed operation and maintenance instructions.

I. Include sequence of operation by controls manufacturer.

J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

K. Provide control diagrams by controls manufacturer as installed.

L. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

M. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

N. Additional Requirements: As specified in individual product specification sections.

3.7 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Yonkers Public Schools's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Owner, YPS Office of Facilities Management, Fuller and D'Angelo, P.C., Consultant, Contractor, and sub-contractor(s) with names of responsible parties.

F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

H. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

J. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.

1. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

3.8 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with YPS Office of Facilities Management's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

CHECKLIST FOR PROJECT CLOSEOUT

AND PROCESSING OF FINAL PAYMENT

A. **PROJECT: Auditorium Upgrades and Exterior Bleacher Replacement.**

BOARD OF EDUCATION BID NUMBER;

CLOSE-OUT SUBMITTALS: (As Applicable)

[ ] PREVAILING WAGE CERTIFICATION.

[ ] UL CERTIFICATION

THREE (3) 3-RING BINDER BROCHURES OF OPERATION AND MAINTENANCE MANUALS FOR ALL EQUIPMENT INSTALLED ON THE PROJECT INCLUDING THE FOLLOWING:

[ ] TYPED OR PRINTED INSTRUCTIONS COVERING THE CARE AND OPERATIONS OF EQUIPMENT AND SYSTEMS FURNISHED AND INSTALLED.

[ ] MANUFACTURERS INSTRUCTION BOOKS, DIAGRAMS, SPARE PARTS LISTS COVERING ALL EQUIPMENT.

[ ] INSTRUCTION OF OWNER'S REPRESENTATIVE IN CARE AND MAINTENANCE OF NEW EQUIPMENT.

[ ] ALL APPROVED SHOP DRAWINGS.

[ ] CERTIFICATES OF COMPLIANCE AND INSPECTION. (WHERE APPLICABLE MANUFACTURER'S REPORTS, ELECTRIC, ELEVATOR, ETC.)

[ ] SPARE PARTS AND MAINTENANCE MATERIALS. (RECEIPT SIGNED BY FIELD SUPERINTENDENT)

[ ] EVIDENCE OF COMPLIANCE WITH REQUIREMENTS OF GOVERNING AUTHORITIES (CERTIFICATES OF INSPECTION ELECTRICAL).

[ ] NOTARIZED STATEMENT THAT ONLY NON-ASBESTOS MATERIALS WERE INSTALLED ON THIS PROJECT.

[ ] FULLY EXECUTED CERTIFICATE OF SUBSTANTIAL COMPLETION: AIA G704.

[ ] CONTRACTOR'S WRITTEN FIVE-YEAR WARRANTY, MANUFACTURER'S WARRANTY, AND EXTENDED WARRANTIES (IF ANY REQUIRED).

[ ] PROJECT RECORD DOCUMENTS: SECTION 01 7800 - Closeout Submittals**.**

[ ] AS-BUILT DRAWINGS.

EVIDENCE OF PAYMENT AND RELEASE OF LIEN

[ ] CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS: AIA G706.

[ ] CONTRACTOR'S AFFIDAVIT OF RELEASE OF LIENS - AIA G706A PRIME CONTRACTORS AND SUBCONTRACTORS.

[ ] CONSENT OF SURETY TO FINAL PAYMENT AIA G707.

REFER TO SECTION 01 7800 and SCHOOL FACILITIES MANAGEMENT CONTRACT MANUAL AND SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS. FINAL PAYMENT WILL NOT BE PROCESSED UNTIL ALL ITEMS INDICATED ARE RECEIVED.

END OF SECTION

SECTION 01 7900
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SUMMARY

A. Demonstration of products and systems where indicated in specific specification sections.

B. Training of YPS Office of Facilities Management personnel in operation and maintenance is required for:
   1. HVAC systems and equipment.
   2. Electrical systems and equipment.

C. Training of YPS Office of Facilities Management personnel in care, cleaning, maintenance, and repair is required for:
   1. Finishes, including flooring, wall finishes, ceiling finishes.
   2. Items specified in individual product Sections.

1.3 RELATED REQUIREMENTS

A. Section 01 7800 - Closeout Submittals: Operation and maintenance manuals.

B. Section 01 9113 - General Commissioning Requirements: Additional requirements applicable to demonstration and training.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Training Plan: YPS Office of Facilities Management will designate personnel to be trained; tailor training to needs and skill-level of attendees.
   1. Submit to YPS Office of Facilities Management for transmittal to .
   2. Submit not less than four weeks prior to start of training.
   3. Revise and resubmit until acceptable.
   4. Provide an overall schedule showing all training sessions.
   5. Include at least the following for each training session:
      a. Identification, date, time, and duration.
      b. Description of products and/or systems to be covered.
      c. Name of firm and person conducting training; include qualifications.
      d. Intended audience, such as job description.
      e. Objectives of training and suggested methods of ensuring adequate training.
      f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
      g. Media to be used, such a slides, hand-outs, etc.
      h. Training equipment required, such as projector, projection screen, etc., to be provided by YPS Office of Facilities Management.

C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
   1. Include applicable portion of O&M manuals.
   2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.

3. Provide one extra copy of each training manual to be included with operation and maintenance data.

D. Training Reports:
1. Identification of each training session, date, time, and duration.
2. Sign-in sheet showing names and job titles of attendees.
3. List of attendee questions and written answers given, including copies of and references to supporting documentation required for clarification; include answers to questions that could not be answered in original training session.

E. Video Recordings: Submit digital video recording of each demonstration and training session for YPS Office of Facilities Management's subsequent use.
1. Format: DVD Disc.
2. Label each disc and container with session identification and date.

1.5 QUALITY ASSURANCE

A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 DEMONSTRATION - GENERAL

A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by YPS Office of Facilities Management.

B. Demonstration may be combined with Yonkers Public Schools personnel training if applicable.

C. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
1. Perform demonstrations not less than two weeks prior to Substantial Completion.
2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.2 TRAINING - GENERAL

A. Conduct training on-site unless otherwise indicated.

B. YPS Office of Facilities ManagementOwner’s representative will provide classroom and seating at no cost to Contractor.

C. Provide training in minimum of two (2) - two hour segments.

D. Training schedule will be subject to availability of YPS Office of Facilities Management's personnel to be trained; re-schedule training sessions as required by YPS Office of Facilities Management; once schedule has been approved byYPS Office of Facilities Management failure to conduct sessions according to schedule will be cause for YPS Office of Facilities Management to charge Contractor for personnel "show-up" time.

E. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
1. The location of the O&M manuals and procedures for use and preservation; backup copies.

2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
3. Typical uses of the O&M manuals.

F. Product- and System-Specific Training:
1. Review the applicable O&M manuals.
2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
4. Provide hands-on training on all operational modes possible and preventive maintenance.
5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
6. Discuss common troubleshooting problems and solutions.
7. Discuss any peculiarities of equipment installation or operation.
8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
9. Review recommended tools and spare parts inventory suggestions of manufacturers.
10. Review spare parts and tools required to be furnished by Contractor.
11. Review spare parts suppliers and sources and procurement procedures.

G. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION

SECTION 028201
ASBESTOS REMOVAL AND DISPOSAL

PART 1 - GENERAL

1.01 Work Included

A. The Contractor shall furnish all labor, materials, services, insurance, patents, and equipment necessary to perform the Work of this Contract. All work will be conducted in compliance with EPA, OSHA, and NYS regulations, any other applicable federal, state, and local regulations and in accordance with these specifications. In the event, there is a conflicting point between these provisions, the most stringent one shall apply.

B. The work will involve the removal of all Asbestos Containing Materials and all Asbestos Waste from within the Work Zones in accordance with all applicable rules and regulations and this specification. Location of asbestos indicated is provided for guidance only. The Contractor shall be responsible for establishing quantities and locations. The project will take place at Lincoln High School, 375 Kneeland Avenue Yonkers, New York 10704.

Lincoln High School –Various Locations

- **Ceramic Tile Backing – Boy's Restroom and Girl's Restroom (845 SF)**
- **Grey/Black Radiator Insulation – Auditorium and 2nd Floor Hallway by Auditorium (270 SF)**
- **Pipe Fittings – 3rd Floor Mechanical Room (14 LF)**
- **Air-Cell Pipe Insulation – 3rd Floor Mechanical Room (36 LF)**
- **Air Handler Duct Insulation - 3rd Floor Mechanical Room (530 SF)**
- **Exterior Louver Caulking – 3rd Floor Mechanical Room (46 LF)**

Removal shall be performed in accordance with New York State Industrial Code Rule 56 and the Contract Documents. **The supporting wood blocking/framing for the ACM board insulation is to remain. Contractor to re-insulate all piping, fittings and ducts and this cost to be included in base bid.**

The project shall be conducted as follows:

A. BASE BID – Lincoln School – Various Locations

Removal and disposal of approximately 845 SF of asbestos containing ceramic tile backing, approximately 270 SF of asbestos containing radiator insulation, approximately 14 LF pipe fittings, approximately 36 LF of asbestos containing pipe insulation, approximately 530 SF of asbestos containing duct insulation, and approximately 46 LF of asbestos containing louver caulking from various locations. Asbestos removal shall be conducted using full containment procedures in accordance with New York State Industrial Code Rule 56 and the contract documents. The contractor shall remove all asbestos and properly clean work area of all debris. **The supporting wood blocking/framing for the ACM board insulation is to remain. Contractor to re-insulate all piping, fittings and ducts and this cost to be included in base bid.**

NOTE:

1) The abatement areas shown on the drawings are provided for guidance only and no claims are made as to their accuracy. **The Contractor is alone responsible for determining the actual abatement quantities. If quantities differ the Contractor is responsible for bringing the discrepancy to the Construction Manager/Engineer's attention before any removal work proceeds.**

2) **In the event that clearance samples do not pass, the Asbestos Abatement Contractor will be responsible for all costs associated with resampling until acceptable clearance levels have been obtained.**

3) Removal of the asbestos containing materials from this building will be conducted in accordance with NYS Industrial Code Rule 56 and the contract documents. The contractor may use project specific variances from NYS ICR 56 to perform the asbestos abatement work. To utilize a project specific variance, the contractor shall submit a copy of the proposed variance that outlines the removal procedures to the engineer for review and approval before the commencement of any work.

4) Removal of the asbestos containing materials from this building will be conducted in accordance with NYS Industrial Code Rule 56, applicable variances, a site-specific variance (if required) and the contract documents.

5) During the project, other trades will be working in the building, the Asbestos Contractor shall coordinate all of his work with the other trades as required.

6) The Contractor is responsible for using " standard of care " when applying or removing tape, spray adhesive or any other type of bonding material from the walls, floors or ceilings. If damage is sustained to an area during the work procedure directly related to the negligence of the contractor, then that Contractor is responsible for returning the area to its original condition unless otherwise noted.

7) Critical barriers and the doorways shown on the drawing shall be covered with three layers of at least six-mil polyethylene sheeting sealed with tape.

8) The Contractor shall be responsible for all utility cable protection within the Work Zone Limits.

9) The Contractor is required to abide by the most current Prevailing Wage Rates at the time of the abatement project.

10) The Contractor shall furnish all labor, materials, services, insurance, patents, and equipment necessary to carry out the removal operation. All work will be conducted in compliance with EPA, OSHA, and NYS regulations, and any other applicable federal, state, and local regulations and in accordance with these specifications. In

the event, there is a conflicting point between these provisions, the most stringent one shall apply.

1.02 Definitions

A. ABATEMENT: Procedures to control fiber release from Asbestos-Containing Materials. This includes encapsulation, enclosure, and removal.

B. AIRLOCK: A system for permitting egress without permitting air movement between a contaminated area and an uncontaminated area, typically consisting of two Curtained Doorways at least 3 feet apart.

C. AIR MONITORING: The process of measuring the fiber content of a specific volume of air in a stated period of time.

D. AREA MONITORING: Sampling of asbestos fiber concentrations within the asbestos control area and outside the asbestos control area, which is representative of the airborne concentrations of asbestos fibers in the breathing zone.

E. AMENDED WATER: Water containing a wetting agent or surfactant.

F. ASBESTOS: Any hydrated mineral silicate separable into commercially usable fibers, including but not limited to chrysotile (serpentine), amosite (cumington-grunerite), crocidolite (riebeckite), tremolite, anthophyllite, and actinolite.

G. ASBESTOS CONTAINING MATERIAL (ACM): Any Asbestos or any material containing more than one percent of Asbestos by weight or volume.

H. ASBESTOS CONTAMINATED OBJECTS: Any object which has been contaminated by Asbestos or Asbestos Containing Material. This shall include all unprotected porous materials in an Asbestos Work Area.

I. ASBESTOS CONTROL AREA: An area where Asbestos Abatement operations are performed, which is isolated by physical boundaries to prevent the spread of asbestos dust, fibers, or debris.

J. ASBESTOS WASTE: Any Asbestos Containing Material or Asbestos Contaminated Objects requiring disposal.

K. AUTHORIZED VISITOR: The Owner, the Engineer, or a representative of any regulatory or other agency having jurisdiction over the project.

L. CLEAN ROOM: An uncontaminated area or room which is part of the Worker Decontamination Enclosure System, with provisions for storage of workers' street clothes and protective equipment.

M. COMPETENT PERSON: One who is capable of identifying existing asbestos hazards in the Work place and who has the authority to take prompt corrective measures to eliminate them as specified in 29 CFR 1926.32(f); Reference 29 CFR 1926.58(b) for duties and responsibilities.

N. CRITICAL BARRIER: Any windows, HVAC diffusers (exhaust or return), pipe sleeves, penetrations, doorways or any other openings leading to an occupied area of the building or to the outside.

O. CURTAINED DOORWAY: A device to allow egress from one room to another while permitting minimal air movement between the rooms, typically constructed of three overlapping sheets of plastic over an existing or temporary door frame. Attach a weight to each sheet and seal at alternating edges so as to produce a zig-zag pattern of entrance or exit.

P. ENCAPSULANT: A liquid material which can be applied to Asbestos-Containing Material and which controls the possible release of Asbestos fibers from the Asbestos Containing Material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant). This may also be used to seal surfaces from which asbestos containing materials have been removed.

Q. ENCAPSULATION: All herein specified procedures necessary to coat materials with an encapsulant to control the possible release of Asbestos fibers into the ambient air.

R. ENCLOSURE: All herein specified procedures necessary to complete enclosure of Asbestos Containing Materials behind an airtight and impermeable barrier.

S. EQUIPMENT ROOM: A contaminated area or room which is part of the Worker Decontamination Enclosure System, with provisions for the storage of contaminated clothing and equipment.

T. FIXED OBJECT: A unit of equipment or furniture in the Work Zone which cannot be removed from the Work Zone.

U. FRIABLE ASBESTOS MATERIAL: An Asbestos Containing Material that can be crumbled, pulverized, or reduced to powder when dry, by hand pressure or will crumble, be pulverized or produce powder when subjected to specific mechanical operation.

V. HEPA FILTER: A high efficiency particulate air (HEPA) filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 micrometers in diameter.

W. HEPA VACUUM EQUIPMENT: High efficiency particulate air (absolute) filtered vacuuming equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall be of 99.97% efficiency for retaining fibers of 0.3 micrometers or larger.

X. HOLDING AREA: A chamber between the Washroom and an uncontaminated area in the Waste Decontamination Enclosure System. The Holding Area comprises an airlock.

Y. MOVABLE OBJECT: A unit of equipment or furniture in the Work Zone which can be removed from the Work Zone.

Z. NEGATIVE PRESSURE SYSTEM: A local exhaust system equipped with HEPA filtration that is capable of maintaining a minimum pressure differential of minus 0.05 inch of water column relative to adjacent unsealed areas.

AA. NON-FRIABLE ASBESTOS MATERIAL: An Asbestos Containing Material in which the fibers have been locked in by a bonding agent, coating, binder, or other material so that the Asbestos is well bound and that when dry cannot be crumbled, pulverized or reduced to powder by hand pressure and will not be subject to mechanical operations.

BB. PERSONNEL DECONTAMINATION ENCLOSURE SYSTEM: A Decontamination Enclosure System for Workers, typically consisting of an Airlock, an Equipment Room, a second Airlock, a Shower room, a third Airlock, and a Clean Room.

CC. PERSONAL MONITORING: Sampling of airborne asbestos fiber concentrations within the breathing zone of an employee.

DD. REMOVAL: All herein specified procedures necessary to strip all Asbestos Containing Materials from the designated areas.

EE. SHOWER ROOM: A room between the Clean Room and the Equipment Room in the Worker Decontamination Enclosure System, with hot and cold running water and suitably arranged for complete showering during decontamination. The Shower Room comprises an airlock between the Equipment Room and the Clean Room.

FF. SURFACTANT: A chemical wetting agent added to water to improve penetration of water into the Asbestos Containing Materials.

GG. TIME WEIGHTED AVERAGE (TWA): An 8-hour time weighted average of airborne fiber concentration per cubic centimeter of air. Three samples are required to establish the 8-hour time weighted average.

II. WASHROOM: A room between the Work Zone and the Holding Area in the Waste Decontamination Enclosure System. The Washroom comprises an airlock.

JJ. WASTE DECONTAMINATION ENCLOSURE SYSTEM: A Decontamination Enclosure System for materials and equipment, typically consisting of an Airlock, a Washroom, a second Airlock, and a Holding Room.

KK. WET CLEANING: The process of eliminating Asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning tools which have been dampened with water, and by afterwards disposing of these cleaning tools as Asbestos Waste.

LL. WORK SITE: Premises where Asbestos Abatement is taking place. The Work Site includes, but is not limited to the Work Zone, the Personnel and Waste Decontamination Systems, the staging area, the disposal route and the loading dock.

MM. WORK ZONE: Any area indicated on the Drawings as Asbestos Abatement areas or as areas with Asbestos Containing Material.

1.03 Submittals

A. Submit the following items to the Engineer for review twenty (20) days prior to the commencement of Work associated with this section:

1. EPA Notification: The form required by the Environmental Protection Agency in accordance with the National Emission Standard for Asbestos, 40 CFR Part 61.

2. New York State Department of Labor Notification: The form required by the State of New York Asbestos Control Program in accordance with Article 30 of the New York State Labor Law.

3. Any proposed project specific variance to any of the applicable regulations.

Upon return of submittals from the Engineer with an action stamp indicating that the submissions have been reviewed and comply with the contract documents, file all notifications with the appropriate agencies in accordance with all applicable regulations and these specifications. Pay the appropriate fees. All filing fees and associated costs shall be borne by the Contractor.

B. Submit the following items to the Engineer for review ten (10) days prior to the commencement of Work associated with this section. No Work shall begin until ALL submittals are returned with an action stamp indicating that the submission is in accordance with these specifications.

1. NOTIFICATIONS: Stamped received copies of the notifications (EPA only) and variances listed above in item A, as well as copies of the canceled checks used to pay all associated fees.

2. CONTRACTOR'S CERTIFICATION: Documentation confirming licensing by New York State Commission of Labor for asbestos Work in accordance with Industrial Code Rule 56.

3. WORKER DOCUMENTATION: Current copies of the AHERA certificates, New York State Department of Labor Asbestos Handling Certificates, Medical Exams and Respirator Fit Tests for all employees performing the Work of this Section.

4. EMPLOYEE RELEASE FORM: Prior to allowing an employee to perform any Work on the project, submit the properly executed Employee Release Form for each employee. A copy of this form is included herein.

5. CONTINGENCY PLANS: A copy of emergency, security, and contingency plans as follows:
   a. A plan to provide for emergency and fire evacuation of personnel from the Work Zone in an emergency. File a copy of this plan with the local fire and/or ambulance unit;

   b. A plan for maintaining the security of the Work Zone. The security plan shall provide a means of preventing accidental or unauthorized entry. Provide security to the decontamination facility and all points of potential access to the Work Zone 24 hours per day during abatement. Submit the form of security and safety log that will be maintained on the project;

   c. A contingency plan addressing emergencies, equipment failures, and barrier failure. Include the telephone numbers of at least three (3) responsible persons who shall be

in the position to dispatch men and equipment to the project in the event of an emergency.

6. LANDFILL: Written evidence that the landfill to be used for disposal of asbestos is approved for disposal of asbestos by the New York State Department of Environmental Conservation (NYS Part 360 Permit) and by the US EPA. In the event the landfill is not located in New York State, approval from the agency having jurisdiction over the landfill must be received. Documentation that the proposed hauler and landfill have the proper permits and are willing to accept the asbestos waste.

   The hauler must have a Waste Transporter Permit pursuant to Article 27, Titles 3 and 15, of the Environmental Conservation Law from the New York State DEC, Division of Hazardous Substance Regulations (NYS Part 364 Permit).

7. MATERIAL SAFETY DATA SHEETS: For all products intended to be used on the project, a Materials Safety Data Sheet in accordance with the OSHA Hazard Communication Standard 29 CFR 1910.1200. Include a separate attachment indicating the specific worker protection equipment required for each material.

8. PRESSURE MONITORING DEVICES; Manufacturer's data on type of equipment to be used to provide a continuous record of pressure differentials. Provide a drawing showing locations and number of units to be used.

9. AIR FILTRATION DEVICES: Manufacturer's data on type of equipment to be used to remove airborne asbestos.

10. ROOM INSPECTION: Inspect all areas in which Work is to be performed. Inspection shall occur in the presence of representatives of the Owner and Engineer. Record any existing damage to components, such as walls, doors, windows, carpeting, fixtures, and equipment. Any damaged components found after completion of the Work will be repaired at the Contractor expense. Make arrangements for the inspection, notify the participants, record the findings, and issue minutes of the inspection to all participants.

11. SCHEDULES: A copy of construction, staffing, and equipment schedules:

    a. A construction schedule stating critical dates of the job including start and completion of mobilization, activation, deactivation, and demobilization of all Work activities (including mobilization, Work Zone preparation, asbestos abatement, inspection and clearance monitoring, each phase of refinishing, and final inspections). Update schedule with each partial payment request. Changes in schedule are subject to the Engineer's approval and require three (3) days prior notice.

    b. A schedule of staffing stating number of workers per shift, name and number of supervisor(s) per shift, hours per shift, shifts per day, and total days to be worked;

    c. A schedule of equipment to be used including numbers and types of all major equipment such as high efficiency particulate absolute (HEPA) air filtration units, HEPA vacuums, and airless sprayers.

12. INSURANCE POLICIES: A copy of all Insurance policies required by this contract, including the *Asbestos Abatement General Liability Occurrence Insurance*, without a sunset clause, in amounts not less than $1,000,000, each occurrence, naming the Owner as the Certificate Holder. Also, include insurance policies of any subcontractor, including the Sudden and Accidental Pollution Liability Insurance required of the Hauler. The following list of Additionally Insured must be included under insurance policies held by the Contractor on this project:

    a. Yonkers School District and its employees
    b. Fuller & D'Angelo and its employees
    c. Warren & Panzer Engineers and its employees

13. AIR SUPPLY SYSTEM: Manufacturer's product information for each component used in the Type "C" supplied air respiratory system, including NIOSH and MSHA Certifications for each component in an assembly and/or the entire assembly. Provide a notarized certification that the system is capable of providing Grade "D" breathable air. Submit a copy of the manufacturer's operations manual for the air purification system and the carbon monoxide monitor.

    Prepare a drawing showing the assembly of components into a complete supplied air respiratory system. Document the number and size of electric air pumps and/or air supply tanks to be kept at the site at all times to ascertain that sufficient air is being supplied to the maximum number of users. Prepare a diagram showing the location of the electric air pumps, the air supply tanks and the hose line connections. The use of gas compressors will not be allowed. Submit complete operating and maintenance instructions for all components and systems as a whole. Bind manual in a form suitable for field use.

C. Daily during the conduct of abatement activities, submit to the Engineer the following:

Printouts from pressure differential monitoring equipment marked with date and Work start/stop times for each day. Use printout paper that indicates elapsed time in intervals no greater than one hour. Indicate on each day recording times of starting and stopping abatement Work, type of Work in progress, breaks, and filter changes. Cut printout into segments by day and label with project name, Contractor's name and date;

D. Within thirty (30) days of removal from the premises, submit to the Owner the disposal certificate(s) from the landfill receiving the Asbestos Waste stating dates and quantities received.

E. Within seven (7) days of completion of all Work associated with this Section submit to the Owner, the following:

1. A bound copy of the job log book showing sign in and sign out of all persons entering the Work Zone, including name, date, time, and position or function and a general description of daily activity. Keep these records on file for the duration of employment plus 30 years;

2. A notarized statement attesting that all personnel performing any work under this Contract were compensated in accordance with the prevailing wage rates contained herein.

1.04 Special Reports

A. Except as otherwise indicated, submit special reports directly to the Owner and the Engineer within one (1) day of the occurrence requiring the special report, with copies to all others affected by the occurrence.

B. When an event of unusual and significant nature occurs at the site (examples: failure of negative pressure system, rupture of temporary enclosures, unauthorized entry into Work Zone), prepare and submit a special report listing date and time of event, chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information.

C. Report any accidents, at the site and anywhere else Work is in progress related to this project. Record and document data and actions. Comply with industry standards.

1.05 Quality Assurance

A. Where methods or procedures are specified, they shall constitute minimum measures and shall in no way relieve the Contractor of sole responsibility for the means, methods, techniques, sequences, or safety measures in connection with the Work.

B. Provide foremen who speak fluent English to supervise all abatement activities. Foremen shall be certified as handler supervisors in accordance with Section 902 of the New York State Labor Law Article 30, and have experience in this field and can furnish a record of satisfactory performance on at least three (3) projects for Work of comparable type.

C. Any proposed Subcontractor performing any Work under this Section "Asbestos Removal and Disposal" shall have similar qualifications. Submit qualifications with the BID for any proposed Subcontractor. Submit Subcontractor qualifications in the same form and quantity as required for the Contractor.

1.06 Applicable Standards and Regulations

A. Perform all Work in compliance with the most current version of all pertinent laws, rules, and regulations, existing at the time of Work, including, but not limited to:

1. Code of Federal Regulations

   a. Title 29 CFR Parts 1910.1001, 1910.1200, 1910.134 1926.58 and 1926.1101;
   [The Occupational Safety and Health (OSHA) Standards]

   b. Title 30 CFR Part 61, Subpart G;
   [The Transport and Disposal of Asbestos Waste]

   c. Title 40 CFR, Part 61, Subparts A and M;
   [The EPA National Emission Standard for Hazardous Air Pollutants, and the National Emission Standard for Asbestos]

   d. Title 40 CFR, Part 763,
   [Asbestos Containing Materials in Schools; Final Rule and Notice]

   e. Title 49 CFR Parts 106, 107, and 171-179.
   [The Transportation Safety Act of 1974 and the Hazardous Material Transportation Act]

   f. Public Law 101-637
   [ASHARA]

2. New York State Official Compilation of Codes, Rules and Regulations.

   a. Title 12 Part 56

   b. Title 10 Part 73

c. Title 6 Parts 360-364

d. Labor Law - Article 30 and Sections 900-912.

e. All applicable Additions, Addenda, Variances and Regulatory Interpretation Memoranda.

3. Applicable Standards

a. The American National Standard Institute (ANSI) Practices for Respiratory Protection ANSI Z88.2-1980.

b. The American National Standard Institute (ANSI) Fundamentals Governing the Design and Operation of Local Exhaust Systems.

c. UL 586 Test Performance of High Efficiency Particulate Air-Filter Units.

B. In the event, there is a conflicting point between these provisions, the most stringent one shall apply.

1.07 Air Monitoring

A. Conduct personnel air monitoring in accordance with OSHA requirements. Collect a sufficient number of samples to determine the Time Weighted Average exposure of twenty percent (20%) of the work force.

B. The Owner will provide area air monitoring as follows:

Sample Type	Analysis Method
Pre-abatement	PCM
During abatement activities	PCM
Clearance air monitoring	PCM & TEM

The Contractor shall cooperate with the Owner's designated representatives with regard to air monitoring and project monitoring procedures. Ensure that employees and Subcontractors do the same.

C. If analysis of any of the air samples collected during abatement indicates that the airborne asbestos concentration outside the Work Zone is greater than or equal to 0.01 f/cc or the background level, whichever is greater:

1. Stop Work immediately;

2. Inspect the integrity of the barriers;

3. Wet clean and vacuum the location where elevated fiber counts were reported; and

4. Do not resume Work until such time when the airborne asbestos concentration outside the Work Zone is once again less than the above limit.

D. In order to pass PCM clearance testing, the analysis of each and every sample collected shall indicate that the airborne fiber concentration is less than 0.01 fibers per cubic centimeter or the background level whichever is greater.

E. In order to pass TEM clearance testing, each and every sample collected shall indicate that the airborne structure concentration is less than 0.01 structures per cubic centimeter or the background level whichever is greater and the average structure concentrations inside the Work Zone shall not be statistically larger than the average of ambient levels as determined by the Z-test.

F. The method of sampling shall be aggressive or nonaggressive depending on the requirements of applicable regulations. The method of analysis for pre-abatement and during abatement shall be NIOSH 7400 using Phase Contrast Microscopy (PCM). Post-abatement samples shall be analyzed by Transmission Electron Microscopy (TEM) for AHERA compliance projects, in accordance with Appendix A to Subpart E-Interim TEM Analytical Methods. For non-AHERA projects, the decision of testing with either PCM or TEM for final air clearance monitoring will be made by the Engineer. The testing laboratory will be a member of the Environmental Laboratory Approval Program (ELAP).

G. In case of failure of the initial final air clearance monitoring, the work zone will be retested following immediate relearning. This process will be repeated as necessary until final air clearance is obtained. All costs and expenses resulting from the additional relearning and retesting (including sampling and analysis) due to failure of the initial final air clearance shall be borne by the Contractor. The expenses thereby incurred will be deducted from any monies due or that may become due to the Contractor.

H. The Contractor shall provide security personnel to watch the decontamination facility and all points of potential access to the Work Zone.

- END OF PART 1 -

PART 2 - PRODUCTS

2.01 Air Filtration Unit

A. Use only Air Filtration Units in compliance with ANSI Z9.2 (1979), Local Exhaust Ventilation. The final filter in each unit shall be of the HEPA type. Use only Air Filtration Units certified by the manufacturer to have an efficiency of not less than 99.97 percent when challenged with 0.3 micron dioctylphthalate (DOP) particles.

B. Equip the system with the following:

1. An automatic shutdown that will stop the fan in the event of a rupture in the HEPA filter or blocked air discharge;

2. Warning lights and/or alarms to indicate an excessive pressure drop across the filters or an insufficient pressure drop across the filters;

3. A non-resettable elapsed time meter to indicate the total accumulated hours of operation;

4. A gauge or manometer to measure the pressure drop across the filter.

2.02 Asbestos Caution Signs

A. Use Asbestos Caution Signs as specified in OSHA Title 29 CFR 1910.1001(j) and 1926.58(k). Posting of warning signs in and around the work site should be in cooperation with the Department of Correction and with approval by the Department of Correction.

2.03 Asbestos Caution Labels

A. Use Asbestos Caution Labels as specified in OSHA Title 29 CFR 1910.1001(j) and 1926.58(k).

2.04 Disposal Bags

A. Use Disposal Bags which are a minimum six (6) mil in thickness, clear in color and preprinted with the Asbestos Caution Label.

2.05 Encapsulating Material

A. All Encapsulating Materials shall be approved by UL for use in class 1A buildings and shall have composite fire and smoke hazard ratings as tested under procedure ASTM E- 84, NFPA 255 and UL 723

Flame Spread	25
Smoke Developed	50

B. If the removal of fireproofing materials is included in this Contract, select an encapsulant from those approved by UL for use with the new fireproofing. If Retro-Guard Type RG or RG-1 manufactured by W.R. Grace & Co. is to be applied, use American Coatings 22P & 22 Power lock, or Fiber lock

Fiber set FT and Fiber set PM, or Certane 909 and 1000, or H.B. Fuller 32-60 and 32-61, or IPC Serpliflex and Serpiloc.

2.06 Equipment

A. Temporary lighting, heating, hot water heating units, ground fault interrupters, and all other equipment on site shall be UL listed and shall be safe, proper, and sufficient for the purpose intended.

B. All electrical equipment shall be in compliance with the National Electric Code. Attention is specifically called to Article 305 Temporary Wiring.

2.07 First Aid Kits

A. Maintain adequately stocked first aid kits in the Clean Room and Work Zone, in accordance with OSHA requirements.

2.08 High Efficiency Particulate Air (HEPA) Filters

A. Employ filters which have been individually tested and certified by the manufacturer to have an efficiency of not less than 99.97 percent when challenged with 0.3 micron dioctylphthalate (DOP) particles, in accordance with Military Standard Number 282 and Army Instructional Manual 136-300-175A. Each filter shall bear a US 586 label to indicate ability to perform under the specified conditions.

B. Each HEPA filter shall be marked with the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of air flow.

2.09 Glove bags

A. Use only commercially available Glove bags. Use Glove bags constructed of clear fire retardant plastic, which have a minimum thickness of six (6) mil.

B. Use Glove bags appropriately sized for the pipe. Use Glove bags, the dimensions of which exceed the pipe insulation diameter by a factor of four (4).

2.10 Plastic

A. Use only new fire-retardant plastic sheets of polyethylene, which has a minimum thickness of 6 mil, true grade.

B. For the initial floor, protective layer use only new reinforced plastic sheets of polyethylene, which has a minimum thickness of ten (10) mil, true grade. As an alternative, apply a ten (10) mil thick layer of "Spray-Poly" by Isotek or as approved.

2.11 Plywood

A. Use only fire-rated CDX plywood, which is at minimum one half inch (1/2") in thickness.

2.12 Respirators

A. Use only respirators approved by the Mine Safety and Health Administration (MSHA), Department of Labor, or the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.

2.13 Sealants

A. Use a combination fire stop foam and fire stop sealant. Use Dow Corning Fire Stop Foam and Dow Corning Fire Stop Sealant or as approved. Apply in accordance with manufacturer's recommendations.

2.14 Studs

A. Use only 2" x 4" fire-rated CDX or metal studs.

2.15 Supplied Air System

A. At all times, air supplied to the type "C" respirators shall be Grade "D" Breathable Air as described by OSHA Regulation 29 CFR 1910.134(d)(1), containing less than the following:

Carbon Monoxide :	20 parts per million
Carbon Dioxide :	1,000 parts per million
Condensed Hydrocarbons:	5 milligrams per cubic centimeter
Objectionable odors:	None

B. Provide a minimum of one (1) hour of reserve air for emergency evacuation. Post, in the Work Zone, emergency evacuation procedures to be followed in the event of breathing air system failure. Explain procedures to all workers prior to commencement of the Work.

C. Water content shall be less than 66 parts per million in order to protect the air purification unit. Certify the air quality of the system prior to beginning asbestos abatement Work and every two weeks during asbestos abatement Work by an independent laboratory certified by the American Board of Industrial Hygiene. Collect samples under the supervision of a Certified Industrial Hygienist. Submit copies of certified test results to the Engineer within five (5) days of the sample collection.

2.16 Vacuums

A. Use only vacuums equipped with HEPA filters.

2.17 Wetting Agents

A. The wetting agent shall be water amended with one (1) oz. of a chemical surfactant per five (5) gallons of water. The composition of the surfactant shall be approximately 50% polyoxyethylene ether and 50% polyoxyethylene esters.

- END OF PART 2 -

PART 3 - EXECUTION

3.01 Personnel Protection

A. Satisfy all applicable Worker protection requirements.

B. Provide protective equipment for use by Workers and designated representatives of the Owner including disposable full body coveralls, respirators and approved cartridges, gloves, hard hats, and goggles. Maintain on site, two (2) sets of protective equipment for the exclusive use of representatives of the owner.

C. At all times, provide all persons with personally issued and marked respiratory equipment suitable for the asbestos exposure level in the Work Zone. Ensure that all persons properly use this equipment at all times.

D. As a minimum, half face negative pressure type respirators must be worn by all personnel during Work Zone preparation. If airborne concentrations of asbestos inside the Work Zone exceed 0.1 fibers per cubic centimeter, employ either PAPR or type "C" respiratory protection whichever is appropriate.

E. PAPRs (Powered Air Purifying Respirators) shall constitute the minimum level of respiratory protection for all persons entering that Work Zone from the time the Work Zone is activated until acceptance.

F. Should airborne concentrations of asbestos inside the Work Zone exceed 2.0 fibers per cubic centimeter, supply all personnel with personally issued and marked Type "C" supplied air respirators operated in the positive pressure demand mode.

G. If the permissible respirators fail to provide sufficient protection against volatile substances emitted by any sealants or other chemicals used, the services of a certified industrial hygienist will be procured, at the Contractor's expense, to determine proper respiratory protection. The Owner will not be liable for the cost of increased respiratory protection.

H. Maintain surveillance of heat stress conditions in the Work Zone. The prevailing Threshold Limit Values (TLVs) for heat stress and the method of heat stress measurement adopted by the American Conference of Governmental Industrial Hygienists (ACGIH) shall govern worker exposure to heat stress.

3.02 Decontamination

A. Construct and operate the Personnel and Waste Decontamination Enclosure Systems in conformance with all applicable rules and regulations. Locate decontamination units outside of the Work Zone.

B. Construct the Personnel Decontamination Enclosure System (PDES) as a series of six (6) completely enclosed and connected rooms: An Airlock, an Equipment Room, a second Airlock, a Shower, a third Airlock, and a Clean (locker) Room. Separate rooms with curtained doorways.

1. Ensure that all egress from the Work Zone is through the PDES.

2. Ensure that all persons leaving the Work Zone vacuum themselves of asbestos in the Work Zone and disrobe in the Equipment Room, shower (including washing of hair) with respirator on, and redress in the Clean Room.

3. Ensure that all persons entering the Work Zone wear clean and new protective clothing and equipment prior to entrance.

4. Equip the Shower with hot and cold water adjustable at the tap, liquid soap, shampoo and disposable towels.

5. Leave all contaminated clothing and equipment in the Equipment Room in barrels or bags. Sanitize respirators in the showers. Equip with fresh cartridges in the Clean Room.

6. No more than one curtained doorway shall be opened at the same time.

C. Remove all asbestos containing waste materials, equipment, or any other materials through the Waste Decontamination Enclosure System (WDES). The WDES shall consist of a series of four (4) completely enclosed and connected rooms: An Airlock, a Washroom, a second Airlock, and a Holding Area. Separate rooms with curtained doorways. Remove materials, waste and equipment as follows:

1. No more than one curtained doorway shall be opened at the same time.

2. Before removing any equipment or asbestos from the Work Zone,

   a. Containerize (or bag) all asbestos;

   b. Wet clean all equipment and packaged asbestos.

3. Place equipment and asbestos in the first Airlock. Workers in the Work Zone shall not enter the Airlock and the Curtained Doorway between the Airlock and the Washroom shall remain closed during this procedure.

4. Uncontaminated Workers in clean new protective equipment shall enter the WDES from outside the Work Zone and enter the Washroom.

5. While in the Washroom:

   a. Remove Waste and Equipment from the first Airlock;

   b. Wet clean all equipment and all packaged asbestos containing waste;

   c. Place bags and other containers into an additional completely clean bag or wrap in plastic. Bags and plastic used for this purpose shall not enter the Work Zone;

   d. Place equipment and asbestos in the second Airlock. Workers in the Work Zone shall not enter the Airlock and the Curtained Doorway between this Airlock and the Holding Area shall remain closed during this procedure.

6. Uncontaminated Workers in clean new protective equipment shall enter the Holding Area from the outside area and remove containerized materials from the airlock.

7. All workers shall proceed into the Work Zone for exiting by way of the PDES. Ensure that personnel do not leave the Work Zone through the WDES.

3.03 Work Zone Preparation

A. Electrical Power: Unless otherwise indicated, shut down all electric power within the Work Zone, as follows:

1. Lock all circuits, which have been shut off, in the off position and label with a printed tag which reads as follows:

"TEMPORARY DISCONNECT
Due to Asbestos Removal Project
DO NOT ACTIVATE THESE CIRCUITS"

2. Provide temporary power and lighting and ensure safe installation of temporary power sources and equipment per applicable electrical code requirements. Provide all equipment which must remain operable, as well as all temporary ground-fault interrupter circuits for lights and electrical equipment. Individually protect all power equipment used inside each Work Zone with in-line ground fault interrupters. Locate ground-fault interrupter outside of the Work Zone.

3. Provide all electrical tie-ins and extensions. Provide a temporary panel board, connected to an electric panel designated by the Owner.

B. Heating Ventilation and Air Conditioning (HVAC): Employ all means necessary to prevent contamination and fiber dispersal to other areas of the structure, as follows:

1. Thoroughly clean all HVAC Equipment and ductwork in the Work Zone. Seal all vents within the Work Zone with tape and plastic. Seal all HVAC duct seams. Wrap all ductwork in two (2) layers of plastic.

2. Remove all HVAC filters. Pack disposable filters in sealable double plastic bags for disposal at the approved landfill. Replace with new filters after final cleanup. Wet-clean permanent filters; reinstall after final cleanup.

3. Remove all heating and ventilating equipment grills, diffusers, returns, and other items located on the asbestos bearing surfaces. Wet clean all such items, seal in two (2) layers of plastic and remove from the Work Zone. Reinstall all displaced items after satisfactory clearance air testing.

4. HVAC systems shall be treated as follows:

a. Unless otherwise indicated, shutdown and lockout all heating, ventilating and air conditioning systems. Isolate system at points of entry to the Work Zone; use two (2) layers of plastic.

b. In cases where the HVAC system serving the Work Zone also serves other areas of the building which must remain in operation,

i. Isolate the ductwork entering the Work Zone from the remainder of the system. Cap all ductwork where it passes in or out of the Work Zone with galvanized steel ASTM 5261 in accordance with SMACNA HVAC Duct Construction Standards. Cover with two (2) layers of plastic.

ii. Operate the affected HVAC system twenty-four (24) hours per day from the initiation of Work Zone activation until successful final air clearance. Maintain a positive pressure within the operational portion of the HVAC system of 0.05-inch water gauge or greater with respect to the ambient pressure outside of the Work Zone. Install pressure monitoring devices.

c. In cases where it is necessary for ductwork passing through the Work Zone to remain active, the following conditions are to be maintained:

i. Maintain a positive pressure within the HVAC system of 0.05-inch water gauge (or greater) with respect to the ambient pressure outside of the Work Zone: the conditions for this system shall be maintained and be operational twenty-four (24) hours per day from the initiation of Work Zone preparation until successful final air clearance.

ii. Test, inspect and record the positive pressure in the duct both at the beginning and at the end of each shift.

iii. Monitor the positive pressurization of the duct using instrumentation that will trigger an audible alarm, if the static pressure falls below the set value.

iv. Place the supply air fan and the supply air damper for the active positive-pressurized duct in the manual "on" position to prevent shutdown by fail safe mechanisms.

v. Shut down and lock out the return air fan and the return air dampers.

vi. Cover all active HVAC ducts that pass through the Work Zone with two (2) layers of plastic.

C. Steam Systems: Unless otherwise noted on the Drawings, shut down all steam systems passing through the Work Zone prior to activation.

D. Utilities: Provide all water, electrical and waste facility connections, as well as all sanitary drains. The Contractor will not be charged for water used, electricity consumed, or discharges made to sanitary sewers as a part of this project.

E. Temporary Service Lines: Upon completion of abatement activities, remove all temporary service lines and restore to their original conditions, in a manner acceptable to the Engineer. Repair any part of the permanent service lines, equipment and building facilities disturbed or damaged as a result of the installation or removal of the temporary service lines.

F. Temporary Heating: Provide temporary heating in the Work Zone, as needed to maintain a minimum temperature of 50°F. Heating equipment shall be approved by the Engineer.

G. Movable Objects: Before Work is initiated, clean all items which can be removed without disrupting any asbestos material. Pre-clean movable objects within the proposed areas using HEPA filtered vacuum equipment an/or wet cleaning methods as appropriate; remove such objects from Work Zones to a temporary location, as directed by the Engineer.

H. Fixed Objects: Pre-clean non-removable objects within the proposed Work Zones, using HEPA filtered vacuum equipment and wet cleaning methods as appropriate prior to abatement activities, and enclose with two (2) layers of plastic sealed with tape.

I. Openings: Prior to placing plastic on walls, floors and ceilings, seal off all openings, including, but not limited to corridors, doorways, windows, skylights, ducts, grills, diffusers, and any other penetrations of the Work Zones, with two (2) layers of plastic sealed with tape.

J. Floor, Wall and Ceiling Penetrations: Prior to any abatement activities fire stop all openings or penetrations that have not already been sealed. This includes both empty holes, expansion joints and holes accommodating items such as cables, pipes, ducts, conduit, etc.

K. Fire Exits: Maintain emergency and fire exits from the Work Zones, or establish alternative exits satisfactory to the local fire officials. Provide panic exit devices for security and egress. Establish this exit in accordance with all applicable codes and regulations.

L. Signs: Outside of the perimeter barrier and at all entrances and exits to the Work Zone, post signs in English, Spanish and any other language spoken at the project location.

1. The signs shall read:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE
HAZARD

Authorized Personnel Only
Respirators and Protective Clothing
are Required in This Area

2. Demarcate the regulated area. Post signs at such a distance from the area that an employee will read these signs before entering the area.

M. All of the above procedures shall be completed prior to the disturbance of any asbestos containing material.

3.04 Engineering Controls

A. Maintain the Work Zone at an air pressure that is lower than that in any surrounding space in the building, or at any location in the immediate proximity outside of the building envelope. This pressure differential when measured across any physical or critical barrier must equal or exceed a static pressure of 0.05 inches of water.

B. From the start of abatement activities:

1. Operate air filtration units continuously during the project, twenty-four (24) hours a day, from the start of abatement through successful clearance air monitoring, in accordance with "Specifications and Operating Procedures for the Use of Negative Pressure Systems for Asbestos Abatement", Guidance for Controlling Asbestos-Containing Materials in Buildings, EPA Report Number 560/5-85-024 (1985).

2. Install the air filtration units in quantities and locations as required in order to achieve the required negative pressure.

3. Provide a minimum of one air change every ten (10) minutes for the area under negative pressure. Assume Air Filtration Units will operate at 50% of their rated capacity. Maintain on site, one (1) spare air filtration unit for every five (5) in use.

4. Locate the exhaust unit(s) so that makeup air enters the Work Zone primarily through the Decontamination Systems and traverses the Work Zone as much as possible. Provide the specified number of air changes throughout the Work Zone. Place the end of the unit or its exhaust duct through an opening in the plastic barrier or wall covering. Seal the plastic around the unit or exhaust duct with tape.

5. Whenever possible, exhaust air filtration units to the outside of the building away from occupied areas in such a manner so that the air intake ports, louvers, or entrances for the building or adjacent buildings will not be adversely affected. In cases where it is impossible to exhaust outside of the building, provide a second air filtration unit in series. For runs longer than 150 feet install additional air filtration units every 150 feet.

6. Use ducting, of equivalent or larger dimension as that of the air filtration unit exhaust port, to exhaust to the outside of the structure. Ducts shall exhaust, at minimum fifty (50) feet from all intakes or entrances to the building or adjacent buildings. Seal and brace all ductwork. Maintain airtight joints. Prevent fiber release into uncontaminated building areas.

7. Place the air filtration system exhaust ducts overhead in an inconspicuous, non-restricting fashion. Connect the ducts to a 14" flange, as shown on the Drawings.

8. All filters shall be accessible from the Work Zone or contaminated side of the barrier. Prior to initial use, replace all filters in air filtration units in the presence of the Engineer with new and unused filters.

9. Use a dedicated power supply for the air filtration units.

10. In the event of loss of negative pressure or electric power to the negative pressure ventilating units, stop all abatement Work immediately. Do not resume Work until power is restored and negative pressure equipment is operational. Under no circumstances shall any Asbestos abatement take place without having the negative air pressure system fully operational.

11. When loss of negative pressure equipment lasts, or is expected to last longer than one-half hour:

    a. Seal airtight all auxiliary make-up air inlets;

    b. Seal all Decontamination Systems airtight after the evacuation of all personnel from the Work Zone;

    c. All adjacent areas will be monitored by the Engineer at the Contractor's expense for asbestos fiber concentration.

12. Use ventilation smoke tubes to check the system performance.

13. Monitor and record the pressure differential between the Work Zone and the outside of the Work Zone with a monitoring device incorporating a continuous recorder (e.g. strip chart). Equip with an audible alarm which will signal if the pressure differential drops below 0.05 inches of water.

3.05 Asbestos Removal

Modified Containment Procedures (Floor Tile and Mastic)
Work in this part shall be performed in accordance with ICR 56, Applicable Variances AV-120 and the contract documents.

The sequence of abatement activities shall be as follows:

A. Modified Containment, completely isolate the Work Zone as shown on the Drawings. Extend the Work Zone to such limits as to permit the removal of all asbestos containing materials within the Work Zone. Isolate the Work Zone as follows:

1. Construct the Remote Decontamination Units for personnel and waste, as shown on the Drawings. Use studs, sixteen inches on center, covered with plywood and two (2) sheets of plastic.

2. Construct isolation barriers. Where feasible, use existing walls and partitions. Where necessary, frame temporary partitions with studs sixteen (16) inches center on center. To support plastic for all areas larger than thirty-two (32) square feet, except where one of the dimensions is less than one (1) foot, reinforce temporary partitions with plywood. Test the negative pressure system to ensure that the 0.05-inch differential is present.

3. Construct an entrance/exit airlock chamber, a minimum of 5’ X 5’ in size, at the entrance to each work zone so as to allow each worker to remove their outer suit, wipe off their inner suit and don a clean suit before proceeding to the remote decontamination enclosure system.

ACM shall be bagged and brought to the Decontamination Enclosure System. At the Decontamination Enclosure, the bags will be wet wiped and the waste double bagged.

4. Cover the floor of the decontamination unit and airlock with reinforced polyethylene sheeting.

5. Cover interior surfaces of the Work Zone with a layer of plastic sealed with tape. Cover the walls with plastic from the floor level to a height of 4' minimum. Overlap seams in plastic 12'' minimum and seal with tape. In areas where floor carpet is to remain, cover the floor with an additional layer of reinforced polyethylene sheeting. The plastic shall be attached with adhesives, furring strips and screws, tape, staples, etc., sufficient to prevent collapse or sagging of any plastic covering. **Inspect all plastic three times a day for sagging and repair all such sags or failures immediately.**

6. Install a second layer of plastic on all interior Work Zone Surfaces. Repeat procedure detailed above in 3.05. A.5.

7. Where required, electrical, telephone equipment, ductwork, etc. shall be covered with three (3) layers of six (6) mil polyethylene sheeting. Energized circuits will be posted with signs warning 'CAUTION - ELECTRICALLY ENERGIZED', in three-inch-high letters.

8. Secure a source of water within the Work Zone (other than the Shower within the Decontamination Zone) for wetting and cleaning.

9. Test the negative pressure system prior to any abatement actions to ensure that the 0.05-inch differential is present. Wait twelve (12) hours. Test system again. If the test results are acceptable to the Engineer, the Work Zone will be activated. Do not disturb Asbestos containing materials prior to activation.

10. Wet all Asbestos prior to removal using a wetting agent. Maintain asbestos wet until packaged for disposal.

11. Upon removal of the floor tile and mastic, directly bag or drop into a flexible catch basin all asbestos containing waste material.

ALL ACM shall be bagged immediately and brought to the Waste Decontamination Enclosure System. At the Decontamination Enclosure, the bags will be wet wiped and the waste double bagged.

3.06 Encapsulation

A. Apply Encapsulating material using an airless sprayer. Comply with manufacturer's recommendations. The Encapsulating material shall be mixed with contrasting color paint to assure proper application.

3.07 Disposal Practices

A. Wet and properly package all Asbestos prior to removal from the Work Zone via the Waste Decontamination Enclosure System. Remove all residual asbestos from the exterior of any package, drum, bag, or other container of Asbestos prior to removal from the Work Zone. Affix the ASBESTOS CAUTION label, the name of the Owner, the name of the Contractor, the name of any Tenant and the location where generated to all packages, drums, bags or other containers used for Asbestos disposal.

B. Store all Asbestos Waste in a totally secure manner. Transport all Asbestos Waste to the disposal site within seven (7) days after completing the Work of this section or thirty (30) days after removal, whichever comes first.

C. Transport Asbestos Waste through the building at the direction of the Engineer at times designated by the Owner. Use sealed carts.

D. During the transport of Asbestos Waste, on or across public thoroughfares, employ a hauler bearing all required permits for the hauling of asbestos. The haulers shall carry insurance in the same types and amounts as the Contractor. In addition, the hauler shall carry "Sudden and Accidental Pollution Liability Insurance in an amount not less than $1,000,000.

E. Dispose of Asbestos Waste at approved landfill bearing all appropriate licenses and permits for asbestos disposal and operated in compliance with all applicable rules and regulations. The Landfill used shall be dedicated for asbestos materials only and shall not accept any other hazardous substances.

F. Within thirty (30) days of removal from the premises, the Contractor shall provide the Owner with disposal certificate(s) from the approved waste disposal site. Final payment will not be approved until all disposal certificates have been provided.

3.08 Clean-up Procedures

A. Daily, during abatement activities:

1. Clean-up visible accumulations of loose Asbestos Waste whenever a sufficient amount of Asbestos Containing Material to fill a single asbestos waste bag has been removed. Removal all waste materials from the Work Zone at the end of each work shift. Maintain visible material wet until after clean up.

2. Place visible accumulations of Asbestos Waste in containers utilizing non-metallic dust pans and non-metallic squeegees or vacuums.

3. Do not use metal shovels.

4. Wet clean and vacuum all surfaces of the Work Zone on a daily basis.

5. Upon completion of waste removal, wet clean the WDES twice. When the PDES Shower Room alternates as a Washroom, wash the Shower Room immediately with cloths or mops saturated with a detergent solution prior to wet cleaning.

6. Wet clean and vacuum the WDES as appropriate, as a minimum after each shift change and meal break.

7. If excess water accumulates in the Work Zone, stop Work until the water is collected and disposed of properly.

8. If Asbestos Waste is spilled in an elevator shaft:

   a. Immediately evacuate, shut down and isolate all of the elevators in the affected elevator bank.

   b. Place all spilled visible accumulations of Asbestos Waste in clean and unused containers.

   c. Vacuum and wet clean all of the contaminated surfaces in the elevator car and shaft in repetitive cycles until clearance air levels are achieved in the car and at each terminus of the shaft.

B. Final Clearance, The Work Zone will be considered acceptable when it has passed both visual inspections and air testing performed by the Engineer according to the criteria and sequence below:

1. In order to pass each of the visual inspections, the Work Zone and adjacent areas shall be free of all visually apparent asbestos. Any disputes over the results of any visual inspection shall be resolved by the Contractor submitting the results of bulk sample analysis demonstrating the contents of the material in question. Remove all Asbestos materials and all asbestos contaminated materials; non-asbestos materials may remain. The laboratory performing such analyses shall be a regular participant in the ELAP Quality Assurance Program for bulk sample analyses with performance results satisfactory to the Engineer. The Engineer reserves the right to independently verify the bulk results.

2. If the Work Zone is not suitable for acceptance for any reason, promptly perform the Work requested by the Engineer.

3. Keep each Work Zone isolated and posted with ASBESTOS CAUTION and CAUTION KEEP OUT signs until after acceptance.

4. Typical acceptance sequence shall be as follows:

   a. After removal of visible accumulations of Asbestos Waste, vacuum all surfaces;

   b. Remove all bagged materials from the Work Site;

   c. Wet clean and vacuum all objects and surfaces in the Work Zone;

   d. Visual inspection by the Engineer;

   e. Encapsulate all plastic within the Work Zone limits, do not encapsulate surfaces from which asbestos was removed;

   f. Remove, bag, and remove from the Work Site the first layer of plastic;

g. Vacate the Work Zone for four (4) hours;

h. Wet clean and vacuum all objects and surfaces in the Work Zone for a second time;

i. Visual inspection by the Engineer;

j. Vacate the Work Zone for four (4) hours;

k. Remove, bag and remove from the Work Site the second layer of plastic;

l. Wet clean and vacuum all surfaces in the Work Zone for a third time;

m. Vacate the Work Zone for four (4) hours;

n. Visual inspection by Engineer to verify the absence of Asbestos Waste, dust and or debris;

o. Clearance Air Monitoring;
Clearance air monitoring shall consist of five air samples taken inside of the work area and five air samples taken outside of the work area.

p. Upon successful clearance air testing, encapsulate surfaces from which Asbestos was removed;

q. Wait for encapsulant to dry;

r. Final Acceptance will be granted provided that items a thru n have been met to the satisfaction of the Engineer;

s. Shut down air filtration units (demobilization);

t. Remove the isolation barriers in conjunction with the use of HEPA vacuums;

u. After all Work and decontamination is complete, relocate and secure objects moved to temporary locations in the course of the Work to their former positions and assure that they are in working order.

- END OF PART 3 and SECTION 02080 –

SECTION 03 0100
MAINTENANCE OF CONCRETE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Cleaning of existing concrete surfaces.

B. Protective Coating of existing concrete surfaces having spalled areas and other damage.

C. Repair of deteriorated concrete.

D. Additional scope of Work: As indicated on drawings.

1.3 RELATED REQUIREMENTS

A. Section 01 2100 - Allowances: For repair work indicated on detail 2/A40.

B. Section 03 3000 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.

C. Section 03 4100 - Precast Structural Concrete.

1.4 REFERENCE STANDARDS

A. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016, with Editorial Revision (2016).

B. ASTM C928/C928M - Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Material for Concrete Repairs; 2013.

C. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair; 2013.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate product standards, physical and chemical characteristics, technical specifications, limitations, maintenance instructions, and general recommendations regarding each material.

C. Manufacturer's Qualification Statement.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten (10) years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with minimum of 3 years of documented experience.

1.7 MOCK-UP(S)

A. Test each type of maintenance procedure required on each type of existing construction, to determine the most appropriate procedures to use and as a record of expected results.

B. Horizontal Surface Repair: Total of five foot square area, demonstrating each type of repair.

C. Vertical Surface Repair: Total of one foot square area, demonstrating each type of repair.

D. Locate mock-up(s) where directed by the YPS Office of Facilities Management .

E. Re-work mock-up(s) until satisfactory to YPS Office of Facilities Management and Fuller and D'Angelo, P.C.

F. Satisfactory mock-up(s) may remain as part of the work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturers' instructions for storage, shelf life limitations, and handling of products.

PART 2 PRODUCTS

2.1 CLEANING MATERIALS

A. Detergent: Non-ionic detergent.

2.2 CEMENTITIOUS PATCHING AND REPAIR MATERIALS

A. Cementitious Repair Mortar, Vertical and Overhead: One component, factory-mixed, polymer-modified cementitious mortar.
   1. In-place material resistant to freeze/thaw conditions.
   2. Mixed with water in proportions as recommended by manufacturer.
   3. Layer Thickness: Min: 1/8"; Max: 3".
   4. Flexural Strength: 28 days 1,000 psi (6.9 MPa)
   5. Splitting Tensile Strength: 28 days 2,000 psi (13.8 MPa).
   6. Shrinkage: < 0.05 %
   7. Increased freeze/thaw durability and resistance to deicing salts.
   8. Dry Material: Complies with ASTM C928/C928M.
   9. Manufacturers:
      a. Sika Corporation, Lyndhurst, NJ 07071, 800.933.7452, SikaQuick VOH. .
      b. Substitutions: Refer to Section 01 2500 Substitution Procedures.

B. Protective Coating: Water dispersed, acrylic, protective, anti-carbonation coating:
   1. For Coating existing concrete walls.
   2. Water Resistance: 2.3 mils, Dry.
      a. ASTM D-2247: >8.
      b. ASTM D-2247:No blisters.
      c. Moisture Vapor Permeability: ASTM: 7.72 perms.
      d. Water Spotting: ASTM D-1848: >8.
      e. Water Vapor Transmission: (at 2.3 mils=55.2 microns dry film thickness).
         a) - value H2O (diffusion coefficient) = 10,300
         b) Sd H2O (equivalent air thickness) = 6 ft. (1.70 m.)
      f. Carbon Dioxide Diffusion (at 2.3 mils=55.2 microns dry film thickness)
         a) - value CO2 (diffusion coefficient) = 631,000
         b) Sd CO2 (equivalent air thickness) = 226 ft. (69 m.)
         c) Sc (equivalent concrete thickness) = 7 in. (17 cm.)
   3. Color: As selected from manufacturer'sfull range of colors.
   4. Manufactures:
      a. Sika Corporation,"Sikagard® 670W", Lyndhurst, NJ 07071, 800.933.7452,

2.3 ACCESSORIES

A. Water: Clean and potable.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Beginning of installation means acceptance of substrate.

3.2 PREPARATION

A. Prepare concrete surfaces to be repaired according to manufacturer's application instructions..

3.3 CLEANING EXISTING CONCRETE

A. Surface must be clean and sound. Remove all deteriorated concrete, dirt, oil, grease, and other bond-inhibiting materials from the area to be repaired.

B. Preparation work should be done by high pressure water blast, scabbler, or other appropriate mechanical means. Obtain an exposed aggregate surface with a minimum surface profile of ± 1/8" (3 mm) (CSP-6) on clean, sound concrete.

C. To ensure optimum repair results, the effectiveness of decontamination and preparation should be assessed by a pull-off test.

3.4 CONCRETE SURFACE REPAIR USING CEMENTITIOUS MATERIALS

A. Clean concrete surfaces, cracks, and joints of dirt, laitance, corrosion, and other contamination using method(s) specified above and allow to dry.

B. Substrate should be Saturated Surface Dry (SSD) with clean water prior to application. No standing water should remain during application

C. Follow bonding agent and repair mortar manufacturer's written installation instructions.

D. Apply coating of bonding agent to entire concrete surface to be repaired.

E. Priming

1. Reinforcing steel: Steel reinforcement should be thoroughly prepared by mechanical cleaning to remove all traces of rust. Where corrosion has occurred due to the presence of chlorides, the steel should be high pressure washed with clean water after mechanical cleaning. Steel shall be fully exposed and have all corrosion removed. Prime the reinforcement with a stiff bristle brush or spray. coat all steel surfaces, allow to dry and then apply a second coat at same coverage
2. Concrete Substrate: Prime the prepared substrate with a stiff bristle brush or spray. Primer must be applied well into substrate, filling all pores and ensure complete coverage of all surface irregularities.

3.5 APPLICATION

A. The prepared mortar must be scrubbed into the substrate, filling all pores and voids. Force material against edge of repair, working toward center.

B. After filling repair, consolidate, then screed.

C. Allow mortar to set to desired stiffness, then finish.

D. Mixing, placing and finishing should not exceed 45 minutes

3.6 CURING TREATMENT

A. Moist cure with wet burlap and polyethylene, or a fine mist of water.

B. Moist curing should commence immediately after finishing. Protect freshly applied mortar from direct sunlight, wind, rain and frost

END OF SECTION

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Removals.

B. Concrete formwork.

C. Concrete materials.

D. Concrete footings, foundations, piers, site structures, concrete sidewalks, stairs, fence posts, and paving.

E. Concrete reinforcement.

F. Waterproof expansion joints.

G. Joint devices associated with concrete work.

H. Mix design

I. Abrasive metal nosing for concrete stairs.

J. Concrete curing.

K. Field Quality Control.

1.3 RELATED REQUIREMENTS

A. Section 03 0100 - Maintenance of Concrete.

B. Section 03 4100 - Precast Structural Concrete.

C. Section 07 9200 - Joint Sealants: Products and installation for sealants in joints in slabs.

D. Section 31 2316 - Excavation.

1.4 REFERENCE STANDARDS

A. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).

B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

C. ACI 301 - Specifications for Structural Concrete; 2016.

D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).

E. ACI 305R - Guide to Hot Weather Concreting; 2010.

F. ACI 306R - Guide to Cold Weather Concreting; 2016.

G. ACI 308R - Guide to External Curing of Concrete; 2016.

H. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2018).

I. ACI 347R - Guide to Formwork for Concrete; 2014.

J. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2018, with Editorial Revision (2018).

K. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2017.

L. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2014.

M. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016, with Editorial Revision (2016).

N. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2018.

O. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2018.

P. ASTM C150/C150M - Standard Specification for Portland Cement; 2018.

Q. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2016.

R. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2016.

S. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).

T. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2017.

U. ASTM C579 - Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes; 2018.

V. ASTM C827/C827M - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures; 2016.

W. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2015.

X. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014a.

Y. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2012.

Z. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars; 2015.

1.5 MATERIAL EVALUATION/QUALITY CONTROL

A. Preconstruction Testing: Contractor shall employ Testing Agency acceptable to YPS Office of Facilities Management to perform material evaluation tests and evaluate concrete mixes prior to submitting.
   1. Testing Agency shall be qualified according to ASTM C 1077 and ASTM E329.

B. Require concrete supplier to provide delivery tickets for each truckload of concrete. Tickets shall be presented to and reviewed by YPS Office of Facilities Management Representative or Testing Agency prior to discharging concrete.
   1. Tickets shall contain project identification name, name of Contractor, name of concrete supplier, location of batch plant, date and time of concrete batching, truck number, delivery ticket number, concrete type and class, concrete mix number, design compressive strength at 28 days, concrete mix proportions and materials, and amount of total mix design water that can be added at site prior to discharging into structure if total mix design water was not used when batched.

C. Testing Agency may visit construction site at appropriate intervals to determine if work is in general conformance with Contract Documents and specifications. Notify YPS Office of Facilities Management 48 hours before anticipated time of completion of reinforcement for a given section of work so they may determine if site observations are required. If site observations are required, do not place concrete until YPS Office of Facilities Management or Testing Agency have had opportunity to observe reinforcement.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions for each product indicated.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
   1. Indicate all penetrations and sleeve location and reinforcing.
   2. Identify areas of exposed surfaces and finish.

D. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.

E. Mix Design: Submit proposed concrete mix design.
   1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
   2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.
   3. Indicate amounts of mixing water to be withheld for later addition at Project site.

F. Test Reports: Submit report for each test or series of tests specified.

G. Qualification Data: For installer, testing agency, and concrete supplier.

H. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
   1. Material Certificates: For each of the following, signed by manufacturers:
      a. Cementitious materials.
      b. Admixtures.
      c. Steel reinforcement and accessories.
      d. Bonding agents.
      e. Joint-filler strips.

I. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.7 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

B. Follow recommendations of ACI 305R when concreting during hot weather.

C. Follow recommendations of ACI 306R when concreting during cold weather.

D. Manufacturer/Supplier Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

E. Installer Qualifications: The work of this section shall be performed by a qualified installer, with a minimum of five (5) years experience, approved by the YPS Office of Facilities Management and Fuller and D'Angelo, P.C. The term “installer” used herein, shall mean a firm of established reputation which is regularly engaged in and which maintains a regular force of workmen skilled in the installation of the type of work specified in this section.

F. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

G. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."

H. Preinstallation Conference: Conduct conference at Project site to comply with requirements.
   1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Concrete subcontractor.
d. YPS Office of Facilities Management.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold and hot weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and re-shoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, concrete repair procedures, and concrete protection.

I. Delivery Records: Each delivery to the site of concrete shall be accompanied by weigh master's certification. Retain all copies for inspection by the Testing Agency.

1. Indicate water added to mix a job site on each delivery ticket. Show quantity of water added. Site water tempered mixes exceeding specified slump range will be rejected as not complying with specification requirements

1.8 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

1.9 DELIVERY, STORAGE AND HANDLING

A. Store materials so as to preserve their quality and fitness for work.

B. Store reinforcement and formwork in manner to prevent bending, damage (including damage to coatings), and accumulation of dirt.

C. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

D. All packed materials shall be delivered to the site in original unopened containers, clearly indicating manufacturer's name, brand name, and other identifying information.

1.10 PROJECT CONDITIONS

A. Coordinate with the work of all other sections and/or separate contracts.

PART 2 PRODUCTS

2.1 FORMWORK

A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.

B. Form Materials: Contrator's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.

1. Form Facing for Exposed Finish Concrete: Plywood, metal, metal-framed/plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown in drawings. .

a. Material:

a) Steel

b) Plywood materials shall be one of the following:

(a) Overlaid plywood complying with U.S. Product Standards PS 1 "A-C or B-B High Density Overlaid (HDO) Concrete Form," Class 1, exterior grade or better.

(b) Plywood complying with U.S. Product Standard PS 1 "B-B (Concrete Form) Plywood," Class 1, exterior grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

2. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.

3. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings, maximum VOC of 450 g/l that will not bond with, stain, or adversely affect concrete surfaces or impair subsequent treatments of concrete surfaces requiring bond or adhesion or impede wetting of surfaces to be cured with water or curing compound.
4. Form Ties: Cone snap .
   a. Provide ties that will leave holes no larger than 1-inch diameter in concrete surface when removed.
   b. Unexposed concrete: "Type A-3 Snap Tie Standard" by Dayton Superior or accepted equivalent.
   c. Exposed concrete: "Type B1 Two Strut Coil Tie" or "Type B1/B3 Screw-on Coil Tie," with coil bolts and plastic cones at each end, by Dayton Superior, or accepted equivalent. Provide "Type B30 Screw-on Plastic Cone or A54 Coil Cone Concrete Plugs," by Dayton Superior, or accepted equivalent; color as selected by Architect.
   d. Provide galvanized or stainless-steel ties for concrete elements that are reinforced with epoxy-coated or galvanized reinforcing.
   e. Internal wood spreaders are prohibited

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

2.2 REINFORCEMENT MATERIALS

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Type: Deformed billet-steel bars.
   2. Finish: Epoxy coated in accordance with ASTM A775/A775M, unless otherwise indicated.

B. Steel Welded Wire Reinforcement (WWR): Class A epoxy coated, deformed type, ASTM A884/A884M.
   1. Mesh Size: 6 x 6.
   2. Wire Gage: W 6 x W6.

C. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
      a. Supports for epoxy-coated reinforcing shall be either wire bar-type coated with epoxy, plastic, or vinyl compatible with concrete for a minimum distance of 2 inches from the point of contact with reinforcing or all plastic-type.
   3. Finish (epoxy-coated or galvanized) for supports formed from reinforcing bars shall match the finish of the supported reinforcing.
   4. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775.
   5. Zinc Repair Material: ASTM A 780, zinc-based solder, paint containing zinc dust, or sprayed zinc.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
   1. Acquire cement for entire project from same source.

B. Fine and Coarse Aggregates: ASTM C33/C33M.
   1. Acquire aggregates for entire project from same source.
   2. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps, or other deleterious substances.
   3. Gradations:
      a. For footings, foundation walls, piers, grade beams, basement walls, retaining walls, and interior walls:

Sieve Size	Percent Passing
2 inch	100

1-1/2 inch	95 to 100
3/4 inch	35 to 70
3/8 inch	10 to 30
No. 4	0 to 5

b. For other applications:

Sieve Size	Percent Passing
1-1/2 inch	100
1 inch	95 to 100
1/2 inch	25 to 60
No.4	0 to 10
No.8	0 to 5

C. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.4 ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Air Entrainment Admixture: ASTM C260/C260M.

C. Water Reducing Admixture: ASTM C494/C494M Type A.
1. Manufacturers:
a. Euclid Chemical Company; EUCON NW: www.euclidchemical.com.

2.5 ACCESSORY MATERIALS

A. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
1. Grout: Comply with ASTM C1107/C1107M.
2. Minimum Compressive Strength at 28 Days, ASTM C109/C109M: 7,000 pounds per square inch.
3. Products containing aluminum powder are not permitted.
4. Flowable Products:
a. Five Star Products, Inc; Five Star Fluid Grout 100: www.fivestarproducts.com.
b. W. R. Meadows, Inc; CG-86: www.wrmeadows.com.
c. Substitutions: See Section 01 2500 Substitution Procedures

B. Non-Shrink Epoxy Grout: Moisture-insensitive, two-part; consisting of epoxy resin, non-metallic aggregate, and activator.
1. Composition: High solids content material exhibiting positive expansion when tested in accordance with ASTM C827/C827M.
a. Maximum Height Change: Plus 4 percent.
b. Minimum Height Change: Plus 1 percent.
2. Minimum Compressive Strength at 7 days, ASTM C579: 12,000 pounds per square inch.
3. Manufacturers:
a. Five Star Products, Inc; Five Star HP Epoxy Grout: www.fivestarproducts.com.

C. Removable post sleeve: Plastic sleeve for forming post holes.
1. Product:"E2 Sleeve" by Sharpe Products.

D. Abrasive Stair Nosings: Extruded aluminum alloy 6063-T6. Provide the following:
1. Model #35011
a. Width: 3"
b. Lip: 1/2"
c. Thickness: 1/4"
2. Heat treated extruded aluminum alloy 6063-T6.

3. Abrasive filler shall consist of a mixture of aluminum oxide and silicon carbide granules in an epoxy matrix.
4. Anchors: Steel wing anchor.
5. Space anchors 3" from ends.
6. Apply bituminous paint to concealed bottoms, sides, and edges of cast-metal units set into concrete
7. Color: As selected by Architect.
8. Product:
    a. American Safety Tread, Model 35011, extruded aluminum. PO Box 611, Helena, AL 35080.
    b. Substitutions: See Section 01 2500 Substitution Procedures

2.6 BONDING AND JOINTING PRODUCTS

A. Epoxy Bonding System:
1. Complying with ASTM C881/C881M and of Type required for specific application.
2. Manufacturers:
    a. Euclid Chemical Company: www.euclidchemical.com.
    b. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
    c. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
    d. Substitutions: See Section 01 2500 Substitution Procedures

B. Dowels: Required for anchoring new concrete to existing concrete slabs.
1. See detail on drawing.

2.7 CURING MATERIALS

A. Moisture-Retaining Sheet: ASTM C171.
1. Manufacturers:
    a. Substitutions: See Section 01 2500 Substitution Procedures

B. Water: Potable, not detrimental to concrete.

2.8 REPAIR MATERIALS

A. Refer to Section 003 0100 - Maintenance of Concrete.

2.9 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
1. For trial mixtures method, employ independent testing agency acceptable to YPS Office of Facilities Management for preparing and reporting proposed mix designs.

C. Identify sources of all products used in design mixes.

D. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

E. Normal Weight Concrete:
1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch.
2. Water-Cement Ratio: Maximum 40 percent by weight.
3. Total Air Content: 4 percent, determined in accordance with ASTM C173/C173M.
4. Maximum Slump: 4 inches.
5. Maximum Aggregate Size: 3/4 inch.

2.10 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

2.11 REINFORCING FABRICATION

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice." Fabricate bars to required lengths, shapes, and bends. Do not re-bend or straighten reinforcement in manner that could weaken material.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

B. Do not proceed with work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances complying with ACI 347 and ACI 117.

C. Verify that forms are clean and free of rust before applying release agent.
   1. Do not coat forms in place.

D. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for concrete placement. Securely brace temporary openings, and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

E. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

F. Chamfer exposed corners and edges as indicated using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

G. Fit corners and joints with gaskets or tape to prevent leakage.

H. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

I. Sleeves: Provide sleeves in concrete formwork for plumbing, electrical, and mechanical penetrations. Coordinate size and location of sleeves with Contractors and mechanical, electrical, and plumbing drawings.
   1. Accurately place and secure in forms.
   2. Coordinate sleeve locations with reinforcing bars.

J. Penetrations shall not occur through footings, piers, columns, beams, joists, grade beams, or supported slabs unless shown in structural drawings

K. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
   1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.

L. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert stainless steel dowels and pack solid with non-shrink epoxy grout.

3.3 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement

B. Fabricate and handle epoxy-coated reinforcing in accordance with ASTM D3963/D3963M.

C. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

D. Place slab reinforcing one-third of slab thickness below top surface of slab. Support reinforcement by metal chairs, runners, bolsters, or concrete brick as required.

1. Dedicate workers to placement of reinforcement to continuously monitor and adjust reinforcement location during concrete placement.

E. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

G. Galvanized Reinforcement: Repair cut and damaged zinc coatings with zinc repair coating according to ASTM A 780. Use galvanized steel wire ties to fasten galvanized steel reinforcement.

H. Comply with manufacturer-recommended procedures for installing and anchoring of doweled reinforcement using chemical adhesives, including drilling and cleaning of holes and mixing and applying of adhesives.

I. Coordinate placement of reinforcement with openings, including sleeves and other embedded items. Where one or more bars are interrupted, provide additional reinforcement at openings. Additional reinforcement is noted in drawings.

J. Use of nails in forms and use of clay brick to support reinforcement is prohibited.

3.4 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Notify YPS Office of Facilities Management not less than 24 hours prior to commencement of placement operations.

C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

D. Ensure reinforcement, inserts, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

E. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

1. Slabs on Grade: Use strip pour methods and mechanical vibratory screed whenever possible.
2. Deposit and consolidate concrete in continuous operation within limits of construction joints until placing of panel or section is complete.
3. Consolidate concrete during placing operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
4. Bring slab surfaces to correct level with a straightedge and strike off. Uniformly slope to drains. Use darbies to smooth surface, leaving it free of humps or hollows. Do not sprinkle water or portland cement on plastic surface. Do not disturb slab surfaces before beginning finishing operations.

F. Deposit concrete in forms in horizontal layers not deeper than 24 inches and in manner to avoid inclined construction joints.

G. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.

H. Do not use vibrators to transport concrete inside formwork.

I. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Vibrators shall penetrate placed layer of concrete at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set.

J. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

K. Do not allow vibrator to come in contact with form.

3.5 SLAB JOINTING

A. Locate joints as indicated on drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

1. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.
2. Place joint filler in floor slab pattern placement sequence. Set top to required elevations.
3. Install joint devices in accordance with manufacturer's instructions.
4. Provide expansion joints in concrete paving and sidewalks every 25' maximum.
5. Apply sealants in joint devices in accordance with 07 9200 - Joint Sealants.

D. Hand tooled or Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.

3.6 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.

B. Stair Nosing: Examine substrates, supports, and conditions under which this work is to be performed and notify Contractor, in writing, of conditions detrimental to the proper completion of the work

1. Strictly comply with manufacturer's instructions and recommendations and approved details. Securely anchor work to substrate.
2. Repair minor damage to eliminate all evidence of repair. Remove and replace work which cannot be satisfactorily repaired.

3.7 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

C. Exposed Form Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.

D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:

1. Broom Finish: Apply a broom finish to exterior sidewalks, concrete platforms, steps, and ramps, and elsewhere unless indicated otherwise.
   a. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
   b. Tool perimeter of surface to ease edges.
   c. Tool control joints every 5' or as indicated on drawings.

3.8 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
   1. Normal concrete: Not less than seven days.

C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.

D. Surfaces Not in Contact with Forms:
   1. Final Curing: Begin after initial curing but before surface is dry.
      a. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.

3.9 FIELD QUALITY CONTROL

A. An independent testing agency may perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

D. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.

E. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

F. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

G. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

3.10 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.

B. Repair or replacement of defective concrete will be determined by the YPS Office of Facilities Management. The cost of additional testing shall be borne by the Contractor.

C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of YPS Office of Facilities Management for each individual area.

3.11 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

SECTION 03 4100
PRECAST STRUCTURAL CONCRETE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Pre-cast seating sections.

B. Pre-cast walkway.

C. Cast in place steps for pre-cast seating sections.

D. Grout packing.

E. Connection and supporting devices.

1.3 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements.

B. Section 03 3000 - Cast-in-Place Concrete: For connection anchor placement. and steps

C. Section 03 0100 - Maintenance of Concrete: For repair to existing supports

D. Section 07 9200 - Joint Sealants.

E. Section 09 9113 - Exterior Painting; for painting of stair nosings and warning strips.

1.4 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2018).

B. ASTM C33 – Aggregates.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

E. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2017.

F. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2014.

G. ASTM C150/C150M - Standard Specification for Portland Cement; 2018.

H. ASTM C260 – Air Entrainment.

I. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars; 2015.

J. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).

K. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2011.

L. IAS AC157 - Accreditation Criteria for Fabricator Inspection Programs for Reinforced and Precast/Prestressed Concrete; 2017.

M. ICC (IBC) – 2020 International Building Code.

N. PCI – Precast/Prestressed Concrete Institute

O. PCI MNL-116 - Manual for Quality Control for Plants and Production of Structural Precast Concrete Products; 1999.

P. PCI MNL-120 - PCI Design Handbook - Precast and Prestressed Concrete; 2012.

Q. PCI MNL-123 - Design and Typical Details of Connections for Precast and Prestressed Concrete; 1988.

R. PCI MNL-124 - Design for Fire Resistance of Precast Prestressed Concrete; 1989.

S. PCI MNL-135 - Tolerance Manual for Precast and Prestressed Concrete Construction; 2000.

T. UL (FRD) - Fire Resistance Directory; Current Edition.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate openings sizes and locations, attachment of related items, and other work related to the fabrication and installation of precast concrete units. Required attendance YPS Office of Facilities Management, Fuller and D'Angelo, P.C., erector, and related trades.

B. Sequencing: Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

C. Preinstallation Meeting: Convene a pre-installation conference two weeks prior to commencing work of this section.
   1. Discuss limitations, if any, on field cutting of openings.
   2. Review shop drawings and installation details.
   3. Anchor and weld plate locations.
   4. Opening locations including those cut in the field.
   5. Limitations on field cutting and core drilling.
   6. Site access requirements and obstructions including but not limited:
      a. Access roads and maintenance thereof.
      b. Protection and repair of existing paving.
      c. Dewatering of footing trenches.
      d. Job site snow removal.
      e. Job site debris removal.
      f. Overhead obstructions including power lines.
   7. Cold weather grouting requirements and expectations.
   8. Cleaning responsibilities and expectations.

1.6 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide precast concrete units and connections capable of withstanding design loads within limits and under conditions indicated on Drawings.
   1. Loading Requirements: 100 psf Live Load.
   2. Concrete: Minimum compressive strength of 6,000 psi at 28 days.

1.7 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate standard component configurations, design loads, deflections, cambers, and bearing requirements.

C. Shop Drawings: Indicate layout, unit locations, fabrication details, unit identification marks, reinforcement, connection details, support items, dimensions, openings, and relationship to adjacent materials.
   1. Indicate design loads, deflections, cambers, bearing requirements, and special conditions.
   2. Indicate locations of and detail hardware and anchorage devices to be cast-in to precast units with relationship to structure.
   3. Indicate welded connections by AWS standard symbols and show size, length, and type of each weld.
   4. Indicate locations of and detail hardware and anchorage devices to be embedded into or attached to structure or other construction with relationship to structure.

5. Indicate locations of and detail hardware and anchorage devices to be embedded into or attached to structure or other construction with relationship to structure.
6. Schedule loose hardware and anchorage devices to be installed by others; include in schedule: identification marks, item descriptions, and total quantities.
7. Indicate locations of and detail lifting and handling devices.
8. Indicate sections and details showing quantities and position of reinforcing steel and related items including special reinforcement
9. Indicate shim sizes and grouting sequence.
10. Handling procedures, sequence of erection, and bracing plan.

D. Samples: Submit two 12 x 12 x 2, in size, illustrating surface finish treatment.

E. Welders' Certificates.

F. Designer's Qualification Statement.

G. Fabricator's Qualification Statement: Provide documentation showing precast concrete fabricator is accredited under IAS AC157.

H. Sustainable Design Reporting: If any fly ash, ground granulated blast furnace slag, silica fume, rice hull ash, or other waste material is used in mix designs to replace Portland cement, submit the total volume of concrete, mix design(s) used showing the quantity of Portland cement replaced, reports showing successful cylinder testing, and temperature on day of pour if cold weather mix is used.

I. Test Reports: Submit to the YPS Office of Facilities Management and Fuller and D'Angelo, P.C. test reports for concrete and other structural materials tested during fabrication including cement mill reports, mix reports, cylinder break reports

1.8 QUALITY ASSURANCE

A. Single Source Requirement: Provide precast concrete of this section by one manufacturer:

B. Design Standards: Comply with ACI 318 (ACI 318M) and the design recommendations of PCI MNL 120, “PCI Design Handbook – Precast and Prestressed Concrete,” applicable to types of structural precast concrete units indicated

C. Designer Qualifications: Design precast concrete members under direct supervision of a Professional Structural Engineer experienced in design of precast concrete and licensed in State of New York.
1. All drawing shall be signed and seal by the Design Engineer.
2. Include all dead, live, and other applicable loads used in the design. Indicate loading on shop drawings.

D. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, notify the YPS Office of Facilities Management, Fuller and D'Angelo, P.C., and Manufactureer's repressentative immediately and submit design calculations and drawings. Do not adversely affect the appearance, durability or strength of units when modifying details or materials. Maintain the general design concept when altering size of units and alignment.

E. Fabricator Qualifications: Company specializing in manufacturing products specified in this section, with not less than five (5) years of documented experience.
1. The firm shall be in good standing in the PCI Plant Certification Program, and that complies with the following requirements: No Exceptions. No other plant certification will be accepted.
    a. Assumes responsibility for engineering precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and Comprehensive Engineering analysis by a qualified Professional Engineer.
    b. Participates in PCI’s Plant Certification program at the time of bidding and through the construction process.
    c. Has sufficient production capacity to produce required units without delaying the Work.
    d. Is registered with and approved by YPS Office of Facilities Management or authorities having jurisdiction.

F. Erector Qualifications: Company specializing in erecting products of this section with not less than five (5) years experience and approved by precast manufacturer. Erector's workman shall be properly trained to handle and erect precast units.

G. Welder Qualifications: Qualified within previous 12 months in accordance with AWS D1.1/D1.1M and AWS D1.4/D1.4M.

1.9 QUALITY CONTROL

A. Manufacturing procedures, testing requirements and quality control recommendations for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Concrete Products."

1. Comply with camber and dimensional tolerances of PCI MNL 135, "Tolerance Manual for Precast and Prestressed Concrete Construction".

B. Welder Qualifications: AWS Certified, approved by the precast concrete manufacturer, and having a minimum of 5 years experience in the erection of precast concrete similar to the requirements of this project. Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code – Steel"; and AWS D1.4, "Structural Welding Code – Reinforcing Steel."

C. Pollution Control Regulations: Comply with all pollution control regulations in fabricating and finishing of all products. Protection of underground water and water runoff is the utmost priority.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Handle precast members in position consistent with their shape and design. Lift and support only from support points. Lifting devices to have a minimum safety factor of 5 to 1.

B. Lifting or Handling Devices: Capable of supporting member in positions anticipated during manufacture, storage, transportation, and erection.

C. Mark each member with date of production and final position in structure.

D. Transportation and Delivery: Transport units in accordance with manufacturer requirements.

E. Storage and Support: At all times store and support units off ground with identification marks clearly visible and so lifting devices are accessible and undamaged. Separate stacked units by batten across full width of each bearing point. Do not use stacked precast units for storage of other units or equipment.

1.11 FIELD CONDITIONS

A. General Contractor shall prepare and maintain site free of obstructions as required by precast erector for the work of this section.

B. Cold Weather Grouting: Provide written procedures to address cold weather grouting to Owner/Architect prior to the erection process

1.12 WARRANTY

A. Provide two (2) year guarantee for workmanship, materials, and satisfactory performance from date of Substantial Completion

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Structural Precast Concrete:

1. Unistress Corp., PO Box 1145, Pittsfield, MA 01202-1145, www.unistresscorp.com
2. Wells Concrete Products: www.wellsconcrete.com.
3. Gage Brothers: www.gagebrothers.com.
4. Molin Concrete Products: www.molin.com
5. Substitutions: See Section 01 2500 Substitution Procedures

2.2 PRECAST UNITS

A. Precast Structural Concrete Units: Comply with PCI MNL-116, PCI MNL-120, PCI MNL-123, PCI MNL-135, ACI 318 and applicable codes.

1. Design components to withstand design loads in the configuration indicated on drawings and as follows:
   a. Concrete: Minimum compressive strength of 6,000 psi at 28 days
   b. Maximum Allowable Deflections: 1/360 span, cambered to achieve slope to drain.
   c. Pre-cast Seating Sections Live Load: 100 pounds per square foot minimum.
2. Calculate structural properties of framing members in accordance with ACI 318.
3. Design members exposed to the weather to provide for movement of components without damage, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to seasonal or cyclic day/night temperature ranges.
4. Design system to accommodate construction tolerances, deflection of other building structural members and clearances of intended openings.

2.3 MATERIALS

A. Cement: Gray Portland type, complying with ASTM C150/C150M, Type I.

B. Aggregate, Sand, Water, Admixtures: Determined by precast fabricator as appropriate to design requirements and PCI MNL-116.

2.4 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi).
   1. Deformed billet-steel bars.
   2. Epoxy coated in accordance with ASTM A775/A775M.

B. Steel Welded Wire Reinforcement (WWR): Class A epoxy coated, deformed type, ASTM A884/A884M.

2.5 FABRICATION

A. Comply with fabrication procedures specified in PCI MNL-116.

B. Fabricate and handle epoxy-coated reinforcing bars in accordance with ASTM D3963/D3963M.

C. Maintain plant records and quality control program during production of precast members. Make records available upon request.

D. Ensure reinforcing steel, anchors, inserts, plates, angles, and other cast-in items are embedded and located as indicated on shop drawings.

2.6 FABRICATION

A. Comply with fabrication tolerances specified in PCI MNL-116.

B. Maintain plant records and quality control program during production of precast members. Make records available upon request.

C. Ensure reinforcing steel, anchors, inserts, plates, angles, and other cast-on items are embedded and located as indicated on shop drawings.

D. Ensure reinforcing steel, anchors, inserts, plates, angles, and other cast-on items are embedded and located as indicated on shop drawings.

E. Tension reinforcement tendons as required to achieve design load criteria.

F. Provide required openings with a dimension larger than 10 inches and embed accessories provided by other Sections, at indicated locations.

2.7 FINISHES

A. Ensure exposed-to-view finish surfaces of precast concrete members are uniform in color and appearance.

B. Cure members under identical conditions to develop required concrete quality, and minimize appearance blemishes such as non-uniformity, staining, or surface cracking.

C. Exposed-to-View Finish (Finish B): Normal plant finish with fins and protrusions removed, ground edges and ends, flat face surfaces.

2.8 ACCESSORIES

A. Grout: Non-shrink, non-metallic, minimum yield strength of 10,000 psi at 28 days.
   1. Type: Epoxy.

B. Bearing Pads: Neoprene (Chloroprene); Shore A Durometer as required by bearing loads; 1/8 inch thick, smooth both sides.

C. Bolts, Nuts and Washers: High strength steel type recommended for structural steel joints.
   1. Quenched and tempered alloy steel type. Corrosion resistant chromium-nickel type.

2.9 FABRICATION TOLERANCES

A. Conform to PCI MNL-116.

2.10 SOURCE QUALITY CONTROL AND TEST

A. Section 01 4000 - Quality Requirements: Provide mix design for concrete.

B. Test samples in accordance with applicable ASTM standard.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that site conditions are ready to receive work and field measurements are as indicated on shop drawings.

3.2 PREPARATION

A. Prepare support equipment for the erection procedure, temporary bracing, and induced loads during erection.

3.3 ERECTION

A. Erect members without damage to structural capacity, shape, or finish. Replace or repair damaged members.

B. Align and maintain uniform horizontal and vertical joints, as erection progresses.

C. Adjust differential camber between precast members to tolerance before final attachment.

D. Install bearing pads.

E. Set vertical units dry, without grout, attaining joint dimension with lead or plastic spacers.

F. Grout As indicated on drawings.

G. Secure units in place. Perform welding in accordance with AWS D1.1/D1.1M.

3.4 TOLERANCES

A. Erect members level and plumb within allowable tolerances.

B. Comply with PCI MNL-116 for erection tolerances, except as specifically amended below.

3.5 PROTECTION

A. Protect members from damage from other trades throughout the job.

3.6 CLEANING

A. Clean weld marks, dirt, or blemishes from surface of exposed members.

END OF SECTION

SECTION 03 5400
CAST UNDERLAYMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Liquid-applied self-leveling floor underlayment.
   1. Use cementitious type at all locations.

1.3 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements

B. Section 01 7000 - Execution: Alteration project procedures; selective removals for remodeling.

C. Section 09 6500 - Resilient Flooring.

1.4 REFERENCE STANDARDS

A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2016a.

B. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2012.

C. ASTM C 580 Flexural Strength

D. ASTM D 3931 Bond Strength (concrete).

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.

F. ASTM F-2170 Relative Humidity in Concrete

G. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair; 2013.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data sheets documenting physical characteristics and product limitations of underlayment materials. Include information on surface preparation, environmental limitations, and installation instructions.

C. Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer's Instructions.

E. Material Test Reports: From a qualified testing agency indicating and interpreting test results of underlayments for compliance with requirements indicated.

F. Minutes of preinstallation conference

1.6 QUALITY ASSURANCE

A. Manufacturer: Provide underlayment manufactured by a firm with a minimum of ten (10) years experience with types equivalent to those specified.
   1. Manufacturer capable of providing technical training and field service representation.

B. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years of experience who has completed work similar in material, design, and extent to that indicated for this Project and approved by the manufacturer.

C. Testing Agency Qualifications: An independent testing agency, acceptable to Owner's Representative or Architect, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented ac-cording to ASTM E 548.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section 01300 Administrative Requirements

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Keep dry and protect from direct sun exposure, freezing, and ambient temperature greater than 105 degrees F.

1.8 REGULATORY REQUIREMENTS

A. Conform to New York State Building Codes for combustibility or flame spread requirements.

1.9 MOCK-UP

A. Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Prepare mock-up in location designated by Architect and Owner's Representative.
   2. Area: 6 ft by 6 ft.
   3. Do not proceed with underlayment work until workmanship of mock-up has been approved by Owner's Representative
   4. If Owner's Representative or Architect determines that mockups do not meet requirements, demolish and remove them from the site and cast others until mockups are approved.
   5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

B. Mock-up may remain as part of the Work.

1.10 FIELD CONDITIONS

A. Do not install underlayment until floor penetrations and peripheral work are complete.

B. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting underlayments performance.

C. Maintain minimum ambient temperatures of 50 degrees F 24 hours before, during and 72 hours after installation of underlayment.

D. During the curing process, ventilate spaces to remove excess moisture.

E. Close areas to traffic during underlayments application and, after application, for time period recommended in writing by manufacturer

1.11 WARRANTY

A. Provide manufacturer's comprehensive 10 year warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Cementitious Underlayment:
   1. ARDEX Engineered Cements; ARDEX K 15 with ARDEX P51 Primer: www.ardexamericas.com.
   2. Substitutions: Section 01 2500 Substitution Procedures.

2.2 MATERIALS

A. Cementitious Underlayment: Blended cement mix, that when mixed with water in accordance with manufacturer's directions will produce self-leveling underlayment with the following properties:
   1. Compressive Strength: Minimum 5000 pounds per square inch after 28 days, tested per ASTM C109/C109M.
   2. Flexural Strength: Minimum 1250 psi after 28 days, tested per ASTM C348.
   3. Shrinkage: 0.025 - 0.045% @ 28 days when tested in conformance with ASTM C 531 (modified).

4. Ideal Slump range 11.5" - 12.5" (2" diameter pipe, 4" high).
5. Bond Strength: 350-400 psi when tested in conformance with ASTM D 3931
6. "0" VOC content
7. Final Set Time: 1-1/2 to 2 hours, maximum.
8. Thickness: Capable of thicknesses from feather edge to maximum 3-1/2 inch.
9. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.

B. Aggregate: Dry, well graded, washed silica aggregate, approximately 1/8 inch in size and acceptable to underlayment manufacturer.

C. Reinforcement: Galvanized metal lath complying with recommendations of underlayment manufacturer for specific project circumstances.

D. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to underlayment mix materials.

E. Moisture mitigation: TEC The LiquiDAM®
1. 100% solids epoxy
2. "0" VOC
3. Use for applications reading up to and including 20 lbs. per 1000 sq. ft. per 24 hours vapor emission per ASTM 1869, or 98% Relative Humidity per ASTM F2170.

F. Primer: Ardex P 51

G. Joint and Crack Filler: Latex based filler, as recommended by manufacturer.

H. Acrylic-Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.3 MIXING

A. Site mix materials in accordance with manufacturer's instructions.

B. Add aggregate for areas where thickness will exceed 1/2 inch. Mix underlayment and water for at least two minutes before adding aggregate, and continue mixing to assure that aggregate has been thoroughly coated.

C. Standard Mix: Mix in accordance with manufacturer's instructions.
1. Slowly add a 50 lb. bag into water while mixing.
2. Use 4.75 - 5.25 quarts of water per 50 lb. bag.
3. Use cool water not over 70 degrees F.
4. Mix using a ½ inch heavy-duty drill with blending paddle at a minimum of 650 rpm. Mix thoroughly for approximately 2-3 minutes. Scrape containers sides and remix to ensure a lump-free consistency.

D. Aggregate Mix: For areas to be installed over 1/2 inch inch thick.
1. Mix as specified for standard mix.
2. Add from 1/3 to 1 part by volume of 1/8 inch or larger aggregate and mix thoroughly to evenly coat all aggregate.
3. Do not use sand.

E. Pumped Mix:
1. Mix as specified for standard mix. Do not over water.
2. Check the consistency of the product with a Slump test.

F. Mix to self-leveling consistency without over-watering and in accordance with manufacturer's instructions.

PART 3 EXECUTION

3.1 EXAMINATION

A. Test moisture content of substrates:

1. Per ASTM F2170, do not install if relative humidity is > 95% (15 pounds per 1000 sq. ft. per 24 hours ASTM F1869) up to and including 98% Relative Humidity (20 pounds per 1000 sq. ft. per 24 hours ASTM F 1869) without first applying TEC® The LiquiDAM® moisture mitigation membrane.
2. For moisture sensitive floor finishes refer to the finish floor manufacturers specifications for moisture limitations. Remediation of excessive moisture conditions **must be done prior to** installation of Self Leveling Underlayment. To reduce moisture vapor emissions to an acceptable level, use material recommended by the manufacturer.

B. Notify the Owner's Representative in writing of any unsatisfactory conditions.

C. Verify that substrate surfaces are clean, dry, unfrozen, do not contain petroleum byproducts, or other compounds detrimental to underlayment material bond to substrate.

3.2 PREPARATION

A. Concrete: Mechanically prepare steel troweled concrete to create a textured surface necessary to achieve the best bond; acceptable methods include bead blasting and scarifying. Do not use acid etching.

B. Concrete: Prepare surfaces according to ICRI 310.2R.

C. For installation over cutback adhesive, remove adhesive by scraping until all that remains is a thin transparent layer of adhesive residue.

D. Existing Concrete: Remove existing surface treatments and deteriorated and unsound concrete. Mechanically abrade base slabs to produce a heavily scarified surface profile with an amplitude of 1/4 inch
1. After profiling test substrate by place drop of water, or other means to insure all coatings, sealers etc have been removed. Repeat profiling if necessary.
2. Prepare and clean existing base slabs according to topping manufacturer's written instructions. Fill voids, cracks, and cavities in base slabs.
3. Mechanically remove contaminants from existing concrete that might impair bond of topping.
4. Saw cut existing contraction and construction joints to a depth of 1/2 inch and fill with epoxy joint filler.

E. Remove substrate surface irregularities. Fill voids and deck joints with filler. Finish smooth.

F. Vacuum clean surfaces.

G. Prime substrate in accordance with manufacturer's instructions. Allow to dry.

H. Close former roof and floor openings where items and equipment have been removed and as indicated..

I. Close floor openings.

3.3 APPLICATION OF PRIMER

A. Prime standard subfloors with P51 solvent-free primer.
1. Mix Primer 1:1 with water and apply evenly with stiff bristled push broom.
2. Apply an even continuous coat.
3. Allow to dry to a clear film (typically 30 minutes; maximum 24 hours).
4. Do not apply underlayment until the primer is dry.
   a. To determine if the primer is dry after a minimum of 30 minutes (max. 24 hours), pour water onto the surface of the primer in several areas and rub it with your finger. If the water remains clear, the primer is dry. If the water turns cloudy or milky, additional drying time is needed.
5. Primer coverage is approximately 400 to 450 sq. ft. per gallon depending on surface texture.
6. Prime extremely absorbent subfloors twice.

3.4 APPLICATION OF UNDERLAYMENT

A. Install cementious self-leveling underlayment in accordance with manufacturer's instructions.

B. Pump or pour material onto substrate. Do not retemper or add water.

1. Pump, move, and screed while the material is still highly flowable.
2. Be careful not to create cold joints.
3. Wear spiked shoes while working in the wet material to avoid leaving marks.

C. Place to required thickness, with top surface level to 1/16 inch in 10 ft.

D. For final thickness over 1-1/2 inches, place underlayment in layers. Allow initial layer to harden to the point where the material has lost its evaporative moisture. Immediately prime and begin application of the subsequent layer within 24 hours.

E. Place before partition installation.

F. Where additional aggregate has been used in the mix, add a top layer of neat mix (without aggregate), if needed to level and smooth the surface.

G. Construction Joints: Construct joints true to line with faces perpendicular to surface plane of topping, at locations indicated or as approved by Owner's Representative.
1. Coat face of construction joint with epoxy adhesive at locations where topping is placed against hardened or partially hardened topping.

H. Contraction Joints: Form weakened-plane contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before topping develops random contraction cracks.
1. Form joints in topping over contraction joints in base slabs, unless otherwise indicated.
2. Construct contraction joints for a combined depth equal to topping thickness and not less than one-fourth of base-slab thickness.
3. Construct contraction joints for a depth equal to one-half of topping thickness, but not less than 1/2 inch deep

I. If a fine, feathered edge is desired, steel trowel the edge after initial set, but before it is completely hard.

3.5 CURING

A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.

B. Air cure in accordance with manufacturer's instructions.

C. Begin curing immediately after finishing topping. Cure by one or a combination of the following methods, according to topping manufacturer's written instructions:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with water, continuous water-fog spray or absorptive cover, water saturated and kept continuously wet. Cover topping surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in two coats in continuous operations by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period

3.6 JOINT FILLING

A. Prepare and clean contraction joints and install epoxy joint filler, according to manufacturer's written instructions, once topping has fully cured.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install epoxy joint filler full depth of contraction joints. Overfill joint and trim joint filler flush with top of joint after hardening

3.7 FIELD QUALITY CONTROL

A. An independent testing agency will perform field inspection and testing, as specified in Section 01 4000 - Quality Requirements.

3.8 REPAIRS

A. Defective Topping: Repair and patch defective topping areas, including areas that have not bonded to concrete substrate

3.9 PROTECTION

A. Do not permit traffic over unprotected floor underlayment surfaces.

END OF SECTION

SECTION 04 2000
UNIT MASONRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Concrete Masonry Units (CMU).

B. Mortar and grout.

C. Reinforcement and anchorage.

D. Accessories.

1.3 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Loose steel lintels and Fabricated steel items.

B. Section 07 8400 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.

C. Section 07 9200 - Joint Sealants: Sealing control and expansion joints.

D. Section 09 3000 - Tiling.

E. Section 09 9123 - Interior Painting.

1.4 MATERIAL EVALUATION/QUALITY ASSURANCE

A. Preconstruction Testing: Contractor shall employ and pay qualified independent Testing Agency to perform preconstruction testing indicated and other inspecting and testing services required for source and field quality control.

1. Concrete Masonry Unit Tests: For each different concrete masonry unit indicated, test units for strength, absorption, and moisture content in accordance with ASTM C 140.
2. Test mortar composition and properties in accordance with ASTM C 270 if Property Specification is used.
3. Evaluate mortar proportions in accordance with ASTM C 270 if Proportion Specification is used.
4. Test mortar properties for approved mix in accordance with ASTM C780 (Compressive Strength Method) to determine a base line for field mortar tests.
5. Test grout compressive strength in accordance with ASTM C 1019 to demonstrate compliance with ASTM C476, Property Specification.
    a. Contractor shall deliver to Testing Agency accepted CMU for fabrication of test samples.
6. Test self-consolidating grout compressive strength in accordance with ASTM C1019. Test slump flow and visual stability index in accordance with ASTM C1611/C1611M.

1.5 REFERENCE STANDARDS

A. ASTM A580/A580M - Standard Specification for Stainless Steel Wire; 2016.

B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2018, with Editorial Revision (2018).

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.

D. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2016.

E. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2016a.

F. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.

G. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2017.

H. ASTM C140/C140M - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2017a.

I. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.

J. ASTM C150/C150M - Standard Specification for Portland Cement; 2018.

K. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.

L. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.

M. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2018.

N. ASTM C476 - Standard Specification for Grout for Masonry; 2018.

O. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.

P. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

1.6 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting two (2) weeks before starting work of this section; require attendance by all relevant installers.

1.7 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units and mortar.

1. Material Data: Submit to YPS Office of Facilities Management and Fuller and D'Angelo, P.C. certificates for the following signed by manufacturer and Contractor certifying each material complies with requirements.
    a. Masonry Units.
    b. Each different cement product required for mortar and grout, including name of manufacturer, brand, and type.
    c. Each material and grade indicated for reinforcing bars.
    d. Each type and size of joint reinforcement.
    e. Each type and size of anchors, ties, and metal accessories.

C. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

D. Test Reports: Concrete masonry manufacturer's test reports for units with integral water repellent admixture.

1. Mortar: Property (Proportion) requirements of ASTM C 270.
2. Grout complying with ASTM C 476. Include description of type and proportions of grout ingredients.
3. Masonry units: ASTM C67 and ASTM C140.

1.8 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum five years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least five (5) years of documented experience.

D. Grouting and Reinforcing: All masonry and grouting and reinforcing work shall be performed by masonry craft-workers who have successfully completed the International Masonry Institute (1-800-IMI-0988) training course for Grouting and Reinforced Masonry Construction, or equal.

E. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by

equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

1. Provide manufacturer's certification for fire ratings.

1.9 MOCK-UP

A. Construct a masonry wall as a mock-up panel sized 8 feet long by 6 feet high; include mortar, accessories, and wall openings in mock-up.

B. Locate where directed.

C. Mock-up may not remain as part of the Work.

D. Build mockup of typical wall area as directed by YPS Office of Facilities Management.

E. Build mockups for the following types of masonry in sizes approximately 8 feet long by 6 feet high by full thickness, including face and backup wythes and accessories. Include a sealant-filled joint at least 16 inches long in each mockup.

F. Clean exposed faces of mockups with masonry cleaner as indicated.

G. Notify YPS Office of Facilities Management seven days in advance of dates and times when mockups will be constructed.

H. Protect accepted mockups from the elements with weather-resistant membrane.

I. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

J. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.

1. Approval of mockups is also for other material and construction qualities specifically approved by YPS Office of Facilities Management in writing.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by YPS Office of Facilities Management in writing.

K. Demolish and remove mockups when directed YPS Office of Facilities Management.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

B. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

1. Protect concrete masonry units from moisture absorption so that, at the time of installation, the moisture content is not more than the maximum allowed at the time of delivery.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil

1.11 WORKMANSHIP

A. Contractor shall be responsible for correction of work not conforming to specified requirements. Correct deficient work as directed by Architect.

B. Remove work found to be defective. Replace with new acceptable work

PART 2 PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Masonry General
   1. Unit Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 “Specifications for Masonry Structures” except where exceeded by the requirements of the contract documents.
   2. Fire Performance Characteristics: Where indicated, provide materials and construction identical to those of assemblies whose fire resistance has been determined in accordance with ASTM E 119 by a testing and inspecting organization, by equivalent concrete masonry thickness, or by another means as acceptable to authorities having jurisdiction.
   3. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

B. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.
      a. Manufactured to specified dimensions of 3/8 inch less than nominal widths by nominal heights by nominal lengths indicated in drawings. If not shown in drawings, use length to produce coursing with little or no cutting.
   2. Special Shapes: Provide non-standard blocks configured for corners and other detailed conditions.
   3. Non-Loadbearing Units: ASTM C129.
      a. Hollow block.
      b. Normal weight.
      c. Strength: Minimum 2,500 @ 28 days.

2.2 MORTAR AND GROUT MATERIALS

A. Masonry Cement: ASTM C91/C91M, Type N.

B. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
   1. Hydrated Lime: ASTM C207, Type S.
   2. Grout Aggregate: ASTM C404.

C. Water: Clean and potable.

2.3 REINFORCEMENT AND ANCHORAGE

A. Manufacturers:
   1. Hohmann & Barnard, Inc: www.h-b.com/sle.
   2. Substitutions: See Section 01 2500 - Substitution Procedures.

B. All reinforcement and anchors located in interior walls shall be galvanized steel.

C. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi), deformed billet bars; galvanized steel.

D. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.

E. Single Wythe Joint Reinforcement: ASTM A951/A951M.
   1. Type: Truss.
   2. Material: ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B.
   3. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure. Flush weld all keys
   4. Hohmann & Barnard - #120.

F. Partition Anchors: Partition anchors to provide lateral shear at upper limit of masonry wall with neoprene pad and anchor.
   1. Hohmann & Barnard PTA-420 Series

2.4 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints (as required).
   1. Manufacturers:
      a. Hohmann & Barnard, Inc; -: www.h-b.com.

B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; in maximum lengths available.
   1. Manufacturers:
      a. Hohmann & Barnard, Inc; -: www.h-b.com/sle.
      b. Substitutions: 01 6000 - Product Requirements.

C. Mortar Grout Screen: ¼" square screen high strength non-corrosive polypropylene polymers.
   1. MSG Hohmann & Barnard, Inc.

D. Epoxy Adhesive: Fiber Glass 1101
   1. Use for dowels inserted in existing masonry or concrete.

2.5 LINTELS

A. Steel Lintels: As detailed; Fabricate and prime paint. Field paint finsh coat.
   1. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where required
   2. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.

2.6 MORTAR AND GROUT MIXING

A. General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
   1. Do not use calcium chloride in mortar or grout.
   2. Field addition of admixtures is prohibited for self-consolidating grout.

B. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification for job- mixed mortar and ASTM C 1142 for ready-mixed mortar of types indicated below:
   1. Interior, non-loadbearing masonry and veneers: Type N.

C. Grout for Unit Masonry: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
   1. Minimum 28-day compressive strength: 2,000 psi.
   2. Slump: 8 to 11 inches.
   3. Use grout of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.

D. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

D. Notify YPS Office of Facilities Management if construction is not acceptable.

E. Do not proceed with construction until unacceptable conditions have been corrected.

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.3 COLD AND HOT WEATHER REQUIREMENTS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work or as required by TMS 402/602.

B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work or as required by TMS 402/602.

3.4 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

3.5 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Bond: Running.
   2. Mortar Joints: Flush.

3.6 PLACING AND BONDING

A. General: Comply with referenced unit masonry standard and other requirements indicated applicable to each type of installation included in project.
   1. Masonry units shall be laid true, level, plumb and in uniform coursing in accordance with drawings. Corners and angles shall be square unless otherwise indicated in drawings.
   2. Lay only dry concrete masonry units. Do not wet concrete masonry units unless approved.
   3. Adjust masonry units into final position while mortar is soft and plastic. If units are displaced after mortar has stiffened, remove mortar, clean joints and units, and relay units with fresh mortar.
   4. Use full-sized units without cutting where possible. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction.
   5. Use concrete brick as miscellaneous infill at pockets and elsewhere as needed.

B. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets.

C. Layup walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.

D. Lay concealed masonry with units in wythe in running bond or bonded by lapping not less than 4 inches.
   1. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch- horizontal face dimensions at corners or jambs.

E. Build chases and recesses as shown or required to accommodate items specified in this and other sections of specifications. Provide not less than 8 inches of masonry between chase or recess and jamb of openings and between adjacent chases and recesses.

F. Nonbearing Interior Partitions: Build full height of story to underside of solid floor or roof structure above and as follows.
   1. Install compressible filler in joint between top of partition and underside of structure above. Brace top of wall as shown in drawings.

G. Lay hollow masonry units with face shell bedding on head and bed joints.

H. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

I. Remove excess mortar and mortar smears as work progresses.

J. Interlock intersections and external corners.

K. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

L. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

M. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

N. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

O. Stopping and Resuming Work: In each course, rack back one-half unit length for one-half running bond or one-third unit length for one-third running bond. Do not tooth. Clean exposed surfaces of set masonry. Wet clay masonry units lightly if required. Remove loose masonry units and mortar prior to laying fresh masonry.

3.7 INSTALLATION OF REINFORCING STEEL

A. Place reinforcement as detailed in drawings. Secure against displacement prior to grouting. Horizontal bars may rest on cross web of hollow units.

B. Tolerances for placement of reinforcing steel in walls and flexural members shall be as follows:
   1. Plus/minus 1/2 inch for depth equal to 8 inches or less.

C. Clearance between reinforcing steel and surface of masonry shall not be less than ¼ inch for fine grout and ½ inch for coarse grout.

D. Positioners: Provide positioners to maintain position of vertical reinforcing bars at each lap splice or at maximum spacing of 10 feet, whichever is less. Where these positioners are within ½ inch of surface of masonry, galvanize according to ASTM Standard A 153.

E. Provide minimum vertical reinforcing of one No. 5 bar in at ends of walls, corners, and each side of vertical control joints. Locate bar maximum 16 inches from end of CMU.

3.8 HORIZONTAL JOINT REINFORCEMENT

A. General:
   1. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
   2. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
   3. Place continuous joint reinforcement in first and second joint below top of walls.
   4. Lap joint reinforcement ends minimum 6 inches.

3.9 LINTELS

A. Install loose steel lintels or concrete masonry "U" block unit over openings.

B. Provide masonry lintels where shown and wherever openings of more than 1 foot for brick-sized units and 2 feet for block-sized units are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Cure precast lintels before handling and installing. Temporarily support formed-in-place lintels.

C. Maintain minimum 8 inch bearing on each side of opening.

3.10 GROUTED COMPONENTS

A. General:
   1. Use grout to fill masonry. Do not use mortar.

2. Reinforcement must be in place prior to grouting.
3. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.

B. Place and consolidate grout fill without displacing reinforcing.

C. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.11 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

C. Size control joints as indicated on drawings; if not indicated, 3/8 inch wide and 1/2" deep.

D. Size control joint in accordance with Section 07 9200 - Joint Sealants for sealant performance.

E. Form expansion joint as detailed on drawings.

3.12 BUILT-IN WORK

A. As work progresses, install built-in metal door frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door frames in adjacent mortar joints. **Fill frame voids solid with grout**.

3.13 TOLERANCES

A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

E. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.14 CUTTING AND FITTING

A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.15 CLEANING

A. Remove excess mortar and mortar droppings.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

E. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

F. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

G. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

3.16 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

3.17 MASONRY WASTE DISPOSAL

A. Excess Masonry Waste: Remove excess, clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property

END OF SECTION

SECTION 04 2616
ADHERED MASONRY VENEER

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Thin Brick.

B. Mortar.

C. Adhesives.

D. Accessories.

1.3 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry for grout.

B. Section 05 4000 - Cold-Formed Metal Framing: Steel stud backup for masonry veneer.

1.4 REFERENCE STANDARDS

A. ANSI A136.1 - American National Standard for Organic Adhesives for Installation of Ceramic Tile; 2008 (Reaffirmed 2013).

B. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.

C. ASTM C1088 - Standard Specification for Thin Veneer Brick Units Made From Clay or Shale; 2018.

D. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2017.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for thin brick units and adhesive.

C. Samples: Submit four samples of thin brick units to illustrate color, texture, and extremes of color range.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least five years of documented experience.

1.7 MOCK-UP

A. Construct a mock-up panel sized 4 feet long by 3 feet high; include mortar, grout, adhesives, accessories, substrate, and representative wall openings in mock-up.

B. Locate where directed.

C. Mock-up may remain as part of the Work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

B. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.9 FIELD CONDITIONS

A. Do not install adhesives in an unventilated environment.

PART 2 PRODUCTS

2.1 THIN BRICK

A. Thin Brick: ASTM C1088.
   1. Type: TBS.
   2. Size: Manufacturer's standard Match existing.
   3. Thickness: 5/8 inch.
   4. Tolerances: 3/32 inch.
   5. Color, Texture, Range, Special Shapes: Match existing.
   6. Protective Coating: Wax.

2.2 ADHESIVE MATERIALS

A. Manufacturers:
   1. Mapei Corporation: www.mapei.com/#sle.
   2. Substitutions: 01 2500 Substitution Procedures

B. Organic Adhesive: ANSI A136.1, thinset bond type.

2.3 MORTAR MIXES

A. Mortar for Unit Masonry: ASTM C270, Proportion Specification.
   1. Interior, non-loadbearing masonry: Type O.

B. Colored Mortar: Proportion selected pigments and other ingredients to match Fuller and D'Angelo, P.C. 's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.

2.4 ACCESSORIES

A. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive thin brick veneer.

3.2 INSTALLATION

A. Interior Applications: Gypsum board substrate comply with TCNA (HB) Method W243.

B. Interior Applications: Masonry/plaster substrate comply with TCNA (HB) Method W202.

3.3 COURSING

A. Establish lines, levels, and coursing to match existing. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Brick Units:
   1. Bond: Match existing.
   2. Mortar Joints: Concave.

3.4 PLACING AND BONDING

A. Remove excess mortar as work progresses.

B. Interlock intersections and external corners, except for units laid in stack bond.

C. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove and replace.

D. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.5 TOLERANCES

A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

B. Maximum Variation from Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.

C. Maximum Variation from Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.

D. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.

3.6 CLEANING

A. Remove excess mortar and mortar smears as work progresses.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

3.7 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 05 4000
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Formed steel stud load-bearing interior wall framing.

B. Stair framing.

1.3 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications for masonry shelf angles and connections

B. Section 07 9200 - Joint Sealants.

C. Section 09 2116 - Gypsum Board Assemblies:

D. Section 09 5100 - Acoustical Ceilings: Ceiling suspension system.

1.4 REFERENCE STANDARDS

A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.

B. AISI 200 North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.

E. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2018.

F. ASTM C955 - Standard Specification for Cold-Formed Steel Structural Framing Members; 2018.

G. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2011a (Reapproved 2015).

H. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.

I. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).

J. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018.

K. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

L. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with work of other sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

1.6 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated

1.7 MATERIAL EVALUATION/QUALITY CONTROL

A. Preconstruction Testing: Contractor shall employ a testing laboratory acceptable to Owner's Representative and Architect to perform material evaluation tests.

B. Submit testing service qualifications demonstrating experience with similar types of projects.

C. The Owner's Representative, Architect, Construction Manager, and Testing Agency will visit the construction site at appropriate intervals to determine if work is in general conformance with Contract Documents and specifications. Notify Owner's Representative, Architect, Construction Manager, and Testing Agency 48 hours before anticipated time of completion for a given section of work so they may determine if site observations are required. If site observations are required, do not conceal framing until Owner's Representative, Architect, Construction Manager, and Testing Agency have had an opportunity to make observations

1.8 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, limitations .

C. Shop Drawings: Indicate component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners, and special framing, and accessories or items required of related work.

1. Indicate stud layout.
2. Describe method for securing studs to tracks and for bolted framing connections.
3. Calculations for loadings and stresses of specially fabricated framing, signed and sealed by a professional structural engineer.

D. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction

E. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention .

F. Engineer's Qualification Statement.

G. Manufacturer's Qualification Statement.

H. Installer's Qualification Statement.

I. Welder's Certifications.

1.9 QUALITY ASSURANCE

A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in New York State and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent

B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, and with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

C. Handle material carefully so it is not bent or marred.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Framing Connectors and Accessories:

2.2 FRAMING SYSTEM

A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.

B. Design Requirements: Provide completed framing system having the following characteristics:
   1. Design: Calculate structural characteristics of cold-formed steel framing members according to AISI S100-12.
   2. Structural Performance: Design, engineer, fabricate, and erect to withstand specified design loads for project conditions within required limits.
   3. Design Loads: New York State Building Code.
   4. Live load deflection meeting the following, unless otherwise indicated:
      a. Floors: Maximum vertical deflection under live load of 1/480 of span.
      b. Roofs: Maximum vertical deflection under live load of 1/240 of span.
   5. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
   6. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
   7. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, panel failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
   8. Design exterior non-load-bearing curtain-wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials

2.3 FRAMING MATERIALS

A. Studs and Track: ASTM C955; studs formed to channel, C- or Sigma-shaped with punched web; U-shaped track in matching nominal width and compatible height.
   1. Gage and Depth: As indicated on drawings.
   2. Track Gage and Depth: Matching steel studs, unless thicker material is required by structural performance. and Flange height: 1-1/4 inch minimum.
   3. Galvanized in accordance with ASTM A653/A653M, G60/Z180 coating.
      a. Provide minimum G90 coating for exposed exterior environments.
   4. Provide components fabricated from ASTM A1008/A1008M, Designation SS (structural steel).
   5. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web. Mechanical attachment to structure and screw attachment to stud web using step-bushings to permit frictionless vertical movement; 68 mils

B. Steel Sheet: ASTM A 1003, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
   1. Grade: As noted on the drawings.
   2. Steel Sheet for Vertical Deflection Clips: ASTM A 653, structural steel, grade 50 and zinc coated (G60).

C. Box Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and section properties as indicated on drawings.

D. Framing Connectors: Factory-made, formed steel sheet.

1. Material: ASTM A653/A653M SS Grade 33 and 40 (minimum), with G90/Z275 hot dipped galvanized coating for base metal thickness less than 10 gage, 0.1345 inch, and factory punched holes and slots.
2. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
3. Movement Connections: Provide mechanical anchorage devices that accommodate movement using slotted holes, shouldered screws or screws and anti-friction or stepped bushings, while maintaining structural performance of framing. Provide movement connections where indicated on drawings.
    a. Where top of stud wall terminates below structural floor or roof, connect studs to structure in manner allowing vertical and horizontal movement of slab without affecting studs; allow for minimum movement of 1/2 inch.
    b. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 10 feet.
4. Fixed Connections: Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.
5. Wall Stud Bridging Connections: Provide mechanical load-transferring devices that accommodate wind load torsion and weak axis buckling induced by axial compression loads. Provide bridging connections where indicated on the drawings.
6. Wall Bridging:
    a. Channel Bridging Inside Wall: 1-1/2 inch web, 1/2 inch flanges, 0.0342 inch uncoated thickness and G-90 hot-dipped galvanized coating according to ASTM A 123. Attach to studs as required by structural design calculations.
    b. Solid Bridging: Channel-shaped bridging with lipped flanges and integral formed clips. Size and gauge as required by structural design calculations.

E. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating required out-of-plan loading and upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

F. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
1. Minimum Base-Metal Thickness: 68 mil (14 Ga) for exterior conditions and 43 mil (18 Ga) for interior conditions, unless noted otherwise.
2. Flange Width: 1 inch plus twice the design gap - with minimum 1-1/2” overlap on stud.

G. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and section properties as indicated on drawings.

2.4 FASTENERS

A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.

B. Welding: Comply with AWS D1.1/D1.1M.

C. Power-Actuated Fasteners: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials with capability to sustain without failure a load equal to 10 times the design load as determined by testing in accordance with ASTM E 1190, performed by a qualified independent Testing Agency.

D. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
1. Kwik-Bolt 3” by Hilti; “Trubolt Wedge Anchors” by ITW Ramset/Red Head; “Power-Stud” by Powers Fasteners; “Wedge-Al” by Simpson/Strong-Tie; or accepted equivalent.

E. Sleeve Anchors: “HLC Sleeve Anchor” by Hilti; “Dynabolt Sleeve Anchor” by ITW Ramset/Red Head; “Power-Bolt” by Powers Fasteners; “Sleeve-All” by Simpson/Strong-Tie; or accepted equivalent

2.5 ACCESSORIES

A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.

B. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

C. Shims: Load bearing, high-density multi-monomer plastic and non-leaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

D. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.6 FABRICATION

A. General: Prefabricate framing components into assemblies before erection wherever possible. Fabricate panels plumb, square, true to line, and braced against racking with joints welded. Perform lifting of prefabricated units to prevent damage or distortion.

B. Fastenings: Attach components by welding, bolting, or screw fasteners as standard with manufacturer unless noted otherwise in drawings.

C. Wire-tying of framing components shall not be permitted.

D. Welds shall be fillet, plug, butt, or seam unless noted otherwise. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

E. Cut framing components squarely or on an angle required to fit tightly with proper bearing against abutting members. Maintain members firmly in position until permanently fastened.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that building framing components are ready to receive work.

B. Verify field measurements and adjust installation as required.

3.2 PREPARATION

A. Grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction

3.3 INSTALLATION OF STUDS

A. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations

B. Install components in accordance with ASTM C1007 requirements.

C. Align floor and ceiling tracks; locate to partition layout. Secure in place with fasteners at maximum 24 inches on center. Coordinate installation of sealant with floor and ceiling tracks.

D. Runner Tracks: Install continuous tracks sized to match studs. Align tracks accurately to layout at base and tops of studs. Secure tracks as shown in drawings, except do not exceed 24 inches on center spacing for nail or power-driven fasteners or 16 inches on center for other types of attachment. Provide fasteners at corners and ends of tracks.

E. Place studs at 16 inches on center; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using welding or fastener method.

1. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
2. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads

F. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.

G. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab to ensure a uniform bearing surface on supporting concrete or masonry construction.

H. Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members

I. Install load-bearing studs full length in one piece. Splicing of studs is not permitted.

J. Install temporary bracing and supports to secure framing and support loads

K. Install horizontal bridging in stud system, spaced vertically 48 inches or as indicated on structural drawings. Fasten at each stud intersection and anchor bridging lines to bottom and/or top tracks as indicated.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 8 inches deep.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions

L. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.

M. Install intermediate studs above and below openings to align with wall stud spacing.

N. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.

O. Attach cross studs to studs for attachment of fixtures anchored to walls.

P. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

Q. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Drawings. Fasten jamb members together to uniformly distribute loads.

R. Provide cross bracing or horizontal bracing at story heights of greater than 14'-0".

S. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs

T. Touch-up field welds and damaged galvanized surfaces with primer.

3.4 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing agency to perform field quality-control testing.

B. Field and shop welds will be subject to inspection and testing.

C. Testing agency will report test results promptly and in writing to Contractor and Owner's Representative, Architect, and Construction Manager.

D. Remove and replace Work that does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements

3.5 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Protect paper-surfaced gypsum sheathing that will be exposed to weather for more than 30 days by covering exposed exterior surface of sheathing with a securely fastened air-infiltration barrier. Apply covering immediately after sheathing is installed.

C. Protect cutouts, corners, and joints in sheathing by filling with a flexible sealant or by applying tape recommended by sheathing manufacturer at time sheathing is applied.

D. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure cold-formed metal framing is without damage or deterioration at time of Substantial Completion

3.6 TOLERANCES

A. Framing and prefabricated assemblies:

B. Length of end bearing members: + 1/16 inch.

1. Vertical alignment of studs: + 1/8 inch in 10 feet.
2. Horizontal alignment of walls: + 1/8 inch in 10 feet; 1/4-inch maximum deviation from theoretical line.
3. Framing spacing: + 1/8 inch from design spacing; 1/2-inch maximum cumulative error.
4. Maximum variation in plane and true position between prefabricated assemblies should not exceed 1/4 inch.

END OF SECTION

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Shop fabricated steel items.

B. Steel framing and supports for mechanical roof support systems, and similar items indicated on drawings.

C. Steel framing and supports for applications where framing and supports are not specified in other Sections.

D. Loose lintel where required.

E. Loose and Bearing plates.

F. Metal Grills.

G. Metal bollards.

H. Slotted channel framing for supplemental ceiling support..

I. Projector Mounts

1.3 RELATED REQUIREMENTS

A. Section 01 4000 - Quality Requirements for testing requirements and procedures.

B. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.

C. Section 05 5213 - Pipe and Tube Railings.

D. Division 7 for roofing and sheet metal flashings for roof penetrations and installations associated with steel support roof framing.

E. Section 09 9113 - Exterior Painting: Paint finish.

F. Section 09 9123 - Interior Painting: Paint finish.

1.4 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).

B. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2017.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.

E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

F. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

G. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.

H. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014 (Editorial 2017).

I. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.

J. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.

K. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.

L. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.

M. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.

N. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).

O. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; 2017.

P. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

Q. SSPC-SP 2 - Hand Tool Cleaning; 1982, with Editorial Revision (2004).

1.5 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: For the following:

1. Lintels
2. Metal bollards.
3. Projector mounts and associated supports.
4. Paint products.
5. Slotted steel channel supports.
6. Metal Grills

C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
2. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer, licensed in the State of New York responsible for their preparation

D. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172.

B. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
2. Provide for trimming and fitting at site.

1.9 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

B. Coordinate with HVAC Contractor's equipment and prefabricated curbs, portals, and conduit.

C. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 PRODUCTS

2.1 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

C. Plates: ASTM A283/A283M.

D. Pipe: ASTM A53/A53M, Grade B Schedule 40, hot-dip galvanized finish.

E. Slotted Channel Framing: ASTM A653/A653M, Grade 33.

F. Slotted Channel Fittings: ASTM A1011/A1011M.

G. Mechanical Fasteners: Same material as or compatible with materials being fastened; type consistent with design and specified quality level.

H. Bolts, Nuts, and Washers: ASTM A307, Grade A, galvanized to ASTM A153/A153M where connecting galvanized components.

I. Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, galvanized to ASTM A 153/A 153M where connecting galvanized components.

J. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

K. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

L. Touch-'Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.2 MATERIALS - STAINLESS STEEL

A. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 316L.

B. Stainless-Steel Bars and Shapes: ASTM A 276, Type 316L.

C. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304.

D. Bars and Shapes: ASTM A 276, Type 304

2.3 FABRICATION

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work

D. Fit and shop assemble items in largest practical sections, for delivery to site.

E. Fabricate items with joints tightly fitted and secured.

F. Weld corners and seams continuously to comply with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Do not use ferrous material and equipment on stainless steel components.
   3. Obtain fusion without undercut or overlap.
   4. Remove welding flux immediately.
   5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes es where water may accumulate

H. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

I. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.

2.5 FABRICATED ITEMS

A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; galvanized finish.

B. Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking and masonry; galvanized finish.

C. Lintels: As detailed; Fabricate and prime paint..Refer to Section 09 9123 Iinterior Painting and Section 09 9113 Exterior Painting for finish painting.
   1. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated
   2. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.
   3. Galvanize loose steel lintels located in exterior walls.

D. Slotted Channel Framing: Cold-formed metal channels with continuous slot complying with MFMA-3.
   1. Size of Channels: 1-5/8 by 1-5/8 inches.
   2. Material: Steel complying with ASTM A 1008/A 1008M, commercial steel, Type B; 0.0677-inch minimum thickness; coated with rust-inhibitive, baked-on, acrylic enamel. Color as selected by Architect.
   3. Provide Where shown on drawings
   4. Basis of Design: . UniStrut P-1000 Channesl
      a. Rods: 1/2 diameter.
      b. Fittings: "U" shape 13/16" x 2-15/16".
   5.

E. Projector mount
   1. Ceiling mounted, “High Ceiling Mount - ELPMB48” as manufactured by Epson, Inc.
      a. Minimum 1-1/2” diameter schedule 10 NPT pipe, threaded and slotted on each end.

b. Provide miscellaneous framing as required to support ceiling mount from existing steel joists.
c. Provide mounting pipes as required to provide the required height.
d. Mount shall support a minimum of 165 lbs.
e. Provide 10 gauge cold rolled ceiling plate
f. Provide safety belts to secure projector in place.
g. Mount shall be capable of 360° swivel and 0-30° tilting.
h. Finish shall be silver.

2.6 METAL GRILLS

A. Auditorium:Stainless Steel, 14 gauge, Satin finish.
1. Countersunk screw holes and screws, 12" oc. top & bottom.
2. Size: As indicated on drawings.
3. Design: 1/2" square opening with 3/16 fret Bars.

B. Lobby and Toilets: Stainless Steel, 14 gauge, Satin Finish.
1. Countersunk screw holes and screws, 12" oc. all sides.
2. Size: As indicated on drawings.
3. Design B with with 1-27/32" x 11/32 slots and 5/32" cross bars.

C. Manufacturers:
1. A-J Manufacturing Co Kansas City MO; 816-231-5522.

2.7 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.8 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.

2.9 FINISHES - STEEL

A. Refer to Section 09 9123 Interior Painting.

B. Interior Prime paint steel items.
1. Prime paint all steel items except:
a. Items sprcified for galvanized finish.
b. Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
c. Stainless Steel.
2. Prepare surfaces to be primed in accordance with SSPC-SP2.
3. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
4. Prime Painting: One coat.
a. Interior ferrous metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664.
a) Refer to Section Section 09 9123 Interior Painting for preparation, prime coats and finish coats for all exterior exposed ferous metal.

C. Exterior Structural Steel Members:
1. All exterior structural steel componenets shall be galvanized.
2. Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.

2.10 STAINLESS-STEEL FINISHES

A. Plate and Sheet: ASTM A 666, Type 316L

B. Use only stainless steel tools, grinders and polishing materials.

C. Remove tool and die marks and stretch lines or blend into finish.

D. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

E. Polished and Buffed Finish: Oil-ground, 180-grit finish followed by buffing.

F. Directional Satin Finish: No. 4.

G. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.11 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.3 INSTALLATION

A. Install fabricated items as per manufacturer's instructions

B. Install items plumb and level, accurately fitted, free from distortion or defects.

C. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

D. Field weld components as indicated on shop drawings.

E. Perform field welding in accordance with AWS D1.1/D1.1M.

F. Obtain approval prior to site cutting or making adjustments not scheduled.

G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.4 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 05 5213
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Exterior Stair railings and guardrails.

B. Interior Free-standing railings at stage steps.

C. Wire mesh infill panels for railings, guardrails and stairs.

1.3 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Placement of anchors in concrete.

B. Section 05 4000 - Cold-Formed Metal Framing

C. Section 06 2000 - Finish Carpentry: Wood stair treads.

D. Section 09 9123 - Interior Painting: Paint finish.

1.4 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

C. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.

D. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).

E. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.

F. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Arrange for all railings and handrails specified in this Section to be fabricated and installed by the same firm.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of metal stairs (including handrails and railing systems) that are similar to those indicated for this Project in material, design, and extent.

C. Fabricator Qualifications: A firm, with a minimum of five (5) years experience in producing metal stairs & railings similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Source Limitations: Obtain each type of railing through one source from a single manufacturer.

E. Welding: Qualify procedures and personnel according to the following:
   1. AWS D1.1, "Structural Welding Code--Steel."

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
   2. Include the design engineer's seal and signature on each sheet of shop drawings.

C. Samples: Submit two, 12 inch long samples of handrail. Submit two samples of elbow, wall bracket, end stop, and finish welding.

D. Designer's Qualification Statement.

E. Fabricator's Qualification Statement.

1.7 QUALITY ASSURANCE

A. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.
   1. AWS D1.1, "Structural Welding Code--Steel."

B. Fabricator Qualifications:
   1. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience in producing handrails and railing similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
   2. All railings and handrails specified in this Section to be fabricated and installed by the same firm.

PART 2 PRODUCTS

2.1 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.

B. Distributed Loads: Design railing assembly, handrails, wall rails, and attachments to resist distributed force of 50 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E 935.

C. Concentrated Loads: Design railing assembly, handrails, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E 935.

D. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbf applied to 1 sq. ft. at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.
   1. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guards.

E. Handrail Dimensions: See drawings for size, configurations and heights.
   1. Top Rails and Wall Rails: 1-1/4 inches diameter, round.
   2. Posts: 1-1/2 inches diameter, round.

F. Guardrail Dimensions:
   1. Top Rails and Posts: Tube rails unless otherwise indicated.
      a. 2 x 2 inches.square. 11ga.

G. Infill at Mesh Railings: Woven wire mesh panels.
   1. Material and Finish: Same finish as railing system.
   2. Wire Size: 0.25 inch (2 3/4 ga.) diameter, lock-crimp steel wire woven, inserted through frame holes and welded into frame.
   3. Wire Spacing: 2" x 2" _____ inch.
   4. Framing: 1-1/2-by-3/4-by-1/8-inch cold-rolled steel channels, for direct connection to railing system.

5. Mounting: Mesh welded to steel frame, frame welded to posts.

H. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
   1. For anchorage to concrete, form or core drill holes not less than 5" (127 mm) deep and 3/4' (19 mm) greater than outside diameter of post. Clean holes of loose material. Insert posts and fill annular space between post and concrete with non-metallic grout, mixed and placed to comply with anchoring material according to manufacturer's direction.

I. Provide all welded joints.

2.2 EXTERIOR STEEL RAILING SYSTEM

A. Steel Tube: ASTM A500/A500M, Grade B cold-formed structural tubing.

B. Steel Pipe: ASTM A 53/A 53M, Grade B Schedule 40, galvanized finish.

C. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.

D. Exposed Fasteners: No exposed bolts or screws.

E. Straight Splice Connectors: Steel welding collars.

F. Galvanizing: In accordance with requirements of ASTM A123/A123M.
   1. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic.
   2. All exterior components shall be hot-dipped galvanized, after fabtication.

2.3 INTERIOR STAINLESS STEEL HANDRAIL

A. Tubing: ASTM A 554, Grade MT 316L.

B. Pipe: ASTM A 312/A 312M, Grade TP 316L.

C. Castings: ASTM A 743/A 743M, Grade CF 8M or CF 3M.

D. Plate and Sheet: ASTM A 666, Type 316L.

2.4 FABRICATION

A. Provide complete assemblies including handrails, railings, clips, brackets other components necessary to support and anchor stairs and platforms on supporting structure.
   1. Join components by welding, unless otherwise indicated.
   2. Use connections that maintain structural value of joined pieces

B. Shop Assembly: Pre-assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.

C. Accurately form components to suit specific project conditions and for proper connection to building structure.

D. Fit and shop assemble components in largest practical sizes for delivery to site.

E. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

F. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work

G. Welded Joints:
   1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
   2. Interior Components: Continuously seal joined pieces by continuous welds.
   3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

H. Close exposed ends of railing members with prefabricated end fittings.

I. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work. match railing finish.

1. For all exterior applications and use stainless steel anchors, including anchors embedded in exterior masonry and concrete construction.

2.5 STAINLESS-STEEL FINISHES

A. Remove tool and die marks and stretch lines or blend into finish.

B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

C. 180-Grit Polished Finish: Oil-ground, uniform, directionally textured finish.

D. 320-Grit Polished Finish: Oil-ground, uniform, fine, directionally textured finish.

E. Polished and Buffed Finish: Oil-ground, 180-grit finish followed by buffing.

F. Directional Satin Finish: No. 4.

G. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.6 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize all exterior steel and iron railings, including hardware, after fabrication.
2. Comply with ASTM A 153/A 153M for hot-dip galvanized railings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Clean and strip aluminum where site welding is required.

C. Supply items required to be cast into concrete with setting templates, for installation as work of other sections.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

C. Anchor railings securely to structure and floor.

3.4 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Subflooring.

B. Fire retardant treated wood materials.

C. Wood nailers, blocking, shims, plywood and curbs for roofing and items installed on roof.

D. Concealed wood blocking, nailers, and supports toilet accessories and hardware.

E. Miscellaneous wood nailers, furring, and grounds.

1.3 RELATED REQUIREMENTS

A. Section 05 4000 - Cold-Formed Metal Framing.

B. Section 06 2000 - Finish Carpentry.

C. Section 07 5010 - Modifications to Existing Roofing.

D. Section 10 2800 - Toilet And Bath Accessories.

1.4 REFERENCE STANDARDS

A. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing; 2003 (Reapproved 2017).

B. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing; 2018a.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.

D. AWPA U1 - Use Category System: User Specification for Treated Wood; 2017.

E. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; 2010.

G. PS 20 - American Softwood Lumber Standard; 2015.

H. WWPA G-5 - Western Lumber Grading Rules; 2017.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide technical data on lumber, plywood, fasteners, and application instructions .

C. Shop drawings, or 2 foot long on-site samples which show the size, shape, configuration and method of fastening for all wood blocking assemblies, and which show how the blocking assemblies will relate to other adjoining work.

D. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

E. Material Safety Data Sheets

1.6 QUALITY ASSURANCE

A. A firm (Installer) with not less than five (5) continuous years experience performing carpentry work comparable to that required for this project, employing personnel skilled in the work specified.

B. The Installer shall directly employ the personnel performing the work of this section.

C. The Installer shall have a full time supervisor/foreman on the roof when work is in progress. The Supervisor shall have a minimum of five (5) years experience in work similar in nature and scope to this project, and speak fluent English.

D. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.
   1. Acceptable Lumber Inspection Agencies: Any agency with rules approved by American Lumber Standards Committee.
   2. Material Quality: Obtain each type of material from a single source to ensure consistent quality, color, pattern, and texture.
   3. Pre-Work Conference: Attend the pre-roofing meeting to discuss how carpentry work will be performed and coordinated with other work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

B. Deliver and store materials dry at all times.

C. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

1.8 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Refer to Section 07 5010 - Modifications to Existing Roofing for Warranty requirements.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. Wood, including shims, nailers, blocking, furring and similar members, in the sizes indicated, worked into the shapes shown.
   2. Acceptable Lumber Inspection Agencies: Any agency with rules approved by American Lumber Standards Committee.
   3. Material Quality: Obtain each type of material from a single source to ensure consistent quality, color, pattern, and texture.
   4. Pre-Work Conference: Attend the pre-roofing meeting to discuss how work will be performed and coordinated with other work.
   5. Species: Douglas Fir, unless otherwise indicated, construction grade solid lumber free of splits, large knots and other imperfections.

B. Lumber fabricated from old growth timber is not permitted.

2.2 DIMENSION LUMBER

A. Grading Agency: Western Wood Products Association; WWPA G-5.

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: Kiln-dry or MC15.

D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.

2.3 CONSTRUCTION PANELS

A. Subflooring, For Stage : Any PS 2A/C type, rated Sheathing.
   1. Bond Classification: A/C.

2. Span Rating: 48.
3. Thickness: 3/4".

B. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

2.4 ACCESSORIES

A. Fasteners and Anchors:
1. General: Provide fasteners of size and type that comply with requirements specified in this article by the authority having jurisdiction, International Building Code, International Residential Code, Wood Frame Construction manual, and National Design Specification
2. Metal and Finish: Hot-dipped galvanized steel as per ASTM A153/A153M for exterior, wet areas, wood presevative, and high humidity areas and unfinished steel for other wood locations.
3. Use screws wherever possible, minimum size diameter #12. If nails are used they shall be annular ring shank type. Do not use dry wall screws to secure wood blocking assemblies.
4. Anchors: Toggle bolt type for anchorage to hollow masonry.

B. Subfloor Adhesives: Waterproof, air cure type, cartridge dispensed; adhesives designed for subfloor applications and complying with either ASTM C557 or ASTM D3498.

2.5 FACTORY WOOD TREATMENT

A. Fire Retardant Treatment:
1. Manufacturers:
a. Arch Wood Protection, Inc: www.wolmanizedwood.com.
b. Koppers, Inc: www.koppers.com.
2. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
b. Treat rough carpentry items all interior concealed blocking.
c. Do not use treated wood in applications exposed to weather or where the wood may become wet.

PART 3 EXECUTION

3.1 PREPARATION

A. Coordinate installation of rough carpentry members specified in other sections.

3.2 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.3 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

C. Provide the following specific non-structural framing and blocking:
1. Grab bars.

2. Toilet accessories.
3. Wall-mounted door stops.
4. Display Case.

3.4 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at all roof openings except where specifically indicated otherwise. Form corners by alternating lapping side members.

C. Provide miscellaneous members as indicated or as required to support finishes, fixtures, specialty items, and trim.

D. Shim and set carpentry work plumb and true, except provide slope at the top surfaces of horizontal members as indicated.

E. Stagger joints in built up assemblies at least 2 feet to obtain maximum strength. Provide the appropriate shapes needed and adjust wood members to suit existing conditions for full bearing and secure attachment. Discard defective material, and pieces which are too small, and fabricate the work with a minimum of joints and an optimum joint arrangement.

F. Securely attach carpentry work by fastening it using recognized standards, to resist a pull of 275 pounds per lineal foot in any direction. Countersink all fasteners flush unless otherwise shown.

G. Space fasteners to achieve adequate holding power, generally as follows:
1. Anchor bolts embedded in concrete, drilled anchors into concrete or masonry, screws into a steel deck or structural steel member, or screws into wood framing: 12 inches on center.
2. Nails into wood: 8 inches on center.
3. Install two rows of fasteners on blocking wider than 5 inches.

H. Fit carpentry work neatly scribed and cut to fit within 1/8 inch of adjoining materials. Position furring, nailers, blocking, shims and similar supports for the proper attachment of subsequent work.

I. Fasten wood blocking to underlying steel members at gypsum deck areas, with self tapping screws. Pre-drill holes in the steel members or utilize self drilling/tapping screws.

3.5 INSTALLATION OF CONSTRUCTION PANELS

A. Subflooring: Glue and nail to framing; staples are not permitted.

B. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
2. Where boards are indicated or required as full floor-to-ceiling height, install with long edge of board parallel to studs.
3. Install adjacent boards without gaps.

3.6 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.

B. Allow preservative to dry prior to erecting members.

3.7 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

3.8 CLEANING AND PROTECTION

A. General: Comply with the requirements of Section 01 7419 - Construction Waste Management and Disposal.
1. Comply with applicable regulations.
2. Do not burn scrap on project site.

3. Do not burn scraps that have been pressure treated.
4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 2000
FINISH CARPENTRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Finish carpentry items.

B. Stair treads and risers.

C. Plywood flooring.

D. Hardware and attachment accessories.

1.3 RELATED REQUIREMENTS

A. Section 05 4000 - Cold-Formed Metal Framing.

B. Section 06 1000 - Rough Carpentry: Subfloor and concealed blocking.

C. Section 09 7700 - Plastic Wall Surfaces.

D. Section 09 9300 - Staining and Transparent Finishing: Staining and transparent finishing of finish carpentry items.

1.4 REFERENCE STANDARDS

A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).

C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2016, with Errata (2017).

D. PS 1 - Structural Plywood; 2009.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with electrical rough-in and installation of associated and adjacent components.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data.
   1. Provide manufacturer's product data, storage and handling instructions for factory-fabricated units.
   2. Provide instructions for attachment hardware.

C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Provide the information required by AWI/AWMAC/WI (AWS).
   2. Include certification program label.

D. Samples: Submit two samples of finish plywood, 12 x 12 inch in size illustrating wood grain and specified finish.

E. Samples: Submit two (2) samples of finished wood trim 12 inches long.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1. Company with at least one project within the past 5 years with value of woodwork within 20 percent of cost of woodwork for this project.

1.8 MOCK-UP

A. Provide mockup for stage front and stairs.

B. Locate where directed.

C. Mock-up may remain as part of the Work.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect from moisture damage.

B. Handle materials and products to prevent damage to edges, ends, or surfaces.

PART 2 PRODUCTS

2.1 FINISH CARPENTRY ITEMS

A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Interior Woodwork Items:

1. Treads, risers, trim, stage nosing: Cherry: Prepare for polyurethane transparent finish.

2.2 LUMBER MATERIALS

A. Hardwood Lumber: Cherry, as indicated on drawings species, plain sawn, maximum moisture content of 8 percent , of quality suitable for transparent finish.

2.3 SHEET MATERIALS

A. Softwood Plywood, Exposed to View: Face species as indicated, plain sawn, medium density fiberboard core; PS 1 Grade A/C, glue type as recommended for application.

1. Location: Stage flooring.

2.4 FASTENINGS

A. Adhesive for factory-fabricated units: Manufacturer's recommended adhesive for application.

B. Fasteners: Of size and type to suit application; mill finish in concealed locations and zinc-plated finish in exposed locations.

2.5 ACCESSORIES

A. Adhesive: Type recommended by fabricator to suit application.

B. Lumber for Shimming, Blocking. Refer to Section 06 1000 - Rough Carpentry.

2.6 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. General: complete fabrication to maximum extent possible before shipment to project site. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.

1. Interior woodwork grade: premium
   a. Shop cut openings to maximum extent possible. Sand edges of cutouts to remove splinters and burrs.

C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Corners edges of solid-wood (lumber) members 3/4 inch thick or less: 1/16 inch.
2. Edges of rails and similar members more than 3/4 inch thick: 1/8 inch.
3. Corners edges of solid-wood (lumber) members and rails: 1/16 inch.

D. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.2 INSTALLATION

A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.

B. Install factory-fabricated units in accordance with manufacturer's printed installation instructions.

C. Set and secure materials and components in place, plumb and level.

D. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

E. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming Install components with nails at 6 inch on center.

F. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

G. Standing and running members: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Scarf running joints and stagger in adjacent and related members. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.

3.3 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

SECTION 07 4213
METAL WALL PANELS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and other Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Manufactured metal panels for bleacher fascia, with related flashings and accessory components.

1.3 RELATED REQUIREMENTS

A. Section 05 1200 - Structural Steel.

B. Section 05 4000 - Cold-Formed Metal Framing: Wall panel substrate.

C. Section 07 9200 - Joint Sealants: Sealing joints between metal wall panel system and adjacent construction.

D. Section 10 00184 - 10 00184

1.4 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

B. AAMA 501.1 Dynamic Water Penetration Tested.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.

E. Code reference: Refer to 01 4100 - Regulatory Requirements.

1.5 DESIGN REQUIREMENTS

A. General Performance: Metal panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation or other defects in construction

B. Panels to meet applicable New York State Building Code and the System shall have tested by the Manufacturer per ASTM E-1592 and have the applicable Load Tables published from this testing for loads

C. Components: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall . Design wind pressure of 40 lb/sq ft.

D. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate dimensions, layout, joints, construction details, and methods of anchorage.

C. Samples: Submit two samples of wall panel, 12 inch by 12 inch in size illustrating finish color, sheen, and texture.

D. Manufacturer's Qualification Statement.

E. Installer's Qualification Statement.

F. Coordination Drawings: Wall plans, drawn to scale, on which the following are shown and coordinated with each other, based on input from installer of the items involved:

1. Metal trusses, bracing and supports.

2. Panels and attachments.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten (10) years of documented experience.

B. Installer Qualifications: Company specializing in installing products of the type specified in this section with minimum five (5) years of documented experience.

1.8 MOCK-UP

A. Construct mock-up, 10 feet long by 4 feet wide; include panel system, , attachments to building frame, associated vapor retarder and air seal materials, weep drainage system, sealants and seals, related insulation, if any, in mock-up.

B. Locate where directed by Owner's representative .

C. Mock-up may remain as part of the Work.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.

B. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.

C. Prevent contact with materials that may cause discoloration or staining of products.

1.10 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion, including defects in water tightness and integrity of seals for metal wall panels.

C. Finish warranty: Manufacturer's standard form in which manufacturer agrees to repair finish or replace standing seam metal roof panels that show evidence of deterioration of factory-applied finish within specified warranty period.

1. Exposed Panels Finish - deterioration includes the following:
   a. Color fading more than 5 hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling or failure of a paint to adhere to a bare metal.
   d. Warranty Period: 20 Years from the date of substantial completion.

PART 2 PRODUCTS

2.1 MANUFACTURED METAL PANELS

A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.

1. Provide exterior panels and subgirt framing assembly.
2. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
3. Design Pressure:
   a. Positive Design Pressure: 40 psf
   b. Negative Design Pressure: 40 psf
4. Maximum Allowable Deflection of Panel: L/1801/180 for length (L) of span.
5. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
6. Lapped edges, fitted with continuous gaskets.
7. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.

8. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
9. Closures: shall be pre-molded polyethylene to match the profile of the exposed fastener panel and shall be in lengths as supplied by the panel manufacturer

B. Exterior Wall Panels:
1. Profile: Horizontal; concealed fastener, interlocking edge, corrugated style.
2. Material: Precoated steel sheet, 18 gauge, 0.0478 inch minimum thickness.
3. Panel Width: 16 inches.
4. Trim: Trim shall be fabricated of the same material and finish to match the profile, and will be press broken in lengths of 10 to 12 feet. Trim shall be formed only by the manufacturer of their approved dealer. Trim to be erected in overlapped condition. Use lap strips only as indicated on drawings. Miter conditions shall be factory welded material to match the sheeting. Trim to be fabricated in accordance with standard SMACNA procedure and details.
5. Color: As selected by the Architect from manufacture's standard and custom colors.
6. Manufacturer: MBCI; Masterline 16.

2.2 MATERIALS

A. Precoated Steel Sheet: Aluminum-zinc alloy-coated steel sheet, ASTM A792/A792M, Commercial Steel (CS)) or Forming Steel (FS), with AZ50/AZM150 coating; continuous-coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

2.3 FINISHES

A. Exposed Surface Finish: Panel manufacturer's standard polyvinylidene fluoride (PVDF) coating, top coat over epoxy primer.

B. Panel Backside Finish: Panel manufacturer's standard siliconized polyester wash coat.

2.4 ACCESSORIES

A. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, stainless steel. Fastener cap same color as exterior panel.
1. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws.

B. Field Touch-up Paint: As recommended by panel manufacturer.

C. Provide strippable coating to be applied on the pre-finished panels to the top side to protect the finish during fabrication, shipping and handling, film shall be removed before installation

2.5 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest practicable lengths.

C. Comply with dimensions, profile limitations, gauges and fabrication details shown and if not shown, provide manufacturer's standard product fabrication.

D. Fabricate components of the system in factory, ready for field assembly.

E. Fabricate components and assemble units to comply with fire performance requirements specified.

F. Apply specified finishes in conformance with manufacturer's standard, and according to manufacturer's instructions.

G. Panels shall be roll formed on a stationary industrial type rolling mill to gradually shape the sheet metal. Portable rollformers by the installer, are not acceptable

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that framing members are ready to receive panels.

B. Examine alignment of structural steel, framing and related supports, primary and secondary roof framing, solid roof sheathing, prior to installation. Components should comply with shop drawings and be smooth, even, sound and free of depressions.

C. For the record, prepare written report, endorsed by installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

3.3 INSTALLATION

A. Install panels on walls in accordance with manufacturer's instructions.

B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.

C. Field paint all cut edges with manufacturer's approved paint system.

D. Install metal panels, fasteners, trim and related sealants in accordance with approved shop drawings and as may be required for a weather-tight installation. Conform to standards set forth in SMACNA architectural sheet metal manuals and approved shop drawings for this project.

E. Install panel system so it is watertight, without waves, warps, buckles or distortions, and allow for thermal movement considerations.

F. Remove all strippable coating and provide a dry-wipe down cleaning of the panels as they are erected.

G. Install panel system so it is watertight, without waves, warps, buckles or distortions, and allow for thermal movement considerations.

H. Abrasive devices shall not be used to cut on or near wall panel system.

I. Fasten panels to structural supports; aligned, level, and plumb.

J. Locate joints over supports.

K. Lap panel ends minimum 2 inches.

L. Provide expansion joints where indicated.

M. Use concealed fasteners unless otherwise approved by Fuller and D'Angelo, P.C.

N. Secure units to supports

O. Place fasteners as indicated in manufacturer's standards.

P. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.4 TOLERANCES

A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.

B. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.

3.5 CLEANING

A. Remove site cuttings from finish surfaces.

B. Apply sealant tape or caulking as necessary at flashing and panel joints to prevent water penetration.

C. Remove protective material from wall panel surfaces immediately upon exposure to direct sunlight..

D. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

END OF SECTION

SECTION 07 5010
MODIFICATIONS TO EXISTING ROOFING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. The existing roof is under warranty. Coordinate with YPS Office of Facilities Management for further information.
   1. Contractor must notify and be authorized by the warranty manufacturer to perform all work as per the manufacturer's instruction.
   2. Refer to paragraph 1.10

B. Modification to existing EPDM membrane roofing system.

C. Remove all existing membrane, insulation, flashings, and cover boards as required to provide and install mechanical equipment, connection to existing roofing, and curbs as shown on drawings.

D. Disposal of removal and construction waste is the responsibility of General Contractor. Perform disposal in manner complying with all applicable federal, state, and local regulations.

E. Install new isocyanurate insulation, cover board, and flashings as indicated or required.

F. Clean all residual material from substrate surfaces and the flutes of any exposed steel deck - prior to installing new insulation and roofing. Install new insulation, roofing and flashings only on dry smooth surfaces.

G. The Contractor shall provide any hoisting and other work needed, and remove, adjust, modify, reset and reconnect all roof-mounted and roof-penetrating devices to enable new roofing and flashings to be installed as shown. Coordinate with mechanical and electrical primes.

H. Roof top mechanical equipment work is specified else-where. Coordinate with the mechanical contractors to set new curbs and equipment, and make modifications to the existing curbs and equipment; then install new roof flashings as indicated.

I. Maintain building watertight at all times.

J. Install new support steel and decking; insulation to finish flush with existing the deck substrate, new insulation and roofing to make the building permanently watertight.

K. Comply with the published recommendations and instructions of the roofing membrane manufacturer.

L. Commencement of work by Contractor shall constitute acknowledgement by Contractor that this specification can be satisfactorily executed, under the project conditions and with all necessary prerequisites for warranty acceptance by roofing membrane manufacturer. No modification of the Contract Sum will be made for failure to adequately examine the Contract Documents or the project conditions.

1.3 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry:

1.4 REFERENCE STANDARDS

A. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2018a.

B. ASTM D1079 - Standard Terminology Relating to Roofing and Waterproofing; 2016.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference: Before start of roofing work, General Construction Contractor and Contractor shall hold a meeting to discuss the proper installation of materials, status of the existing warranty and requirements to maintain the existing warranty and requirements to maintain the existing warranty.

1. Require attendance with all parties directly influencing the quality of roofing work or affected by the performance of roofing work.
2. Notify Owner's Representative well in advance of meeting.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data:

1. Provide manufacturer's printed data sufficient to show that all components of roofing systems, including insulation and fasteners, comply with the specified requirements and with the roofing manufacturer's requirements and recommendations for the system type specified; include at least the following:.
   a. Technical data sheet for roof membrane.
   b. Technical data sheets for splice tape and adhesives.
   c. Technical data sheet for each insulation type.
   d. Technical data sheet for each cover board type.
2. Where the existing roofing system is UL or FM approved provide documentation that shows that the modification installed is UL-Classified or FM-approved, as applicable; include data itemizing the components of the classified or approved system.
3. Installation Instructions: Provide manufacturer's instructions to installer, marked up to show exactly how all components will be installed; where instructions allow installation options, clearly indicate which option will be used.
4. Pre-Work Site and Building Inspection Report with photos to documents conditions before commencing work.
5. Written certification from the manufacturer which states that the installer is acceptable or licensed to install the specified roofing; if not previously provided.

C. Pre-Installation Notice: Copy to show that manufacturer's required Pre Installation Notice has been accepted and approved by the manufacturer.

D. Executed Warranty.

1.7 CODE APPROVAL REQUIREMENTS

A. Install roofing and insulation system components to meet the following minimum requirements:

1. New York State Uniform Fire Prevention and Building Code, which includes by reference the New York State Energy Conservation Code.
2. Underwriters Laboratories Inc. Class A External Fire Rating for roof assemblies tested in accordance with ASTM E 108 or UL 790.
3. Minimum wind uplift pressure calculated using ASCE 7 and a safety factor of 2:
   a. Field Zone - 90 psf
   b. Perimeter Zones - 135 psf
   c. Corner Zone - 180 psf

1.8 QUALITY ASSURANCE

A. Existing Roof is under warranty or is not under warranty.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty (20) years of documented experience.

C. Installer Qualifications: Roofing installer shall have the following:

1. A firm (Installer) with not less than 5 continuous years experience performing PVC membrane roofing work similar to that required for this project, employing personnel skilled in the specified work.
   a. The Installer shall directly employ the personnel performing the work of this section.
   b. The Installer shall have a full time supervisor/foreman on the roof when roofing work is in progress. The Supervisor shall have a minimum of 5 years experience in roofing work similar in nature and scope to this project, and speak fluent English.
   c. The Installer shall provide a reference list of at least three projects of comparable size and similar design, within a fifty mile radius of this project, which may be observed by representatives of the Owner:
      a) The reference list shall include at a minimum, the completion date, a description of the work performed, the Owner's name - contact person - phone number and address and the Architect's name - contact person and phone number.
      b) The Installer shall provide the reference list prior to contract award if requested.
   d. The Installer shall be acceptable to or licensed by the Manufacturer of the primary roofing materials, and provide written certification from the Manufacturer to confirm this prior to award if requested.

D. Material Quality: Obtain each product, including the insulation, cover board, EPDM roofing and flashing, and cements, primers and adhesives produced by a single Manufacturer, which has manufactured the same products in the United States of America for not less than 5 continuous years.

1.9 JOB CONDITIONS (CAUTIONS & WARNINGS)

A. Splice cleaner, primer, cements and bonding adhesives are flammable. Do not breathe vapors or use near fire or flame or in a confined or unventilated area. Dispense only from a UL listed or approved safety can.

B. Remove empty adhesive and solvent containers and contaminated rags from the roof and legally dispose of them daily.

C. Do not apply adhesives adjacent to open ventilation system louvers, or windows. Temporarily cover the louvers and windows with 6 mil fire retardant polyethylene and prevent adhesive odors from entering the building. Remove temporary covers at the end of each days work.

1.10 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver material to the site in the Manufacturer's original and unopened packaging, bearing labels which identify the type and names of the products and Manufacturers, with the labels intact and legible.

B. Store all materials in accordance to manufacturer's instructions.

C. Immediately remove any insulation which gets wet from the job site.

D. Do not overload the structure when storing materials on the roof.

E. Store and install all material within the Manufacturer's recommended temperature range.

1.11 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Existing Roof System Under Warranty
   1. The existing roofing system is under warranty and the General Construction Contractor or their subcontractor must notify and be authorized by the manufacturer to perform all work as per the manufacturer's instruction.
      a. Guarantee/Warranty coverage shall remain in effect for gust wind speeds up to 72 miles per hour, measured at ground level at the site.
      b. Manufacture's Warranty: Certification from manufacturer that the existing warranty covering membrane, roof insulation, and other indicated components of the system, shall remain the new and existing terms of the original warranty.

2. Comply with all warranty procedures required by manufacturer, including notifications Manufacture's Warranty: Certification from manufacturer that the existing warranty covering membrane, roof insulation, and other indicated components of the system, shall remain the new and existing terms of the original warranty, scheduling, and inspections:
3. Manufacture's Warranty: Certification from manufacturer that the existing warranty covering membrane, roof insulation, and other indicated components of the system, shall remain the new and existing terms of the original warranty Contractors warranty.
4. Manufacturer's and Contractor's Guarantees/Warranties shall be issued no more than 30 days before the satisfactory completion of punch list work.

C. Manufacturer's and Contractor's Guarantees/Warranties shall be issued no more than 30 days before the satisfactory completion of punch list work.

D. Guarantees/Warranties shall include the removal and replacement of items or materials superimposed over the EPDM roof as part of the original work, if removal is needed to make warranty repairs.

PART 2 PRODUCTS

2.1 GENERAL

A. Acceptable Manufacturer - Roofing System: Match existing manufacturers roofing system.
1. Roofing systems by other manufacturers are not acceptable .

2.2 EPDM ROOFING

A. Unreinforced 60 mils thick, fire retardant, EPDM (Ethylene Propylene Diene Monomer) sheet membrane conforming to the following minimum physical properties.

B. Related Materials:
1. Cleaners, adhesives, sealants, caulking and fasteners furnished by the EPDM system Manufacturer. Use low VOC adhesives and cleaners to comply with regulations in effect at the time of application.
a. Stripping: 90 mil thick 5 inch and 9 inch wide self adhering flashing, consisting of 45 mils of semi-cured EPDM factory laminated to 45 mils of cured seaming tape.
b. Bonding Adhesive: High strength contact adhesive.
c. Splice Adhesive: High strength synthetic polymer based contact cement formulated specifically to splice EPDM sheets.
d. Lap Sealant: EPDM rubber based gun grade sealant.
e. Water Block Seal: One component low viscosity butyl rubber sealant.
f. Pre-Molded Pipe Flashing: Pressure sensitive prefabricated flashings with pre-applied adhesive.
g. Pourable Sealer: Two component, solvent free polyurethane based sealant.
h. Reinforced Perimeter Fastening Strips: .030 inch thick reinforced cured EPDM.
i. Seam Tape Primer: Synthetic rubber polymer based primer designed to clean and prime seam tape spice areas prior to installing the tape.
j. Seam Splice Tape: Nominal 30 mil thick cured polymer self adhesive tape with release paper carrier, 6 inches wide.
k. Plates and Bars: Galvanized and corrosion resistant specialty products.
l. Fasteners: #14 Fluorocarbon polymer coated heavy duty screws.

C. Gypsum Cover Board: 1/4 inch thick fire resistant gypsum board decking with inorganic glass mat facers and a water resistant core, formulated in 48 x 48 inch square edge boards, UL Class A, meeting ASTM C-1177, manufactured under the trade name Dens-Deck Prime

2.3 INSULATION:

A. Isocyanurate – Tapered rigid cellular polyisocyanurate boards with fibrous felt/fiberglass mat facers, sloping 1/8 inch per foot, (match existing) minimum starting thickness 1-1/2 inches, minimum compressive strength 20 psi, meeting ASTM C1289-01, Type II, Class1, Grade 2.

1. Tapered insulation sloping 1/4 inch per foot, thickness to match existing
2. Crickets sloping 1/4 inch per foot.
3. At repairs to existing building match thickness of existing insulation.

2.4 ACCESSORY MATERIALS

A. Concrete Pavers: Interlocking, with shiplap edges on all sides and integral radiused bearing pads.
   1. Size: Approximately 30 inches by 30 inches by 1-1/2 inches thick.

B. Walkway Pads: Rubber, adhered to roof surface
   1. 30"x30" x 3/8"

C. Pipe Portal: Prefabricated pipe portal housing. Sigrist Pipe Chase Housing by Alta Products, LLC.
   1. Size: 16.5"x10"x12.5"
   2. Full gasketed lid
   3. Provide 7 exit seals; coordinate size with HV and Elec. Contractors.

D. Pipe Support Block: Prefabricated Recycled Rubber with integraal through-bolted galvanized attachment channel. Dura-Blok as manufactured by Eaton, Inc.
   1. Overall Length: 40 "
   2. Coordinate final locations and quantity with HV contrcator.

PART 3 INSTALLATION

3.1 GENERAL

A. Construct the new roofing system in a watertight, workmanlike manner, meeting the guarantee requirements specified herein; in strict accordance with the drawings and in conformance with the Manufacturer's requirements, except as enhanced in this specification.

B. Clean the surface on which roofing system components will be applied, of all laitance, dirt, oil, grease or other foreign matter which would in any way affect the quality of the installation.

C. Install roof system components on dry surfaces only. Do not install any items when weather conditions and outside temperatures are not suitable in accordance with the Manufacturer's recommendations.

D. Complete all work in sequence as quickly as possible so that as small an area as practicable is in the process of construction at any one time. Complete the entire area of work begun each day, the same day, and make all exposed edges watertight at the end of each day's work.

3.2 SUBSTRATE INSPECTION

A. Remove portions of existing roofing, insulation, and flashings, and carefully check the existing deck and new roof substrate. To be an acceptable surface for the new roofing system, the deck and substrate shall be well secured to the underlying structure, dry and not otherwise deteriorated.

B. Immediately notify the Owner's Representative in writing if defects in the substrate are discovered.

C. Maintain the building watertight in the interim, but do not install new insulation or roofing until substrate defects have been corrected.

3.3 DECK REPAIR

A. Steel deck repairs:
   1. Remove damage decking across the entire width of individual sections by a length equal to a minimum of two joist bays.
   2. Install new galvanized steel decking, to match the thickness, gauge and cross section configuration of the existing deck.
   3. Fasten new deck to the joists / beams/joists with #12 screws spaced 6 inches on center in each joist / beam.
   4. Stitch side seams of steel deck with #10 screws spaced 24 inches apart.

3.4 NEW TO EXISTING INTERFACE

A. Remove and replace portions of existing roofing at the construction interface between new construction and existing roof areas.
   1. Install new isocyanurate insulation, mechanically fastened, to match existing insulation thickness and to maintain the slope of the existing insulation.
   2. Install 60 mil. fully adhered PVC membrane to lap a minimum of 12 inches onto existing PVC membrane.

3.5 INSULATION AND COVER BOARD

A. Install tapered insulation and crickets, neatly cut at all miters and transitions.
   1. Do not lace corner boards.
   2. Install the crickets under the new insulation

B. Install insulation with joints offset between rows and layers a minimum of 12 inches. Cut insulation to fit neatly at penetrations and joints. Fill any gap which is greater than 1/4 inch.

C. Fasten new and replacement layers of insulation only to the top flute of the steel deck, with screws and discs which penetrate through the deck a minimum of 3/4 inch and a maximum of 1-1/2 inches.
   1. Provide number of fasteners as recommended by the manufacturer or the equivalent of:
      a. Install 16 fasteners per 4 by 8 foot insulation board in the field of the roof.
      b. Install 28 fasteners per 4 by 8 foot insulation board in 12 foot wide perimeter zones.
      c. Install 32 fasteners per 4 by 8 foot insulation board in 12 foot square corner zones.

D. Install gypsum cover board over the insulation with joints offset between rows and the insulation a minimum of 12 inches. Cut gypsum cover board to fit neatly at penetrations and joints. Fill any gap which is greater than 1/4 inch.

E. Install all layers of insulation on deck areas and the gypsum cover board, in low rise polyurethane foam adhesive applied in accordance with the Manufacturer's recommendations and to achieve the specified minimum uplift resistance.
   1. Install 1/2 inch diameter adhesive beads spaced 12 inches on center in the field of the roof.
   2. Install 1/2 inch diameter adhesive beads spaced 6 inches on center in 12 foot wide perimeter zones.
   3. Install 1/2 inch diameter adhesive beads spaced 4 inches on center in 12 foot square corner zones.

3.6 PREPARATION

A. Remove all of the existing roof system down to the roof deck including all existing composition base flashings. Dispose of all materials properly. Perform asbestos removal in accordance with federal, state and local regulations and dispose of waste in legal manner.
   1. At penetrations, remove all existing flashings, including lead, asphalt, mastic, etc.
   2. At walls, curbs, and other vertical and sloped surfaces, remove loose and unsecured flashings; remove mineral surfaced and coated flashings; remove excessive asphalt to provide a smooth, sound surface for new flashings.

B. Take appropriate measures to ensure that fumes from adhesive solvents are not drawn into the building through air intakes.

C. Prior to proceeding, prepare roof surface so that it is clean, dry, and smooth, and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease and other materials that may damage the membrane.

D. Fill all surface voids in the immediate substrate that are greater than 1/4 inch wide with fill material acceptable insulation to membrane manufacturer.

E. Seal, grout, or tape deck joints, where needed, to prevent bitumen seepage into building.

3.7 INSULATION AND COVER BOARD INSTALLATION

A. Install insulation in configuration and with attachment method(s) specified in PART 2, under Roofing System.

B. Neatly and tightly fit insulation to all penetrations, projections, and nailers, with gaps not greater than 1/4 inch. Fill gaps greater than 1/4 inch with acceptable insulation. Do not leave the roofing membrane unsupported over a space greater than 1/4 inch.

C. Mechanical Fastening: Using specified fasteners and insulation plates engage fasteners through insulation into deck to depth and in pattern required by membrane manufacturer.

3.8 SINGLE-PLY MEMBRANE INSTALLATION

A. Place membrane without stretching over substrate and allow to relax at least 30 minutes before attachment or splicing; in colder weather allow for longer relax time.

B. Lay out the membrane pieces so that field and flashing splices are installed to shed water.

C. Install membrane without wrinkles and without gaps or fishmouths in seams; bond and test seams and laps in accordance with membrane manufacturer's instructions and details.

D. Install membrane adhered to the substrate, with edge securement as specified.

E. Fully adhere EPDM to the substrate with bonding adhesive, .

1. Allow contact bonding adhesive to dry to the touch EPDM before joining the EPDM to the substrate. Roll the EPDM onto the bonding adhesive and immediately rub it vigorously with a soft bristle broom to ensure complete adhesion.
2. Do not punch holes in cans of adhesive and use them in a “Better Spreader” without first opening the cans to mix them.
3. Replace used roller covers each day; discard covers after each days use.
4. Allow bonding adhesive to dry to the touch before joining the EPDM to the substrate.
5. Allow bonding adhesive to dry to the touch before joining the EPDM to the substrate.

F. Roofing installed over improperly applied adhesive or with adhesive that wasn't stirred, and roofing installed with blisters, ridges, mole runs and similar deficiencies shall be removed and replaced at the Contractor’s expense

G. Adhered Membrane: Bond membrane sheet to substrate using membrane manufacturer's recommended bonding material, application rate, and procedures.

H. Edge Securement: Secure membrane at all locations where membrane terminates or goes through an angle change greater than 2 in 12 inches using mechanically fastened reinforced perimeter fastening strips, plates, or metal edging as indicated or as recommended by roofing manufacturer.

3.9 FLASHING AND ACCESSORIES INSTALLATION

A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.

B. Flashing at Walls, Curbs, and Other Vertical and Sloped Surfaces: Install weathertight flashing at all walls, curbs, parapets, curbs, skylights, and other vertical and sloped surfaces that the roofing membrane abuts to; extend flashing high above membrane surface or as shown on drawings.

1. Use the longest practical flashing pieces.
2. Evaluate the substrate and overlay and adjust installation procedure in accordance with membrane manufacturer's recommendations.
3. Complete the splice between flashing and the main roof sheet with specified splice adhesive before adhering flashing to the vertical surface.
4. Provide termination directly to the vertical substrate as shown on roof drawings.

C. Flashing at Penetrations: Flash all penetrations passing through the membrane; make flashing seals directly to the penetration.

D. Pipe Coverings and Fittings: PVC heavy-duty fitting covers and jacketing.

1. High-impact, UV-resistant polyvinyl chloride indoor use only.
2. For use over insulated pipe and bare metal.
3. Product:

a. Zeston 300 Series manufactured by Johns Manville

3.10 FINISHING AND WALKWAY INSTALLATION

A. Install walkway pads at locations shown, under all concrete pavers and piping supports, at access points to the roof, around rooftop equipment that may require maintenance, where indicated on the drawings.
   1. Use specified walkway pads unless otherwise indicated.
   2. Adhere to the roofing membrane, spacing each pad at minimum of 1.0 inch and maximum of 3.0 inches from each other to allow for drainage.
      a. If installation of walkway pads over field fabricated splices or within 6 inches of a splice edge cannot be avoided, adhere another layer of flashing over the splice and extending beyond the walkway pad a minimum of 6 inches on either side.
      b. Prime the membrane, remove the release paper on the pad, press in place, and walk on pad to ensure proper adhesion.

B. Concrete Pavers: Install butted tightly, not more than 1/2 inch apart.

3.11 FIELD QUALITY CONTROL

A. Inspection by Manufacturer: Provide final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer specifically to inspect installation for warranty purposes (i.e. not a sales person).

B. Perform all corrections necessary for issuance of warranty.

3.12 CLEANING

A. Clean all contaminants generated by roofing work from building and surrounding areas, including bitumen, adhesives, sealants, and coatings.

B. Repair or replace building components and finished surfaces damaged or defaced due to the work of this section; comply with recommendations of manufacturers of components and surfaces.

C. Remove leftover materials, trash, debris, equipment from project site and surrounding areas.

3.13 PROTECTION

A. Where construction traffic must continue over finished roof membrane, provide durable protection and replace or repair damaged roofing to original condition.

END OF SECTION

SECTION 07 8400
FIRESTOPPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Firestopping systems.

B. Firestopping of joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.3 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01 7000 - Execution: Cutting and patching.

C. Section 09 2116 - Gypsum Board Assemblies.

1.4 REFERENCE STANDARDS

A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2018c.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).

C. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2015.

D. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2013 (Reapproved 2017).

E. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.

F. ITS (DIR) - Directory of Listed Products; current edition.

G. FM 4991 - Approval Standard for Firestop Contractors; 2013.

H. FM (AG) - FM Approval Guide; current edition.

I. SCAQMD 1168 - Adhesive and Sealant Applications; 1989 (Amended 2017).

J. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

K. UL (FRD) - Fire Resistance Directory; Current Edition.

L. UL 2079 - Standard Test Method of Fire Resistant Joints

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.

C. Product Data: Provide data on product characteristics, performance ratings, and limitations.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
   1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and:
   1. Verification of minimum three years documented experience installing work of this type.

1.7 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.1 MATERIALS

A. Mold and Mildew Resistance: Provide firestoppping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.

B. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

C. Fire Ratings: Refer to drawings for required systems and ratings.

2.2 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Head-of-Wall Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of floor or wall, whichever is greater.

B. Floor-to-Floor, Wall-to-Wall, and Wall-to-Floor Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.

C. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.

2.3 FIRESTOPPING FOR FLOOR-TO-FLOOR, WALL-TO-FLOOR, AND WALL-TO-WALL JOINTS

A. Gypsum Board Walls:
   1. Wall to Wall Joints That Have Movement Capabilities (Dynamic):
      a. 1 Hour Construction: UL System WW-D-0067; Hilti CP 606 Flexible Firestop Sealant.
   2. Top of Wall Joints at Underside of Steel Beam and Concrete Over Metal Deck Floor with Sprayed On Fireproofing:
      a. 1 Hour Construction: UL System HW-D-0259; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
   3. Top of Wall Joints at Concrete Over Metal Deck:
      a. 2 Hour Construction: UL System HW-D-0034; Specified Technologies Inc. ES Elastomeric Firestop Sealant.
      b. 2 Hour Construction: UL System HW-D-0043; Specified Technologies Inc. AS200 Elastomeric Spray.
   4. Top of Wall Joints at Concrete Over Metal Deck, Wall Parallel to Ribs:
      a. 1 Hour Construction: UL System HW-D-0049; Hilti CFS-SP WB Firestop Joint Spray and CP 672.

2.4 FIRESTOPPING PENETRATIONS THROUGH CONCRETE AND CONCRETE MASONRY CONSTRUCTION

A. Penetrations Through Floors or Walls By:
   1. Multiple Penetrations in Large Openings:
      a. 1 & 2 Hour Construction: UL System C-AJ-8143; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   2. Uninsulated Metallic Pipe, Conduit, and Tubing:
      a. 1 & 2 Hour Construction: UL System C-AJ-1226; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   3. Electrical Cables Not In Conduit:
      a. 1 & 2 Hour Construction: UL System W-J-3199; Hilti CFS-SL SK Firestop Sleeve Kit.
   4. Insulated Pipes:
      a. 1 & 2 Hour Construction: UL System C-AJ-5091; Hilti FS-ONE IMAX intumescent Firestop Sealant.
   5. HVAC Ducts, Uninsulated:
      a. 1 & 2 Hour Construction: UL System C-AJ-7111; Hilti FS-ONE MAX Intumescent Firestop Sealant.

B. Penetrations Through Walls By:
   1. Uninsulated Metallic Pipe, Conduit, and Tubing:
      a. 1 Hour Construction: UL System W-J-1067; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   2. Electrical Cables Not In Conduit:
      a.
   3. Insulated Pipes:
      a. 1 Hour Construction: UL System C-AJ-5091; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   4. HVAC Ducts, Uninsulated:
      a. 1 & 2 Hour Construction: UL System W-J-7109; Hilti FS-ONE MAX Intumescent Firestop Sealant or CP 606 Flexible Firestop Sealant.
   5. HVAC Ducts, Insulated:
      a. 1 & 2 Hour Construction: UL System W-J-7112; Hilti FS-ONE MAX Intumescent Firestop Sealant.

2.5 FIRESTOPPING PENETRATIONS THROUGH GYPSUM BOARD WALLS

A. Blank Openings:

B. Penetrations By:
   1. Multiple Penetrations in Large Openings:
      a. 1 Hour Construction: UL System W-L-1408; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   2. Uninsulated Metallic Pipe, Conduit, and Tubing:
      a. 2 Hour Construction: UL System W-L-1054; Hilti FS-ONE MAX Intumescent Firestop Sealant.
      b. 1 Hour Construction: UL System W-L-1164; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   3. Electrical Cables Not In Conduit:
      a. 1 Hour Construction: UL System W-L-3393; Hilti CFS-SL RK Retrofit Sleeve Kit for existing cables.
   4. Insulated Pipes:

a. 1 Hour Construction: UL System W-L-5028; Hilti FS-ONE MAX Intumescent Firestop Sealant.

5. HVAC Ducts, Insulated:
   a. 2 Hour Construction: UL System W-L-7156; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   b. 1 Hour Construction: UL System W-L-7156; Hilti FS-ONE MAX Intumescent Firestop Sealant.

2.6 MATERIALS

A. Firestopping Sealants: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.

B. Elastomeric Silicone Firestopping: Single component silicone elastomeric compound and compatible silicone sealant; conforming to the following:
   1. Manufacturers:
      a. 3M Fire Protection Products; Product CP-25WB: www.3m.com/firestop.
      b. Substitutions: See Section 01 6000 - Product Requirements.

C. Fiber Firestopping: Mineral fiber insulation used in conjunction with elastomeric surface sealer forming airtight bond to opening; conforming to the following:
   1. Density: 4 lb/cu ft.

D. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

C. Install backing materials to prevent liquid material from leakage.

3.3 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Do not cover installed firestopping until inspected by authorities having jurisdiction.

C. Install labeling required by code.

3.4 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 9200
JOINT SEALANTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Self-leveling pourable joint sealants.

C. Acoustical sealant.

D. Joint backings and accessories.

1.3 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

B. Section 03 3000 - Cast-In-Place Concrete.

C. Section 03 4100 - Precast Structural Concrete.

D. Section 07 8400 - Firestopping: Firestopping sealants.

E. Section:08 8000 - Glazing: Glazing sealants and accessories.

F. Section 09 2116 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.

G. Section 09 2400 - Portland Cement Plaster.

H. Section 09 3000 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.

1.4 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015.

B. ASTM C834 - Standard Specification for Latex Sealants; 2017.

C. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012 (Reapproved 2017).

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

E. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

F. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2018.

G. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2018c.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.

1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
2. List of backing materials approved for use with the specific product.
3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.

4. Substrates the product should not be used on.
5. Substrates for which use of primer is required.
6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
7. Sample product warranty.
8. Certification by manufacturer indicating that product complies with specification requirements.

C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

E. Samples for Verification: Where custom sealant color is specified, obtain directions from Fuller and D'Angelo, P.C. and submit at least two physical samples for verification of color of each required sealant.

F. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five (5) years documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section and with at least five (5) years of documented experience.

C. Field Adhesion Test Procedures:
1. Allow sealants to fully cure as recommended by manufacturer before testing.
2. Have a copy of the test method document available during tests.
3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
4. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Fuller and D'Angelo, P.C. .

1.7 MOCK-UP

A. Mockups: Before installing joint sealants, apply elastomeric sealants as follows to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution:
1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.

B. Construct mock-up with specified sealant types and with other components noted.

C. Locate where directed.

D. Mock-up may remain as part of the Work.

1.8 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.1 JOINT SEALANT APPLICATIONS

A. Scope:
1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
a. Joints between different exposed materials.

b. Joints between pre-cast concrete sections and adjacent materials
c. Horizontal joints in concrete paving and sidewalks.

2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
   a. Joints between door, window, and other frames and adjacent construction.
   b. Other joints indicated below.
3. Do not seal the following types of joints.
   a. Joints where installation of sealant is specified in another section.
   b. Joints between suspended panel ceilings/grid and walls.

2.2 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 6116.

2.3 NONSAG JOINT SEALANTS

A. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
   1. Color: White.
   2. Applications: Use for:
      a. Use for all perimeter joints of toilet fixtures,.
   3. Manufacturers:
      a. 786 Mildew Resistant; Dow Corning.
      b. Pecora Corporation; 898 Silicone Sanitary Sealant: www.pecora.com.
      c. Sanitary 1700; GE Silicones..
   4. Substitutions: Refer to 01 2500 - Substitution Procedures.

B. Type ___ - Tamper-Resistant, Silyl-Terminated Polyether (STPE) and Polyurethane (STPU) Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus ___ percent, minimum
   2. Hardness Range: 25 to 30, Shore A, when tested in accordance with ASTM C661.

C. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 50 percent, minimum.
   2. Color: To be selected by Fuller and D'Angelo, P.C. from manufacturer's full range.
   3. Service Temperature Range: Minus 40 to 180 degrees F.
   4. Manufacturers:
      a. Pecora Corporation; Dynatrol I;: www.pecora.com.
      b. Sika Corporation; Sikaflex-1a: www.usa-sika.com.
   5. Applications: Use for:
      a. All interior vertical joints.
   6. Substitutions: Section 01 2500 - Substitution Procedures

D. Non-Sag "Traffic-Grade" Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion and traffic without the necessity to recess sealant below traffic surface.
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 40 to 50, Shore A, when tested in accordance with ASTM C661.
   3. Adhesion to Concrete (pli): 47 ASTM C794.
   4. Elongation (%): 250-300 ASTM D412.
   5. Tensile Strength (psi): 150-200 ASTM D412
   6. Color: To be selected by Fuller and D'Angelo, P.C. from manufacturer's full range.

7. Manufacturers:
   a. Dynatred, as manufactured by Pecora Corporation; www.pecora.com .
   b. Substitutions: Refer to Section 01 2500 - Substitution Procedures.
   c. Use for all exterior joints between precast concrete sections and adjacent material.

E. Type Acoustical Sealant: - Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-hardening, non-sagging; not intended for exterior use.
1. Color: To be selected by Fuller and D'Angelo, P.C. from manufacturer's full range.
2. Grade: ASTM C834; Grade Minus 18 Degrees C (0 Degrees F).
3. Manufacturers:
   a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant: www.pecora.com.
4. Applications: Use for:
   a. Use for all interior joints of where acoustical sealant indicated.
5. Substitutions: Refer to 01 2500 - Substitution Procedures.

2.4 SELF-LEVELING SEALANTS

A. Self-Leveling Silicone Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent, explicitly approved by manufacturer for traffic exposure when recessed below traffic surface; not expected to withstand continuous water immersion.
1. Movement Capability: Plus 100 percent, minus 50 percent, minimum.
2. Hardness Range: 0 to 15, Shore A, when tested in accordance with ASTM C661.
3. Color: To be selected by Fuller and D'Angelo, P.C. from manufacturer's full range.
4. Service Temperature Range: Minus 40 to 180 degrees F.
5. Manufacturers:
   a. Sika Corporation; Sikaflex 1c SL: www.usa-sika.com.
   b. Use for all horizontal exterior joints in concrete sidewalks.
   c. Substitutions: 01 2500 - Substitution Procedures

2.5 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type C - Closed Cell Polyethylene.
3. Open Cell: 40 to 50 percent larger in diameter than joint width. (Not to be used in flat or horizontal joints)
4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width. (Use for flat and hoizontal joints)

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
   1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
   2. Notify Fuller and D'Angelo, P.C. of date and time that tests will be performed, at least seven days in advance.
   3. Record each test on Preinstallation Adhesion Test Log as indicated.
   4. If any sample fails, review products and installation procedures, consult manufacturer, or take whatever other measures are necessary to ensure adhesion; re-test in a different location; if unable to obtain satisfactory adhesion, report to Fuller and D'Angelo, P.C. .
   5. After completion of tests, remove remaining sample material and prepare joint for new sealant installation.

3.2 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.3 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

D. Install bond breaker backing tape where backer rod cannot be used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

H. Self-leveling joints: Recess joint depth as recommended by the sealant manufacturer.

3.4 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION

SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Fire-rated hollow metal doors and frames.

1.3 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry.

B. Section 08 7100 - Door Hardware.

C. Section 08 8000 - Glazing.

D. Section 09 9123 - Interior Painting.

1.4 ABBREVIATIONS AND ACRONYMS

A. HMMA: Hollow Metal Manufacturers Association.

B. SDI: Steel Door Institute.

C. UL: Underwriters Laboratories.

1.5 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.

C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.

D. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2003 (R2009).

E. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2017.

F. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.

G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.

H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.

I. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.

J. ASTM E413 - Classification for Rating Sound Insulation; 2016.

K. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2016.

L. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

M. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.

N. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.

O. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.

P. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2017.

Q. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2013.

R. UL (BMD) - Building Materials Directory; current edition.

S. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.

C. Shop Drawings: Details of each opening, showing elevations and frame profiles

D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five (5) years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

C. Maintain at project site copies of reference standards relating to installation of products specified.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Hollow Metal Doors and Frames:

1. Ceco Door, an Assa Abloy Group company; Maxim: www.assaabloydss.com.
2. Curries, an Assa Abloy Group company: www.assaabloydss.com.
3. Substitutions: See Section 01 2500 Substitution Procedures .

2.2 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:

1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
2. Accessibility: Comply with ICC A117.1 and ADA Standards.
3. Door Top Closures: Flush end closure channel, with top and door faces aligned.
4. Door Edge Profile: Beveled.
5. Typical Door Face Sheets: Flush.
6. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

a. Provide 14 gauge channel reinforcing for all door closers.

7. Galvanizing including all doors and frames: All components hot-dipped zinc-iron alloy-coated (galvannealed), manufacturer's standard coating thickness.

2.3 STEEL DOORS

A. Door Finish: Factory primed and field finished.

B. Interior Doors, Non-Fire-Rated and Fire-Rated:

1. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless, continuous welded.
   a. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
   b. Model 2 - Seamless., fully welded
   c. Door Face Metal Thickness: 14 gage, 0.067 inch, minimum.
   d. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
2. Acoustical Core: Where indicated on door schedule provide sound absorption core
3. Door Core Material: Vertical steel stiffeners.
   a. 20 ga. spaced 6" o.c. welded to face sheets max. 5" o.c.
   b. STC Rating: 25.
4. Door Thickness: 1-3/4 inch, nominal.
5. Door Finish: Factory primed and field finished.
6. Product:
   a. Ceco Door, an Assa Abloy Group company; Maxim: www.assaabloydss.com.

2.4 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Frame Finish: Factory primed and field finished.

C. Interior Door Frames, Non-Fire Rated and Fire Rated: Full profile/continuously welded type.

1. Frame Metal Thickness: 12 gage, 0.093 inch, minimum.
2. Frame Finish: Factory primed and field finished.
3. Product:
   a. Curries, an Assa Abloy Group Company; M Series; MK for doors over 4'-0" wide: www.assaabloydss.com.
   b. Ceco Door, an Assa Abloy Group company; SU Series: www.assaabloydss.com.

2.5 FINISHES

A. Refer to Section 09 91 23 Interior Painting.

B. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.6 ACCESSORIES

A. Glazing Trim: As per manufacterer's standard for doors and glass thickness.

B. Glazing: As specified in Section 08 8000.

C. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is prohibited.

D. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

E. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

F. Frame Anchors: Minimum of six wall anchors and two base anchors.

1. T anchors for masonry.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.2 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.3 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated and NAAMM HMMA 840.

B. Coordinate frame anchor placement with wall construction.

C. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

D. Install door hardware as specified in Section 08 7100.

E. Comply with glazing installation requirements of Section 08 8000.

F. Field Paint all exposed surfaces of doors and frames in accordance with Section 09 9123.

3.4 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.

B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.5 ADJUSTING

A. Adjust for smooth and balanced door movement.

3.6 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 1416
FLUSH WOOD DOORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Flush wood doors; flush configuration; non-rated.

1.3 RELATED REQUIREMENTS

A. Section 08 1213 - Hollow Metal Frames.

B. Section 08 7100 - Door Hardware.

1.4 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).

B. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

C. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2013.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.

1. Provide information as required by WDMA I.S.1-A or _____.
2. Include certification program label.

D. Samples: Submit two samples of door veneer, 8 x 8 inch in size illustrating plastic laminate color.

E. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

F. Manufacturer's Installation Instructions: Indicate special installation instructions.

G. Cleaning Instructions: Submit manufacturer’s cleaning instructions for doors.

H. Manufacturer’s Certification: Submit manufacturer’s certification that doors comply with specified requirements and are suitable for intended application.

I. Specimen warranty.

J. Warranty, executed in Yonkers Public Schools's name.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than Ten (10) years of documented experience.

1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.

B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

C. Quality Certification:

1. Provide labels or certificates indicating that the installed work complies with WDMA I.S.1-A or AWS requirements for grade or grades specified.
2. Provide designated labels on shop drawings as required by certification program.
3. Provide designated labels on installed products as required by certification program.
4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

D. Store doors in accordance with manufacturer’s instructions.

E. Store doors in clean, dry area indoors, protected from damage and direct sunlight.

F. Store doors flat on level surface.

G. Do not store doors directly on concrete.

H. Keep doors completely covered. Use covering which allows air circulation and does not permit light to penetrate.

I. Store doors between 50 and 90 degrees F (10 and 32 degrees C) and 30 to 50 percent relative humidity.

J. Handle doors in accordance with manufacturer’s instructions.

K. Protect doors and finish during handling and installation to prevent damage.

L. Handle doors with clean hands or clean gloves.

M. Lift and carry doors. Do not drag doors across other doors or surfaces.

1.8 PROJECT CONDITIONS

A. Coordinate the work with door opening construction, door frame and door hardware installation.

B. Do not subject doors to extreme conditions or changes in temperature or relative humidity in accordance with WDMA I.S.1-A.

1.9 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Interior Doors: Provide manufacturer's warranty for the life of the installation.

1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.
2. Defects noted during warranty period shall be corrected at no cost to Owner. Corrective work shall include labor and material for repair, replacement, refinishing, and rehanging as required.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. High Pressure Decorative Laminate (HPDL) Faced Doors:

1. VT Industries, Inc; Heritage: www.vtindustries.com/#sle.

2.2 DOORS

A. Doors: Refer to drawings for locations and additional requirements.

1. High Pressure Decorative Laminate (HPDL) Faced Doors: 5-ply unless otherwise indicated.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.

1. Provide solid core doors at each location.
2. High pressure decorative laminate (HPDL) finish as indicated on drawings.

2.3 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 and 45 Minute Rated Doors: Type staved lumber core (SLC), plies and faces as indicated.

2.4 DOOR FACINGS

A. High Pressure Decorative Laminate (HPDL) Facing for Non-Fire-Rated Doors: NEMA LD 3, HGS; color as selected; finish as selected. Match wall panels.

2.5 ACCESSORIES

A. Hollow Metal Door Frames: As specified in Section 08 1113.

B. Door Hardware: As specified in Section 08 7100.

2.6 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Where supplementary protective edge trim is required, install trim after veneer facing has been applied full-width.

C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

E. Provide edge clearances in accordance with the quality standard specified.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.2 PREPARATION

A. Allow doors to become acclimated to building temperature and relative humidity for a minimum of 24 hours before installation.

3.3 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Install door hardware as specified in Section 08 7101.

D. Use machine tools to cut or drill for hardware.

E. Coordinate installation of doors with installation of frames and hardware.

F. Coordinate installation of glazing.

3.4 TOLERANCES

A. Comply with specified quality standard for fit and clearance tolerances.

B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.5 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

3.6 SCHEDULE - See Drawings

END OF SECTION

SECTION 08 7101
DOOR HARDWARE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepencies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:
   1. Swinging doors.

B. Door hardware includes, but is not necessarily limited to, the following:
   1. Mechanical door hardware.
   2. Electromechanical door hardware.

C. Related Sections:
   1. Division 06 Section “Rough Carpentry”.
   2. Division 06 Section “Finish Carpentry”.
   3. Division 08 Section “Hollow Metal Doors and Frames”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
   1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
   2. ICC/IBC - International Building Code.
   3. NFPA 70 - National Electrical Code.
   4. NFPA 80 - Fire Doors and Windows.
   5. NFPA 101 - Life Safety Code.
   6. NFPA 105 - Installation of Smoke Door Assemblies.
   7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:
   1. ANSI/BHMA Certified Product Standards - A156 Series
   2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
   1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
   2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
   3. Content: Include the following information:
      a. Type, style, function, size, label, hand, and finish of each door hardware item.
      b. Manufacturer of each item.
      c. Fastenings and other pertinent information.

d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.
h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:
1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
b. Complete (risers, point-to-point) access control system block wiring diagrams.
c. Wiring instructions for each electronic component scheduled herein.
2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:
1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
   1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
   2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

E. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

F. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
   1. Function of building, purpose of each area and degree of security required.
   2. Plans for existing and future key system expansion.
   3. Requirements for key control storage and software.
   4. Installation of permanent keys, cylinder cores and software.
   5. Address and requirements for delivery of keys.

G. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
   1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
   2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
   3. Review sequence of operation narratives for each unique access controlled opening.
   4. Review and finalize construction schedule and verify availability of materials.
   5. Review the required inspecting, testing, commissioning, and demonstration procedures

H. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction

boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

D. Building Information Modeling (BIM) Support: Utilize designated BIM software tools and obtain training needed to successfully participate in the Project BIM processes. All technical disciplines are responsible for the product data integration and data reliability of their Work into the coordinated BIM applications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Seven years for heavy duty cylindrical (bored) locks and latches.
2. Five years for exit hardware.
3. Twenty five years for manual surface door closer bodies.
4. Two years for electromechanical door hardware.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.
   1. Quantity: Provide the following hinge quantity, unless otherwise indicated:
      a. Two Hinges: For doors with heights up to 60 inches.
      b. Three Hinges: For doors with heights 61 to 90 inches.
   2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
      a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
      b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.
   3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
      a. Exterior Doors: Heavy weight, non-ferrous, ball bearing hinges unless Hardware Sets indicate standard weight.
      b. Interior Doors: Standard weight, steel, ball bearing hinges unless Hardware Sets indicate heavy weight.
   4. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:
      a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:
   5. Acceptable Manufacturers:
      a. Bommer Industries (BO).
      b. Hager Companies (HA) - CB Series.
      c. McKinney Products (MK).

2.3 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinders: Original manufacturer cylinders complying with the following:
   1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
   2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
   3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
   4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
   5. Keyway: Match Facility Standard

D. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
   1. Removable Cores: Core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware. Provide removable core (small or large format) as specified in Hardware Sets.

E. Keying System: Each type of lock and cylinders to be factory keyed.
   1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
   2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
   3. Existing System: Field verify and key locks to match Owner's existing system.

F. Key Quantity: Provide the following minimum number of keys:
   1. Change Keys per Cylinder: Three (3).
   2. Master Keys (per Master Key Level/Group): Five (5).
   3. Construction Keys (where required): Ten (10).

4. Construction Control Keys (where required): Two (2).
5. Permanent Control Keys (where required): Two (2).

G. Construction Keying: Provide temporary keyed construction cores.

H. Key Registration List (Bitting List):
1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.4 MECHANICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified cylindrical (bored) locksets furnished in the functions as specified in the Hardware Sets. Lock chassis fabricated of heavy gauge steel, zinc dichromate plated, with through-bolted application. Furnish with solid cast levers, standard 2 3/4” backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt. Locks are to be non-handed and fully field reversible.
1. Acceptable Manufacturers:
a. Corbin Russwin Hardware (RU) – CL3300 Series.
b. Sargent Manufacturing (SA) – 10 Line.

B. Lock Trim Design: As specified in Hardware Sets.

2.5 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:
1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.6 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.
3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

5. Energy Efficient Design: Provide lock bodies which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.
6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
    1. Manufacturers:
        a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
        b. Sargent Manufacturing (SA) - 80 Series.

2.7 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:
    1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
    2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
    3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.
    4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
    5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
    6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
    7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
    8. Provide metal covers on all closures.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Manufacturers:
   a. Corbin Russwin Hardware (RU) - DC8000 Series.
   b. Sargent Manufacturing (SA) - 351 Series.
   c. Norton Door Controls (NO) - 7500 Series.

2.8 ARCHITECTURAL TRIM

A. Door Protective Trim
   1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
   2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
   3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
   4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
      a. Stainless Steel: 300 grade, 050-inch thick.
   5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
   6. Manufacturers:
      a. Hiawatha, Inc. (HI).
      b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
      c. Trimco (TC).

2.9 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
   1. Acceptable Manufacturers:
      a. Burns Manufacturing (BU).
      b. Rockwood Manufacturing (RO).
      c. Trimco (TC).

2.10 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
   1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: :Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
   1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Acceptable Manufacturers:
   1. National Guard Products (NG).
   2. Pemko Manufacturing (PE).
   3. Reese Enterprises, Inc. (RS).

2.11 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.12 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

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

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
   1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
   2. Install hardware in accordance with manufacturer's instructions and applicable codes.
   3. Use templates provided by hardware item manufacturer.
   4. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation.
   5. Install hardware on fire-rated doors and frames in accordance with code and NFPA 80.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
   1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

2. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
3. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Unless otherwise specified, locate all hardware in accordance with the recommended locations for builders hardware for standard doors and frames as published by the Door and Hardware Institute.

D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

E. Frame set into new or existing masonry wall and filled with mortar, drill and tap fasterners.

F. Gaskets: install jamb-applied gaskets before closers, overhead stops, rim strikes, etc. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.

G. When hardware is to be attached to existing metal surface and insufficient reinforcement exists, use RivNuts, NutSerts or similar anchoring device for screws.

H. Do not use thru-bolts orzip screws to attached hardware.

I. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

J. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Closers shall not be visible in corridors, lobbies and other public spaces unless approved by Architect.
1. Adjust spring power of door closers to insure exterior and fire rated doors will consistently close and latch doors under existing conditions. Adjust all other door closers to insure opening force does not to exceed 5 lbs.
2. Adjust "sweep", "latch", & "back check" valves on all door closers to properly control door throughout the opening and closing cycle. Adjust total closing speed as required to comply with all applicable state and local building codes

K. Lock Cylinders: Install construction cores to secure building and areas during construction period.
1. Replace construction cores with permanent cores as indicated in keying section.

L. Stops: Provide wall stops for doors unless floor or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

M. Locate floor stops not more than 4 inches from the wall.

N. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

O. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed

P. Locate floor stops not more than 4 inches from the wall.

Q. Shim doors as required to maintain proper operating clearance between door and frame.

R. Use only fasteners supplied by or approved by the manufacturer for each respective item of hardware.

S. Where necessary, adjust doors and hardware as required to eliminate binding between strike and latchbolt. Doors should not rattle.

T. Deliver to the owner 1 complete set of installation and adjustment instructions, and tools as furnished with the hardware.
1. For Steel Doors and Frames: Refer to Section 08 1113.

U. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

V. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Section 07 9200 - Joint Sealants

W. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. and provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SCHEDULE

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door.

C. Manufacturer’s Abbreviations:
1. MK - McKinney
2. RU - Corbin Russwin
3. SA - SARGENT
4. NO - Norton
5. RO - Rockwood
6. RF - Rixson
7. PE - Pemko

3.9 Hardware Schedule

Set: 1.0

Doors: 101, 103, 105

6	Hinge, Anchor, Hvy Wt (Sq. Edge Door)	TA792 5" x 4-1/2"	US26D	MK
2	Head Pivot	CP-10HD	US26D	RO
1	Surface Vert Rod Exit, Exit Only	12 8710 EO	US32D	SA
1	Open back strike	815 OBS		

1	Mortise Exit Device	12 LC 8916 ETP	US32D	SA
2	Permanent Core	CR8000	626	RU
2	Cylinder	As Required x Temp Core	626	RU
2	Door Closer	P7500	689	NO
1	Latch Cover Kick Plate	BFLG1050 10"	US32D	RO
1	Kick Plate	K1050 - 10" x 2" LDW x 4BE x CSK	US32D-316	RO
2	Electromagnetic Holder	998M	689	RF
1	Gasketing	S773BL		PE
1	Astragal	S772BL		PE
1	Latch Guard Cover - Bottom Rod	BFRC24	US32D	RO
1	Latch Guard Cover - Top Rod	BFRC x LAR	US32D	RO

Set: 2.0

Doors: 102, 106, 107

3	Hinge, Anchor, Hvy Wt (Sq. Edge Door)	TA792 5" x 4-1/2"	US26D	MK
1	Head Pivot	CP-10HD	US26D	RO
1	Storage Lock	CL3357 PZD CT6B	626	RU
1	Permanent Core	CR8000	626	RU
1	Door Closer 7500 / P7500	689	NO	
1	Kick Plate	K1050 - 10" x 2" LDW x 4BE x CSK	US32D-316	RO
1	Wall Stop	400 / 441CU	US26D	RO
1	Gasketing	S773BL		PE

Set: 3.0

Doors: 100, 104

3	Hinge, Anchor, Hvy Wt (Sq. Edge Door)	TA792 5" x 4-1/2"	US26D	MK
2	Head Pivot	CP-10HD	US26D	RO
1	Intruder Lock	CL3352 PZD CT6B	626	RU
2	Permanent Core	CR8000	626	RU
1	Door Closer	7500 / P7500	689	NO
1	Kick Plate	K1050 - 10" x 2" LDW x 4BE x CSK	US32D	RO
1	Wall Stop	400 / 441CU	US26D	RO
1	Gasketing	S773BL		PE

Set: 4.0

Doors: 108, 109, 110

4	Hinge, Anchor, Hvy Wt (Sq. Edge)	TA792 5" x 4-1/2"	US26D	MK
2	Head Pivot	CP-10HD	US26D	RO
1	Deadbolt Lock	DL3017	626	RU
1	Permanent Core	CR8000	626	RU
2	Surface Bolts	580-8	US32D	RO

END OF SECTION

SECTION 08 8000
GLAZING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Fire rated safety glass.

B. Glazing compounds and accessories.

1.3 RELATED REQUIREMENTS

A. Section 08 1113 - Hollow Metal Doors and Frames: Glazed lites installed in doors and borrowed lites.

1.4 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015.

C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2015).

D. ASTM C1036 - Standard Specification for Flat Glass; 2016.

E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

F. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2018c.

G. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

I. New York State Section 2406 Safety Glazing.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data for each glass product and glazing material indicated. Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

D. Samples: Submit one (1) samples 12 by 12 inch in size of glass units.

1.6 QUALITY ASSURANCE

A. Sustainable Design Certification: Glass shall be Cradle to Cradle Certified™, minimum Silver Level, Cradle to Cradle Innovation Institute.

B. Perform Work in accordance with GANA (SM) and GANA (LGRM) for glazing installation methods.

C. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 and, Insulating Glass Manufacturers Alliance ANSI Z97.1.

1. Lites more than 9 square feet (sf) (0.84 sq. m) in area are required to be Category II materials

D. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum Ten (10) years of documented experience and meet ANSI / ASQC Q9002 1994.

E. Fabricator Qualifications: Manufactured Certified as acceptable to the manufacturer

F. Installer Qualifications: Company specializing in performing work of the type specified and with at least five (5) years documented experience.

PART 2 PRODUCTS

2.1 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.
   1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
   2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
   3. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.

B. Fire-Resistance-Rated Glass Manufacturers: Provide products as required to achieve indicated fire-rating period.
   1. Anemostat; (310) 835-7500; door@anemostat.com.
   2. Substitutions: Refer to Section 01 2500 - Substitution Procedures

2.2 GLAZING UNITS

A. Fire Rated Safety Glass conforming to Underwriters Laboratories, Inc. Fire Tests of Door Assemblies and the following:
   1. Manufacturer: Anemostat; (310) 835-7500; door@anemostat.com
   2. I-W, clear ceramic laminated with 2 pieces of PREMIUM FireLite and a proprietary interlayer specialty high impact fire rated glazing material.
      a. Thickness: 5/16”
      b. U Value: 0.40
      c. Weight: 3.8-lbs/sq. ft.
      d. Sound Transmission Rating: 38 STC
      e. Glazing materials shall be optically clear, colorless and free from usual distortion.
      f. Each piece of fire-rated glazing material shall be labeled with a permanent logo including name of product, manufacturer, testing laboratory fire rating period and safety glazing standards.
      g. Glazing material installed shall be certified and permanently labeled as meeting applicable requirements referenced in NFPA 80 and:
      h. ANSI Z97.1
      i. CPSC 16 CFR 1201, Category II 400 ft.lbs.
      j. Glazing shall be installed in a rated framing system meeting ASTM E2010-01, NFPA 257, UL 9, UBC 7-4 or CAN4-S106 and ASTM E2074-00, NFPA 252, UL 10b, UBC 7-2 or CAN4-S104
   3. Use for all interior vision panels in fire rated doors

2.3 GLAZING COMPOUNDS

A. As recommended by the manufacturer.

2.4 ACCESSORIES

A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Continuous by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.

C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
   1. Width: As required for application.

2.5 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements

2.6 SOURCE QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements and individual sections requirements.

PART 3 EXECUTION

3.1 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that the minimum required face and edge clearances are being provided.

C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

3.2 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.3 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.

E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.4 GLAZING SYSTEM:

A. Manufacturer's standard factory-glazing system that produces weather tight seal. Refer to Section 08 1113 Hollow Metal Doors and Frames.

3.5 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

3.6 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove non-permanent labels immediately after glazing installation is complete.

C. Clean glass and adjacent surfaces after sealants are fully cured.

D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.7 PROTECTION

A. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

3.8 SCHEDULE

A. Refer to door schedule and drawings for location and/or requirements.

END OF SECTION

SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.

B. Metal stud wall framing.

C. Furring channels.

D. Metal Trim

E. Gypsum wallboard.

F. Joint treatment and accessories.

1.3 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 042616 - Adhered Masonry Veneer

C. Section 05 4000 - Cold-Formed Metal Framing: Structural steel stud framing.

D. Section 07 8400 - Firestopping: Top-of-wall assemblies and penetrations at fire rated walls.

E. Section 07 9200 - Joint Sealants.

1.4 REFERENCE STANDARDS

A. AISI S-100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members.

B. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2010 (Reaffirmed 2016).

C. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2016).

D. ASTM C473-19 - Standard Test Methods For Physical Testing Of Gypsum Panel Products.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.

F. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014, with Editorial Revision (2015).

G. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.

H. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2017.

I. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2018b.

J. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.

K. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2016.

L. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.

M.

N. ASTM C1325 - Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units; 2017a.

O. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.

P. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2018a.

Q. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2018.

R. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.

S. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.

T. UL (FRD) - Fire Resistance Directory; Current Edition.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.

C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

E. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

F. Samples: Submit two samples of gypsum board finished with proposed texture application, 12 by 12 inches in size, illustrating finish color and texture.

1.6 QUALITY ASSURANCE

A. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.

B. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 5 years of experience.

1.7 REGULATORY REQUIREMENTS

A. Refer to Section 01 4100 - Regulatory Requirements.
   1. Conform to New York StateBuilding and Fire Code for fire rated assemblies as indicated on drawings.

PART 2 PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

B. Fire-Resistance-Rated Assemblies: Provide completed assemblies with the following characteristics:
   1. Fire Rated Partitions: Rating as indicated on the drawings.; 1 hour rating.
   2. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
   3. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.2 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:
   1. Marino: www.marinoware.com.

B. Non-structural Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
   1. Studs: "C" shaped with knurled or emobossed faces.
      a. Minimum Base Metal Thickness: 0.0312 (20 gauge), unless noted otherwise.
      b. Depth: As indicated.
   2. Runners: U shaped, sized to match studs.
   3. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch.

C. Deflection and Firestop Track:
   1. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-rating of the wall assembly.
   2. Products:
      a. Clark Dietrich," MaxTrak Slotted Deflection Track" or approved equal.
         a) Minimum 20 ga. x 2-1/2" leg.
         b) Non-structural.
   3. Substitutions: 01 2500 - Substitution Procedures

D. Flute Cover:
   1. Corrugated strap for horizontal use to span flute areas of unprotected metal decks.
   2. Products:
      a. Clark Dietrich," (FC) Flute Cover.
         a) Minimum 20 ga.
         b) Non-structural.

E. Non-structural Framing Accessories:
   1. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.

F. Suspended Ceiling and Soffit Framing:
   1. Components, General: Comply with ASTM C 754 for conditions indicated.
   2. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch, a minimum 1/2-inch-wide flange, with ASTM A 653, G40 (Z120), hot-dip galvanized zinc coating.
      a. Depth: 1-1/2" unless otherwise indicated.
   3. Furring Channels (Furring Members): Commercial-steel sheet with ASTM A 653/A 653M, G40, hot-dip galvanized zinc coating.

2.3 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. Georgia-Pacific Gypsum: www.gpgypsum.com.
   2. National Gypsum Company: www.nationalgypsum.com.
   3. USG Corporation: www.usg.com.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for base layer soffits, unless otherwise indicated.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
      a. **Mold resistant board is required at all locations.**
   3. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
   4. Thickness:
      a. Vertical Surfaces: 5/8 inch

b. Soffits and Ceilings: 1/2 inch.

C. Abuse Resistant Wallboard:
1. Application: Face layer of all partitions unless noted otherwise.
2. Surface Abrasion: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
3. Indentation: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
4. Soft Body Impact: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
5. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
6. Paper-Faced Type: Gypsum wallboard, as defined in ASTM C1396/C1396M.
7. Type: Fire-resistance-rated Type X, UL or WH listed.
8. Thickness: 5/8 inch.
9. Microbial Resistance (ASTM D6329, EPA 12-week protocol): Will not support microbial growth.
10. Humidified Deflection (ASTM C473, ASTM C1658): Not more than 1/8 inch.
11. Hardness, Core, Edges, and Ends (ASTM C473, ASTM C1396, ASTM C1658): Not less than 15.
12. Water Absorption (ASTM C1396, ASTM C1658): Less than 5 percent of weight.
13. Edges: Tapered.
14. Paper-Faced Products:
    a. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold Guard Abuse-Resistant: www.gpgypsum.com/#sle.
    b. National Gypsum Company; Gold Bond Hi-Abuse XP Gypsum Board: www.nationalgypsum.com/#sle.
    c. Substitutions: .See Section 01 2500 Substitution Procedures
15. Glass Mat Faced Products:
    a. Georgia-Pacific Gypsum; DensArmor Plus Abuse-Resistant: www.gpgypsum.com/#sle.
    b. National Gypsum Company; Gold Bond eXP Interior Extreme AR Gypsum Panel: www.nationalgypsum.com/#sle.

D. Cementitious Backing Board For Wet Areas:
1. Application: Surfaces behind adhered masonry veneer areas.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
3. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
    a. Thickness: 5/8 inch.
    b. Products:
        a) National Gypsum Company; PermaBase Cement Board: www.nationalgypsum.com.
        b) USG Corporation; Durock: www.usg.com.
        c) Substitutions: See Section 01 2500 Substitution Procedures

2.4 GYPSUM WALLBOARD ACCESSORIES

A. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
1. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
2. Thickness: Full width of framing member.

B. Beads, Joint Accessories, and Other Trim: ASTM C1047, galvanized steel, unless noted otherwise.
1. Corner Beads: Low profile, for 90 degree outside corners.
    a. Products:
2. L-Trim with Tear-Away Strip: Sized to fit the thickness gypsum wallboard.
    a. Products:
        a) Phillips Manufacturing Co; gripSTIK L-Tear: www.phillipsmfg.com.

C. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.

1. Mold resistant and asbestos free.
2. Joint Compound: Drying type, vinyl-based, ready-mixed.
   a. Products:
      a) CertainTeed Corporation; Extreme All-Purpose Joint Compound: www.certainteed.com.
      b) Substitutions: See Section 01 2500 Substitution Procedures

D. Abuse Resistant Finishes:
   1. Acrylic, water-based, non-textured, high build, tintable primer and surfacer.

E. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.

F. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

G. Utility angle: 2"x 2" 20 ga. for attachments of intersection framing and right angle corner enclosures.

H. Flat straps: 6", 16 ga. use for stud bridging.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.2 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Provide metal Bracing: at midpoint up to 8' 0"; at third point over 8'-0".

C. Studs: Space studs at 16 inches on center, unless shown otherwise
   1. Extend partition framing to structure in all locations.

D. **Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs minimum 16 gauge**.

E. Standard Wall Furring: Install at masonry walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 16 inches on center.
   1. Orientation: Horizontal.
   2. Spacing: As indicated.

F. Blocking: Install blocking for support of plumbing fixtures, toilet partitions, casework, toilet accessories, and hardware. Comply with Section 06 1000 for wood blocking.

G. Suspended Ceiling and Soffits: Space framing and furring members as indicated.

3.3 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

C. Double-Layer, Nonrated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.

D. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

E. Cementitious Backing Board: Install over steel framing members where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

F. Installation on Metal Framing: Use screws for attachment of gypsum board.

G. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board with sealant.

3.4 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
   1. Not more than 30 feet apart on walls and ceilings over 50 feet long.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.5 JOINT TREATMENT

A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
   2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
   4. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.

B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.
   2. Taping, filling, and sanding are not required at base layer of double-layer applications.

C. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.6 FIRE RATED WALL MARKING AND IDENTIFICATION

A. For all walls or partitions indicated to be fire rated, or smoke rated, where there is an accessible concealed floor, ceiling or attic space adjacent to said wall. Contractor shall permanently mark with signs or stenciling within he concealed space, in accordance with IBC 703.7 in concealed spaces.
   1. Identifications shall be located within 15 feet of the end of each wall or partition and at intervals not exceeding 30 feet measured horizontally along the wall or partition.
   2. Identifications shall include lettering not less than 3 inches in height with a minimum 3/8 inch stroke width in a contrasting color incorporating the wording " FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS".

3.7 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.8 FINISH LEVEL SCHEDULE

A. Level 1: Above finished ceilings concealed from view.

B. Level 2: Utility areas and areas behind cabinetry.

C. Level 4: Walls and ceilings scheduled to receive flat or eggshell paint finish.

D. Level 5: Walls and ceilings scheduled to receive semi-gloss or gloss paint finish.

END OF SECTION

SECTION 09 2400
CEMENT PLASTERING

PART 1 GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Cement plastering.

B. Removal/cutting openings in existing plaster ceilings to accomodate new acoustical tile ceilings.

C. Repair/patch existing metal lath and solid surfaces cement plaster.

D. Accessories

1.3 RELATED REQUIREMENTS

A. Section 09 2236.23 - Metal Lath: Lath, furring, beads, screeds, and joint accessories for plaster base.

B. Section 09 9123 - Interior Painting.

1.4 REFERENCE STANDARDS

A. ASTM C847 - Standard Specification for Metal Lath; 2018.

B. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.

C. ASTM C150/C150M - Standard Specification for Portland Cement; 2018.

D. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.

E. ASTM C897 - Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters; 2015.

F. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster; 2018a.

G. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2018c.

H. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. UL (FRD) - Fire Resistance Directory; Current Edition.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittals procedures.

B. Product Data: Provide data on plaster materials and trim accessories.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum five (5)years documented experience.

1.7 MOCK-UP

A. Construct mock-up of typical patching of ceiling, long illustrating .
   1. Locate where directed.
   2. Mock-up may remain as part of this work.

1.8 FIELD CONDITIONS

A. Interior Plaster Work: Maintain minimum ambient temperature of 50 degrees F during installation of plaster and until fully cured.

PART 2 PRODUCTS

2.1 CEMENT PLASTER APPLICATIONS

A. Lath Plaster Base: Metal lath.
   1. Plaster Type: Factory prepared plaster mix.
   2. Number of Coats: One coat where not exposed; two coats where exposed.
   3. Leveling Coat: Apply to a nominal thickness of 1/32 to 1/16 inch.
   4. Finish Coat: Apply to a nominal thickness of 1/8 inch.
      a. Texture: Match existing.

B. Solid Plaster Base: Over existing plaster or masonry.
   1. Plaster Type: Factory prepared plaster mix.
   2. Number of Coats: One coat where not exposed; two coats where exposed.
   3. First Coat: Apply to a nominal thickness of 1/4 inch.
   4. Leveling Coat: Apply to a nominal thickness of 1/32 to 1/16 inch.
   5. Finish Coat: Apply to a nominal thickness of 1/8 inch.
      a. Texture: ccccccccccccccccccccccccccccccccccccccccccccccccccccc.

2.2 FACTORY PREPARED CEMENT PLASTER

A. Premixed One-Coat Base: Mixture of Type I Portland cement complying with ASTM C150/C150M, hydrated lime complying with ASTM C207, fibers and other approved ingredients; install in accordance with ASTM C926.

B. Premixed Leveling Coat: Acrylic polymer-based blend approved for use with plaster manufacturer's base coat and finish materials.

C. Primer: Acrylic, as recommended by coating manufacturer and compatible with plaster base coat.

D. Premixed Finish Coating: Integrally colored, cementitious coating.
   1. Color: Matching existing.

2.3 ACCESSORIES

A. Ribbed Metal Lath: ASTM C847, galvanized; 3/8 inch thick.
   1. Weight: 3.4 lb/sq yd.

B. Beads, Screeds, and Joint Accessories: As specified in Section 09 2236.23.

C. Beads, Screeds, Joint Accessories, and Other Trim: Depth governed by plaster thickness, maximum possible lengths.
   1. Material: Formed sheet steel with rust inhibitive primer, expanded metal flanges.
   2. Corner Beads: Radiused corners.
   3. Expansion Joints: Accordion profile with factory-installed protective tape, 2 inch wide flanges.
   4. Control Joints: Accordion profile with protective tape, 2 inch flanges.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions are acceptable prior to starting this work.

B. Verify masonry joints are flush and surfaces are ready to receive work of this section, and that there are no existing bituminous or water repellent coatings on masonry surfaces.

C. Verify lath is flat, secured to substrate, and joint and surface perimeter accessories are properly in place.

D. Verify mechanical and electrical equipment and services located within areas to receive this work have been properly tested and approved.

3.2 PREPARATION

A. Dampen masonry surfaces to reduce excessive suction.

B. Roughen smooth concrete surfaces and apply bonding compound in accordance with manufacturer's written installation instructions.

C. Apply dash bond coat of plaster to solid bases and moist cure for at least 24 hours before applying first coat of jobsite mixed plaster.

3.3 MIXING

A. Mix only as much plaster as can be used prior to initial set.

B. Mix materials dry, to uniform color and consistency, before adding water.

C. Do not retemper mixes after initial set has occurred.

3.4 APPLICATION

A. Apply plaster in accordance with manufacturer's written instructions and comply with ASTM C926.

B. Base Coats:
   1. Apply base coat(s) to fully embed lath and to specified thickness.
   2. Follow guidelines in ASTM C926 and manufacturer's written installation instructions for moist curing base coats and application of subsequent coats.

C. Leveling Coat:
   1. Apply leveling coat to specified thickness.

D. Finish Coats:
   1. Primer and Cementitious Coatings:
      a. Remove surface contaminants such as dust and dirt without damaging substrate.
      b. Apply primer in accordance with manufacturer's instructions.
      c. Apply finish coating in number of coats and to thickness recommended by manufacturer.

3.5 REPAIR

A. Patching: Remove loose, damaged or defective plaster and replace with plaster of same composition; finish to match surrounding area.

END OF SECTION

SECTION 09 3000
TILING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Stone thresholds.

1.3 RELATED REQUIREMENTS

A. Section 03 5400 - Cast Underlayment.

B. Section 04 2000 - Unit Masonry.

1.4 REFERENCE STANDARDS

A. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2017.

1. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 1999 (Reaffirmed 2010).
2. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2010).
3. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar; 2017.
4. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes For Thin-Set Ceramic Tile And Dimension Stone Installation; 2014.
5. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014.
6. ANSI A136.1 - American National Standard for Organic Adhesives for Installation of Ceramic Tile; 2008 (Reaffirmed 2013).
7. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2012.
8. ASTM C150/C150M - Standard Specification for Portland Cement; 2018.

B. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2017.

C. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2017.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches in size illustrating pattern, color variations, and grout joint size variations.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Master Grade Certificate: Submit for each type of tile, signed by the tile manufacturer and tile installer.

F. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

G. Maintenance Materials: Furnish the following for Yonkers Public Schools's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Tile: 10 square feet of each size, color, and surface finish combination.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.

B. Installer Qualifications:
   1. Company specializing in performing tile installation, with minimum of five years of documented experience.

1.7 MOCK-UP

A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.

B. Construct tile mock-up incorporating all components specified for the location.
   1. Minimum size of mock-up 8' x 8'.
   2. Approved mock-up may remain as part of the Work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.9 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

PART 2 PRODUCTS

2.1 TILE

A. Manufacturers: All products of each type by the same manufacturer.
   1. Floor Tile: Casalgrande Padana.
   2. Wall Tile: United States Ceramics.
   3. Substitutions: 01 6000 - Product Requirements.

B. Porcelain Floor Tile: Group B1 fully vitrified.
   1. Moisture Absorption: <0.1 percent as tested in accordance with ISO 10545-3.
   2. Size: 12 by 24 inch, nominal.
   3. Thickness: 3/8/"
   4. Shape: Rectangle.
   5. Edges: Square.
   6. Surface Finish: Unglazed, Non-slip, to comply with or exceed R10 A+B DIN 51130 > 0.40.
   7. Color(s): As indicated on drawings.
      Pattern: As indicated on drawings
   8. Products:
      a. Casalgrande Panda, Basaltina..

C. Glazed Wall Tile: ANSI A137.1, standard grade and as follows:
   1. Size: As indicated on Finish Schedule.
   2. Edges: Square.
   3. Surface Finish: As iindicated on drawings..
   4. Color(s): As indicated on drawings.

5. Trim Units: Matching bullnose and cove shapes in sizes indicated.
6. Products:
   a. United States Ceramic Tile.
7. Substitutions: 01 6000 - Product Requirements.

D. Terrazzo Tile:
1. Composition: Portland cement, ASTM C150/C150M; aggregate complying with ASTM C33/C33M or ASTM C609 class, shade and rating as per manufacturer's recommendations for tile selected.
2. Size: 24 by 24 inch, nominal.
3. Thickness: 5/8 inch.
4. Surface Finish: Polished.
5. Edges: Chamfered.
6. Color(s): As scheduled.
7. Trim Units: Matching base with bullnose edge in sizes indicated.
8. Products:
   a. Tectura Designs, a division of Wausau Tile Inc; Traditional Series: www.tecturadesigns.com.

2.2 TRIM AND ACCESSORIES

A. Non-Ceramic Trim: PVC and Stainless Steel, style and dimensions to suit application, for setting using tile mortar or adhesive.
1. Applications: Refer to Finish Schedule for types and finish.
   a. Floor to wall transition: Rondec-AC and Quadec as indicated on drawings. cove transition.
   b. Transition between floor finishes of different wall finishes types and heights.
2. Manufacturers:
   a. Schluter-Systems: www.schluter.com.
   b. Substitutions: 01 6000 - Product Requirements.

2.3 SETTING MATERIALS

A. Manufacturers:
1. Mapei Corporation. Product: ULTRAFLEX 2.
2. Substitutions: 01 6000 - Product Requirements.

2.4 ADHESIVE MATERIALS

A. Manufacturers:
1. Mapei Corporation; Product MAPEI TYPE 1: www.mapei.com.
2. Substitutions: Section 01 2500 Substitution Procedures.

2.5 GROUTS

A. Manufacturers:
1. Mapei Corporation ; Product Mapei Ultracolor, Plus FA
2. Substitutions: Section 01 2500 Substitution Procedures.

2.6 ACCESSORY MATERIALS

A. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
1. Crack Resistance: No failure at 1/16 inch gap, minimum; comply with ANSI A118.12.
2. Fluid or Trowel Applied Type:
   a. Material: Synthetic rubber.
   b. Thickness: 25 mils, minimum, dry film thickness.
   c. Products:

a) Mapei; Aqua Defence.

B. Trowelable Underlayments and Patching Compounds: Latex-modified, Portland-cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated

C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers

D. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints that does not change color or appearance of grout.

1. Products: MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout
   a. Provide sealer coat over all tile floors

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

D. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

3.3 INSTALLATION - GENERAL

A. Install tile and thresholds and grout in accordance with applicable requirements of ANSI A108.1A thru A108.13, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Install non-ceramic trim in accordance with manufacturer's instructions.

G. Install thresholds where indicated.

H. Sound tile after setting. Replace hollow sounding units.

I. Keep control and expansion joints free of mortar, grout, and adhesive. Refer to TCNA (HB) EJ 171 for location and frequency of joints.

J. Keep expansion joints free of adhesive or grout. Apply sealant to joints.

K. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

L. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

M. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

N. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.4 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.

1. Where waterproofing membrane is indicated, install in accordance with TCNA (HB) Method Provide 2 coats. Install in accordance with manufacturer's recommendations..

3.5 INSTALLATION - WALL TILE

A. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.6 CLEANING

A. Clean tile and grout surfaces.

3.7 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

SECTION 09 5100
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical panels

C. Special Trim.

1.3 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 05 5000 - Metal Fabrications; supplemental support framing.

C. Section 09 2400 - Cement Plastering

D. Section 07 9200 - Joint Sealants.

E. Divisions 23 and 26 for air outlets and inlets, light fixtures, and fire alarm.

1.4 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.

B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

C. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2017.

D. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.

F. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2018c.

G. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2017.

H. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.

I. CHPS (HPPD) - High Performance Products Database; Current Edition at www.chps.net/.

J. Ceilings and Interior Systems Construction Association (CISCA): Code of Practices.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate grid layout and related dimensioning and mechanical and electrical items installed in the ceiling.

C. Product Data: Provide data on acoustical units and suspension system components.

D. Samples: Submit two samples 6x 6 inch in size illustrating material and finish of acoustical units.

E. Samples: Submit two samples each, 12 inches long, of suspension system main runner, cross runner, and perimeter molding.

F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

G. Maintenance Materials: Furnish the following for Yonkers Public Schools's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Acoustical Units: Quantity equal to 5 percent of total installed.
   3. Label and store where directed by the YPS Office of Facilities Management including codes used on the Drawings. Do not deliver to the Project site until the YPS Office of Facilities Management is prepared to receive and store maintenance materials.

1.6 QUALITY ASSURANCE

A. All components for ceiling systems shall be from one manufacturer.

B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years documented experience.

C. Installers Qualifications: Company specializing in the installation of acoustical ceilings specified in this section with minimum 5 years documented experience.

D. Fire Performance: ASTM E84 surface burning characteristics. Flame Spread index 25 or less. Smoke development index 50 or less. (UL Labeled) Class A in accordance to ASTM E1264

E. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by YPS Office of Facilities Management and Fuller and D'Angelo, P.C..
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved byYPS Office of Facilities Management and Fuller and D'Angelo, P.C..
   3. Refinish mock-up area as required to produce acceptable work.

F. Pre-installation Conference: Conduct conference at Project site minimum one week before installation. Agenda shall include project conditions, coordination with work of other trades, and layout of items which penetrate ceilings.
   1. Attendance shall included YPS Office of Facilities Management, Fuller and D'Angelo, P.C., Contractor, and Manufacturer's Representative.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver in unopened bundles and store in a dry place with adequate air circulation. Do not deliver material to building until wet conditions such as concrete, plaster, paint, and adhesives have been completed and cured.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Protect system components from excessive moisture in shipment, storage, and handling

1.8 WARRANTY

A. Warranty: Provide manufacturer's standard warranty against manufacturing defects in material or workmanship when installed in accordance with the current CISCA Handbook and ASTM C367.
   1. Acoustical Panel Warranty Period: Thirty (30) years.
   2. Acoustical Clouds Period: Ten (10) years.

1.9 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acoustic Tiles/Panels:
   1. Armstrong World Industries, Inc: www.armstrong.com.

2. Substitutions: See Section 01 2500 - Substitution Procedures..

B. Suspension Systems:
1. Armstrong World Industries, Inc: www.armstrongceilings.com/#sle.
2. Substitutions: See Section 01 2500 - Substitution Procedures.

2.2 ACOUSTICAL UNITS

A. Acoustical Panels: Glass fiber with membrane-faced overlay, with the following characteristics:
1. Application(s): "Formations" Acoustical and Cloud Kits-Curves.
2. Classification: ASTM E1264 Type XII.
a. Form: 2.
b. Pattern: "E" - lightly textured.
3. Size: 24 by 24 inches.
4. Thickness: 3/4 inch.
5. Light Reflectance: 0.90 percent, determined in accordance with ASTM E1264.
6. NRC Range: 0.90 to 0.90, determined in accordance with ASTM E1264.
7. Articulation Class (AC): 180, determined in accordance with ASTM E1264.
8. Panel Edge: Square.
9. Optima Factory Cut Curved Panels: (Contractor Option)
a. See drawings for sizes and configurations
a) 6' Circle: Kit #3970.
b) 8' Circle Kit #3973
c) 10' Circle Kit #3974
10. Suspension System Type Prelude 15/16": Exposed.
11. Products:
a. Armstrong World Industries, Inc; Optima 3150-D: www.armstrongceilings.com/#sle.
b. Substitutions: See Section 01 6000 - Product Requirements.

2.3 SUSPENSION SYSTEM(S)

A. Manufacturers:
1. Armstrong World Industries, Inc; Product Prelude XL 15/16": www.armstrong.com.
2. Structural Classification: Intermediate duty, ASTM C 635.

B. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, and perimeter moldings as required.
1. Materials:
a. Steel Grid: ASTM A653/A653M, G30 coating, unless otherwise indicated.

C. Exposed Suspension System: Hot-dipped galvanized steel grid with aluminum cap.
1. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
2. Profile: Tee; 15/16 inch face width.
3. Finish: Baked enamel.
4. Color: White.

2.4 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.

B. Hanger Wire: 12-gage 0.08 inch galvanized steel wire.

C. Perimeter Moldings: Same metal and finish as grid.
1. Minimum 7/8" horizontal flange

D. Metal Edge Trim for "Cloud" Suspension Systems: Steel or extruded aluminum; provide attachment clips, splice plates, and preformed corner pieces for complete trim system.

1. See drawings for sizes and configurations
2. Trim Height: 6 inch.
3. Finish: Baked enamel.
4. Color: White.
5. Products:
   a. Armstrong World Industries, Inc; Axiom Vector; www.armstrongceilings.com..\

E. Acoustical Sealant For Perimeter Moldings: Specified in Section 07 9200 - Joint Sealants.

F. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

3.2 PREPARATION

A. Install after major above-ceiling work is complete.

B. Coordinate the location of hangers with other work.

C. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

3.3 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system and Formations Cloud suspension kits ASTM C636/C636M and manufacturer's instructions suspension system in accordance with manufacturer's instructions and as supplemented in this section.

B. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.

C. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

D. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

E. Do not eccentrically load system or induce rotation of runners.

3.4 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

E. Cutting Acoustical Units:
   1. Make field cut edges of same profile as factory edges.
   2. Cut curved tile with manufacturer's kits.

F. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.

G. Install seismic clips or stabilizer bars as per code requirements.

3.5 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.6 ADJUSTING AND CLEANING

A. Replace damaged or broken material, Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with mfg,, touch up procedures using touch up paint as required for small nicks and minor scratches in the surface, Remove and replace any work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

1. Provide touch up kit for Owner's use.

3.7 SCHEDULE

A. Refer to Finish Schedule.

END OF SECTION

SECTION 09 6500
RESILIENT FLOORING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Crack repair and surface preperation.

B. Resilient tile flooring.

C. Resilient base.

D. Resilient Transition Strips

E. Resilient stair accessories.

F. Installation accessories.

1.3 RELATED REQUIREMENTS

A. Section 02 2080 - Asbestos Removal and Disposal.

B. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

1.4 REFERENCE STANDARDS

A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2017.

B. ASTM F150 - Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring; 2006 (Reapproved 2018).

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2017.

E. ASTM F925: Standard Test Method for Resistance to Chemicals of Resilient Flooring.

F. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile; 2013a.

G. ASTM F1861 - Standard Specification for Resilient Wall Base; 2016.

H. ASTM F-1869 Test Method for Measuring Moisture Vapor Emissions in Concrete.

I. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs.

J. ASTM F2420 - Standard Test Method for Determining Relative Humidity on the Surface of Concrete

K. CAL (CHPS LEM) - Low-Emitting Materials Product List; California Collaborative for High Performance Schools (CHPS); current edition at www.chps.net/.

L. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2015.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Verification Samples: Submit two samples, 12" x 12" in size illustrating color and pattern for each resilient flooring product specified.

D. Sustainable Design Submittal: Submit VOC content documentation for flooring and adhesives.

E. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.

F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

G. MSDS (Material Safety Data Sheets) should be submitted for all adhesives used:
1. Membrane, primer, patch, leveler, heat weld rod, cold weld, liquid wax and cleaning agents

H. Maintenance Materials: Furnish the following for1 's use in maintenance of project.
1. See Section 01 6000 - Product Requirements, for additional provisions.
2. Extra Materials: Furnish one box of tile for each fifty boxes or fraction thereof, for each type, color, pattern and size of the tile installed, from same manufactured lot as materials installed.
a. Deliver extra tile to Owner after completion of work.
b. Furnish tiles in protective packaging with identifying labels.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum 10 years documented experience, with resilient flooring of types equivalent to those specified.

B. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.

B. Store all materials off of the floor in an acclimatized, weather-tight space.

C. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions

1.8 MOCK UP

A. Field Samples per Section 001 4000 - Quality Requirements. Provide field samples, dry laid, to demonstrate aesthetic effects of materials in place.

1.9 FIELD CONDITIONS

A. Store materials for not less than 48 hours before, during, and 72 hours after installation, in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.10 PRE-INSTALLATION TESTING

A. Conduct pre-installation testing as follows:
1. ASTM F-1869 Test Method for Measuring Moisture Vapor Emissions in Concrete Maximum: 3 lbs/1000 SF
2. ASTM F-2170 Test Method for Determining Relative Humidity in Concrete: Maximum RH: 55%.

1.11 WARRANTY

A. Provide manufacturer's non-prorated ten (10) year limited warranty to be free from defects in material and workmanship, under normal use and service, to repair or replace all defective tiles including reasonable labor.

PART 2 PRODUCTS

2.1 TILE FLOORING

A. Enhanced Resilient Tile Type ERT-1:
1. Manufacturers:
a. C0089, Lineate, Hot and Heavy Collection LVT as manufactured by Mohawk Group; 800.554.6637.

b. Substitutions: 01 2500 - Substitution Procedures.

2. Construction: Commercial Grade Enhanced Resilient Tile.
3. Classification: ASTM F1700 - Class III, Type A - Smooth, Type B - Embossed
4. Squareness: ASTM F2421 - Passes - ±0.10" max
5. Size and Tolerance: ASTM F2055 - Passes - ±0.016 in. per linear foot
6. Thickness: ASTM F386 - Passes - as specified ±0.005"
7. Flexibility: AASTM F137 - Passes - ≤1" mandrel
8. Dimensional Stability: ASTM F2199 - Passes - 0.020"/linear foot max
9. Static Load: ASTM F970 - Passes, modified - 1000 psi
10. Residual Indentation: ASTM F1914 - Passes - Average less than 8%,
11. maximum single reading 10%
12. Resistance To Chemicals: ASTM F925 - Passes - No more than a slight change.
13. Resistance To Light: ASTM F1515 - Passes - $\Delta E < 8$
14. Resistance To Heat: ASTM F1514 - Passes - $\Delta E < 8$
15. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648.
16. Smoke Density: ASTM E662 Part A - Less than 450.
17. Size: 9 by 59 inches.
18. Overall Thickness: 5 mm
19. VOC Content Limits: As specified in Section 01 6116.
20. Thickness: 0.125 inch.
21. Color: As noted on drawings.

B. Installation Method: Full Spread.

C. Adhesive: M95.0 Resilient Flooring Adhesive, M99 Resilient Flooring Adhesive, or M700 Adhesive.

D. Feature Strips: Of same material as tile, 1 inch wide.

2.2 RESILIENT BASE AND TRANSITION STRIPS

A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove, and Style A straight for carpet installation as follows:

1. Manufacturers:
   a. Johnsonite, a Tarkett Company: www.johnsonite.com.
   b. Substitutions: See Section 01 2500 - Substitution Procedures.
2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
3. Height: 4 inch.
4. Thickness: 0.125 inch.
5. Finish: Matte
6. Length: 4 foot sections.
7. Color: Solid color as indicated on drawings.
8. Accessories: Premolded external corners and internal corners.

B. Transition Strip: Homogenious PVC Composition

1. Manufacturers:
   a. Johnsonite, a Tarkett Company; CTA-XX-J: www.johnsonite.com.
   b. Substitutions: See Section 01 2500 - Substitution Procedures.
2. Hardness : Minimum 85 Shore A in accordance with ASTM D2240
3. Abrasion Resistance: 0,22 mg/cycle; ASTM D 3389
4. Thickness: 0.125 inch.
5. Finish: Matte

6. Length: 12 ft..
7. Color: To be selected by Fuller and D'Angelo, P.C. from manufacturer's full range.

2.3 ACCESSORIES

A. Subfloor Crack and Joint Repair: Two-part polyurethane repair compound .
   1. 100% solids for no shrinkage
   2. Service temperature range of -35° to 110°F (-37° to 43°C),
   3. Product:"Ardex ArdiFix", Ardex Engineered Cements, 400 Ardex Park Drive, Aliquippa, PA 15001 USA, Tel: 724-203-5000

B. Self-Drying, Cement-Based Finish Underlayment
   1. Trowelable leveling compounds: Portland-cement-based formulation provided or approved by resilient flooring manufacturer for water-soluble adhesives on concrete.
   2. Product: "Ardex Feather Finish®", Ardex Engineered Cements, 400 Ardex Park Drive, Aliquippa, PA 15001 USA, Tel: 724-203-5000.

C. Adhesive for Vinyl Tile Flooring:
   1. Adhesive shall be as recommended by the manufacturer, compatible with tile and substrate.
      a. Note that recommendations shall be made which reflect and are compatible with the results of moisture level tests in the concrete substrate.

D. Adhesive for Transition Strip:
   1. Premium Contact Adhesive
   2. Manufacturer: Tarkett USA, Inc. ; Premium Contact Adhesive 946

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
   1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

D. Moisture Testing: Moisture testing shall be performed using ASTM test method ASTM F 2170 in situ Relative Humidity Test. The acceptable test result when using test method F 2170 should not exceed seventy five per cent (75%) AND pH readings should not exceed 9.0.

E. Verify that existing concrete sub floor do not containing curing compound by placing 1/4 cup of water on surface. If water beads up scarify surface.

F. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

B. Concrete substrate that fully conforms to the requirements of ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring is required, or as detailed in the manufacturer's Installation Guide.

C. Crack and Joint Repair: Concrete must be structurally sound, solid, dry, and free of laitance, dirt, debris, coatings, sealers, solvent base adhesives and any contaminant that may act as a bond breaker.
   1. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface up to 1/2".
   2. Dry diamond blade may be used to prepare cracks and create a clean surface for bonding.

3. Do not use sweeping compounds, solvents or acid etching to prepare the surface.
4. Cracks or joints should be free of dust, dirt, oils and any other debris.
5. New concrete should be fully cured and free of movement.
6. Prohibit traffic until filler is fully cured.

D. Underlayment: All concrete substrates must be solid, thoroughly clean and free of oil, wax, grease, asphalt, latex and gypsum compounds, curing compounds, sealers and any contaminant that might act as a bond breaker.
1. **Mechanically profile with grinder 100% of all existing substrates receiving resilient flooring. Provide dust control as required.**
a. After profiling test substrate by place drop of water, or other means to insure all coatings, sealers etc have been removed. Repeat profiling if necessary.

E. Provide leveling compound over 100% of all existing substrates receiving resilient flooring .

3.3 INSTALLATION GENERAL

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Crack and Joint Repair: During set-up of cartridge (purging air and balancing) and initial dispensing of material, keep cartridge and nozzle assembly pointed straight up to prevent material in the nozzle from flowing back into the cartridge.
1. Apply continuously once opened to prevent the tip from becoming clogged.
2. Immediately broadcast clean sand size #30 or #35 into the freshly applied material.
3. Fill the crack, joint or repair area so the material is slightly higher than the face of the concrete slab.
4. Allow to set for approximately 10 to 15 minutes (at 75° F), and then use a sharp razor scraper to shave excess material from the top of the slab.

D. Underlayment: Installed from a true featheredge up to 1/2 in. (12.7 mm).
1. Verify crack/joint repair has dried thoroughly.
2. Use the least amount possible to attain the desired smoothness.
3. Allow to dry in accordance to manufacturer's recommendations.

Adhesive-Applied Installation:
1. Spread only enough adhesive to permit installation of materials before initial set as recommended by the manufacturer.
2. Fit joints and butt seams tightly.
3. Set flooring in place, press with heavy roller to attain full adhesion.

E. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

F. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
1. Resilient Strips: Attach to substrate using contact adhesive specified. Apply adhesive to both transition strip and substrate at rate in accordance with manufacturer's recommendations. Allow to dry in accordance with manufacturer's installation instructions. Apply to substrate and roll with hand roller.

G. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

H. Install flooring in recessed floor access covers, maintaining floor pattern.

I. Install feature strips where indicated.

J. Do not mix manufacturing batches of a color within the same area.

K. Do not install resilient flooring over building expansion joints.

L. Do not install defective or damaged resilient flooring.

M. Layout resilient flooring to provide equal size at perimeter. Adjust layout as necessary to reduce the amount of resilient flooring which is cut to less than half full width.

N. Install resilient flooring without voids at seams. Lay seams together without stress.

O. Remove excess adhesive immediately

3.4 INSTALLATION TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

B. Lay flooring with joints and seams aisle to building lines to produce symmetrical pattern.

C. Install plank tile with a random offset of at least 6 inches from adjacent rows.

3.5 INSTALLATION RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

3.6 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

C. Cleaning of Vinyl Composition Tile

1. Sweep or dust mop to remove dirt and grit. Do not use treated dust mops.

3.7 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation and 72 hours heavy rolling loads.

3.8 SCHEDULE

A. Refer to Finish Schedule on drawings.

END OF SECTION

SECTION 09 7700
PLASTIC WALL SURFACES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Pre-manufactured panel system including mounting hardware and specified accessories and trim.

1.3 RELATED SECTIONS

A. Section 06100 - Rough Carpentry; furring, blocking, and other carpentry work that is not exposed to view.

B. Section 06 2000 - Finish Carpentry: plastic stage front doors and panels.

C. Section 09 2116 - Gypsum Board Assemblies; for metal support systems not included in this section.

1.4 REFERENCES

A. American Society for Testing and Materials (ASTM) E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1. Class 1/A - Flame Spread 0-25, Smoke Developed 450 or less.

B. Architectural Woodwork Institute (AWI) Quality Standards.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 3000 - Administrative Requirements.

B. Product Data: Manufacturer's on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Shop drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with adjacent work.

D. Selection Samples: For each finish product specified, one complete set of color samples representing manufacturer's standard range of available colors and patterns.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Firm with a minumum three (3) years experienced in successful production of wall systems similar to that indicated for the Project, with sufficient production capacity to produce required units without causing delay in the work.
2. Provide certificate signed by panel manufacturer certifying that products comply with specified requirements.

B. Installer Qualifications: Demonstrate five (5) years successful experience in installing architectural woodwork similar in type and quality to those required for this project.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver wall system until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate wall system have been completed in installation areas as specified by AWI 1700-G-3.

B. If panels are stored prior to installation, store them flat in completely enclosed areas, out of the weather. If panels must be stored in other than installation areas, store only in areas where environmental conditions comply with manufacturers recommendations. Do not expose panels to continuous direct sunlight, nor to

extremes in temperature and humidity. Store products in manufacturer's packaging until ready for installation.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with direction of YPS Office of Facilities Management.

1.8 PROJECT CONDITIONS

A. Do not deliver or install wall system until building is enclosed, wet work is complete and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period as specified by AWI 1700-G-3.

B. Do not install wall system until normal lighting conditions exist. Normal lighting conditions are described as those in place when the project is finished. This includes, but not limited to, design lighting (wall washers, spot lights and flood lights, and similar fixtures) and natural lighting.

C. Wall, ceilings, floors, and openings must be level, plumb, straight, in-line and square as specified by AWI 1700-G-3.

D. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer. Do not install products under environmental conditions outside manufacturer's absolute limits. Panels shall be conditioned in the environment in which they will be installed for a minimum of 72 hours prior to installation. The recommended environment is 75 degrees F (24 degrees C) and 45 percent relative humidity.

E. Environmental Conditions: Comply with Woodwork Manufacturer's recommendations for optimum temperature and humidity conditions for woodwork during its storage and installation. Do not install woodwork until these conditions have been attained and stabilized so that woodwork is within plus or minus 1.0 percent of optimum moisture content from date of installation through remainder of construction period.

1.9 WARRANTY

A. Manufacturer warrants any product it has manufactured and sold against defects in materials or workmanship for a period of five years from the date of original purchase and acceptance for use. This warranty extends to products assembled / installed and used in the manner intended and does not cover damage or failure caused by: misuse, abuse or accidents, exposure to extreme temperature, improper installation, improper maintenance and exposure to water or excessive humidity or excessive moisture.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Panel Specialists, Inc.; 3115 Range Rd., Temple, TX 76504. ASD. Toll Free Tel: (800) 947-9422. Tel: (254) 774-9800. Fax: (254) 774-7222. Email: psiwalls@panelspec.com. Web: <http://www.panelspec.com>

B. Substitutions: Referr to 01 2500 - Substitution Procedures.

2.2 PANEL SYSTEMS

A. Provide prefinished decorative panels where shown on the drawings, as specified herein, and as needed for a complete and proper installation.

B. Comply with applicable requirements of "Architectural Woodwork Quality Standards" in the production and installation of the wall panel system as published by the Architectural Woodwork Institute (AWl) unless otherwise indicated.

C. Panel System: #312 as manufactured by Panel Specialists, Inc. A progressive panel system with an exposed ½ inch (12mm) recessed horizontal channel reveal and a 1/2 inch (12mm) vertical divider molding creating a horizontal and vertical reveal between edge banded panels. Recommended for vertical and horizontal interior installations. Maximum panel length for horizontal installations is 96 inches (2438 mm).

1. Panel Thickness: 7/16 inches (11.1 mm).

2. Horizontal Reveal: System to provide a recessed channel reveal of ½ inch (12mm) between panels.
3. Vertical Reveal: System to provide a 1/2" (12mm) reveal between panels.
4. Panel Finish: Refer to Finish Schedule on drawings.
5. Main Laminated Panel Fire Rating:
   a. Fire Rating: ASTM E84, Class A.
6. Panel Dimensions: Refer to drawings.
7. Molding: All moldings to be .062" thick (at structural areas) 6063 alloy aluminum with T5 temper.
   a. Refer to drawings for all molding types.
   b. ½" Wide Edge Trims & 1" Corners (Choose)
      a) #304 ½" Edge Trim Molding
         (a) #304A ½" Edge Trim Molding (2-piece)
         (b) #103-90 90° Outside Corner Molding (1" Rounded)
         (c) #103-135 135°Outside Corner Molding
         (d) #304-90 End Cap for top and bottom of 90° outside corner
         (e) #304-135 End Cap for top and bottom of 135° outside corner
8. Finishes:
   a. Panel Face:
      a) Refer to drawings for all types.
      b) 1. Finish #1: Plastic Laminate
   b. Panel Face Pattern Direction:
      a) 1. Horizontal
   c. Aluminum Molding Finish:
      a) 1. Clear Anodize

2.3 MATERIALS

A. High Pressure Decorative Laminates (VGS,VGP,VGF & HGS) and non-decorative backers (BKV) used to surface wall panels systems shall be manufactured to meet or exceed the National Electrical Manufacturing Association (NEMA LD3-2005) for thickness, performance properties and appearance.

B. Particleboard: 45# density shall be used in Class III panel composition. Fire-rated particle board shall be used for Class I and Class II panel compositions (refer to AWI Section 200)

C. Bulletin Board:
   1. Linoleum resilient homogeneous tackable surface material shall be of natural materials consisting linseed oil, granulated cork, resin binders and dry pigments, mixed and bonded to a natural jute backing.
   2. Linoleum as scheduled in the Room Finish Schedule or as indicated on the drawings.
   3. Resilient tackable panel from manufacturer's standard line.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared according to AWI 1700-G-3.

B. If substrate preparation is the responsibility of another installer, notify YPS Office of Facilities Management of unsatisfactory preparation before proceeding.

3.2 FIELD DIMENSIONS

A. Where wall system is indicated to be fitted to other construction, check actual dimensions of other constructions by accurate field measurements before manufacturing wall system; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of work.

B. Where field measurements cannot be made without delaying the work, guarantee dimensions and proceed with manufacture of wall system without field measurements coordinate other construction to ensure that actual dimensions correspond to guaranteed dimensions.

3.3 PREPARATION

A. Panels must be acclimated to ambient temperature and humidity conditions in accordance with manufacturer's specifications prior to installation. Refer to PSI installation guide for proper, handling, storage and acclimation procedures.

B. Clean surfaces thoroughly prior to installation.

C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

D. Prepare existing wall by removing all items. Grind and projections on wall to provide substrate within specified tolerances.

3.4 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Field cutting of all wall systems should be accomplished using carbide tools. All face penetrations and cutouts should have a minimal 1/8 inch (3 mm) radius in corners according to NEMA Standards Publication LD 3-2005.

C. All wall systems should receive an "S" bead of panel mastic on the back of the panel during installation.

D. Fasten all trim pieces and supports to existing concrete block with appropriate fasteners, Tapcon or similar.

E. For vertical applications, wall systems shall be mechanically fastened to horizontal metal furring strapping spaced 24 inches (610 mm) O.C. Furring straps shall be no less than 18-ga 3-1/2 inches (89 mm) wide, continuously. Metal strapping to be installed to the drywall studs prior to the application of the gypsum board by the framing contractor.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 09 9113
EXTERIOR PAINTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish exterior surfaces exposed to view, and unless otherwise indicated.
   1. Stair nosing.

1.3 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 03 0100 - Maintenance of Concrete for exposed concrete surfaces.

C. Section 09 9123 - Interior Painting.

1.4 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

1.5 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.

C. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2017).

D. ASTM D4259 - Standard Practice for Abrading Concrete; 1988 (Reapproved 2012).

E. SSPC-SP 2 - Hand Tool Cleaning; 1982, with Editorial Revision (2004).

F. SSPC-SP 3 - Power Tool Cleaning; 1982, with Editorial Revision (2004).

G. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "epoxy").
   2. Manufacturer's installation instructions.

C. Samples: Submit two paper chip samples, 8-1/2 x 11 inch in size illustrating range of colors and textures available for each surface finishing product scheduled.

D. Manufacturer's Instructions: Indicate special surface preparation procedures.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum five (5) years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years experience.

1.8 MOCK-UP

A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.

B. Provide stair nosing with grit surface.

C. Locate where directed by Owner's Representative.

D. Mock-up may remain as part of the work.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.10 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

PART 2 PRODUCTS

2.1 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.

B. Volatile Organic Compound (VOC) Content: Comply with Section 01 6116.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Colors: To be selected from manufacturer's full range of available colors.

1. Selection to be made by Architect after award of contract.

2.2 PAINT SYSTEMS - EXTERIOR

A. Stair Nosing: High Build Epoxy: Spreading rate recommended by manufacturer to achieve a dry film thickness, two coats 5.0 to 10.0 mils.

1. Sherwin Williams Macropoxy 646-100 Fast Cure Epoxy

2.3 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

D. Test shop-applied primer for compatibility with subsequent cover materials.

3.2 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or repair existing paints or finishes that exhibit surface defects.

D. Concrete:

1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
2. Prepare surface as recommended by top coat manufacturer and according to ASTM D4259.

E. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

3.3 APPLICATION

A. Apply products in accordance with manufacturer's written instructions.

B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

3.5 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.6 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 09 9123
INTERIOR PAINTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
   1. Steel doors and frames
   2. Plaster
   3. Concrete masonry units (CMU).
   4. Concrete floors.
   5. Wood Stage floor
   6. Gypsum Board/Plaster walls, soffits, and ceilings.
   7. Exposed surfaces of steel lintels

D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
   5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, and lead items.
   6. Marble, granite, slate, and other natural stones.
   7. Floors, unless specifically indicated.
   8. Ceramic and other tiles.
   9. Brick, architectural concrete.
   10. Glass.
   11. Acoustical materials, unless specifically indicated.
   12. Concealed pipes, ducts, and conduits.

1.3 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 04 2000 - Unit Masonry.

C. Section 05 5000 - Metal Fabrications: Shop-primed items.

D. Section 08 1113 - Hollow Metal Doors and Frames.

E. Section 09 2116 - Gypsum Board Assemblies.

F. Section 09 2400 - Cement Plastering.

G. Section 09 9300 - Staining and Transparent Finishing: Stage wood stairs and trim.

1.4 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

1.5 REFERENCE STANDARDS

A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.

B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2017).

C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2016.

D. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.

E. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).

F. SSPC-SP 2 - Hand Tool Cleaning; 1982, with Editorial Revision (2004).

G. SSPC-SP 3 - Power Tool Cleaning; 1982, with Editorial Revision (2004).

H. SSPC-SP 13 - Surface Preparation of Concrete; 1997 (Reaffirmed 2003).

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
   4. Manufacturer's installation instructions.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
   2. Where sheen is not specified, discuss sheen options with Fuller and D'Angelo, P.C. before preparing samples, to eliminate sheens definitely not required.

D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

E. Manufacturer's Instructions: Indicate special surface preparation procedures.

F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

G. Maintenance Materials: Furnish the following for YPS Office of Facilities Management's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
   3. Label each container with color in addition to the manufacturer's label.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum 10 years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3 years experience.

1.8 MOCK-UP

A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.

B. Provide door and frame assembly illustrating paint color, texture, and finish.

C. Locate Where directed by the [].

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.10 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.

D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
   1. Substitutions: Refer to Section 01 2500 - Substitution Procedures..

B. Paints:
   1. Base Manufacturer: Sherwin-Williams Company: www.sherwin-williams.com.
   2. Primer Sealers: Same manufacturer as top coats.

C. Substitutions: 01 2500 - Substitution Procedures..

2.2 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
   4. Supply each paint material in quantity required to complete entire project's work from a single production run.
   5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content: Comply with Section 01 6116.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Fuller and D'Angelo, P.C. from the manufacturer's full line.

E. Colors: As indicated in Finish Schedule.

2.3 PAINT SYSTEMS - INTERIOR

A. Concrete/Masonry, Opaque, Latex, Three coats: (New surfaces)
   1. Block Filler: One Coat Spreading rate recommended by manufacturer to achieve a dry film thickness of 16 mils wet; 7.7 mils dry
      a. Sherwin Williams Super PrepRite Block FillerCraft No. 285.
   2. Topcoat:Two Coats latex enamel spreading rate recommended by manufacturer to achieve a dry film thickness of 4 mils wet; 1.3 mils dry.
      a. Sherwin Williams ProMar 400 Zero VOC Semi-Gloss

B. Concrete/Masonry, Opaque, Latex, 2 coat: (Existing surfaces)
   1. Latex Primer Sealer: One Coat latex enamel spreading rate recommended by manufacturer to achieve a dry film thickness of 4 mils wet; 1.3 mils dry..
      a. Sherwin Williams Multi-Purpose Interior Exterior Latex Primer EW
   2. Topcoat: Semi-gloss: One coat of latex enamel.
      a. Sherwin Williams ProMar 400 Zero VOC Semi-Gloss

C. Ferrous metals, Not Primed, Acrylic Latex, 3 coat:
   1. One Coat latex primer spreading rate recommended by manufacturer to achieve a dry film thickness of 3.0 to 5.6 mils.
      a. Sherwin Williams Direct-to-Metal Semi-Gloss.
   2. Topcoat: Three coats Acrylic Latex
      a. Sherwin Williams ProMar 400 Zero VOC Semi-Gloss

D. Ferrous metals, Primed, Acrylic Latex, 2 coat:
   1. Touch up with latex primer.
   2. Two Coats Acrylic Latex spreading rate recommended by manufacturer to achieve a dry film thickness of 4 mils wet; 1.3 nils dry to 5.6 mils:
      a. Sherwin Williams ProMar 400 Zero VOC Semi-Gloss

E. Aluminum and Galvanized Metals, Not Primed, Acrylic Latex, 3 coat:
   1. One Coat latex primer spreading rate recommended by manufacturer to achieve a film thickness of 5.0 to 10 mils wet; 1.8.to 3.6 mils dry..
      a. Sherwin Williams Pro-Cryl Universal Primer
   2. Two Coats Acrylic Latex spreading rate recommended by manufacturer to achieve a dry film thickness of 4 mils wet; 1.3 nils dry to 5.6 mils:
      a. Sherwin Williams ProMar 400 Zero VOC Semi-Gloss

F. Gypsum Board/Plaster, Latex, 3 coat: (New Surfaces)
   1. One Coat latex primer spreading rate recommended by manufacturer to achieve a dry film thickness of 4 mils wet and 1.3 mils dry.
      a. Sherwin Williams QUICK DRY Interior Exterior Stain Blocking Primer Latex
   2. Topcoat: Two Coats of Acrylic Latex spreading rate recommended by manufacturer to achieve a dry film thickness of 4 mils wet; 1.3 nils dry to 5.6 mils
      a. Sherwin Williams ProMar 400 Zero VOC Semi-Gloss

G. Gypsum Board/Plaster, Latex, 2 coat: (Existing Surfaces)
   1. One Coat latex primer spreading rate recommended by manufacturer to achieve a dry film thickness of 4 mils wet and 1.1 mils dry..
      a. Sherwin Williams QUICK DRY Interior Exterior Stain Blocking Primer Latex
   2. Topcoat: One Coat of Latex spreading rate recommended by manufacturer to achieve a dry film thickness of 4 mils wet; 1.3 nils dry to 5.6 mils
      a. Sherwin Williams ProMar 400 Zero VOC Semi-Gloss

H. Concrete Floor Surface, Urethane modified alkyd resin, Two coat (Existing surfaces)
   1. One Coat latex primer spreading rate recommended by manufacturer to achieve a dry film thickness of 5-8 mils wet and 2.1-3.2 mils dry.
      a. Sherwin Williams QUICK DRY Interior Exterior Stain Blocking Primer Latex
   2. High Gloss: One coat Alkyd Enamel spreading rate recommended by manufacturer to achieve a dry film thickness of 2.0 to 4.0 mils.
      a. Sherwin Williams Pro Industrial Urethane Alkyd Enamel

I. Wood Floor Surface, Urethane modified alkyd resin, Two coat
   1. Satin: Two coat Alkyd Enamel spreading rate recommended by manufacturer to achieve a dry film thickness of 2.0 to 4.0 mils.
      a. Sherwin Williams Pro Industrial Urethane Alkyd Enamel

2.4 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

D. If substrate preparation is the responsibility of another installer, notify Fuller and D'Angelo, P.C. of unsatisfactory preparation before proceeding.

E. Test shop-applied primer for compatibility with subsequent cover materials.

F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Plaster and Stucco: 12 percent.
   2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
   3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
   4. Concrete Floors and Traffic Surfaces: 8 percent.

3.2 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
   1. Prior to removing mildew, test any cleaner on a small, inconspicuous area prior to use.
   2. Bleach and bleaching type cleaners may damage or discolor existing paint films. Alternative cleaning solutions may be required
   3. Wear protective eye wear, waterproof gloves, and protective clothing.

F. Concrete:
   1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

2. Clean concrete according to ASTM D4258. Allow to dry.
3. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.

G. Masonry:
1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
2. Prepare surface as recommended by top coat manufacturer.

H. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

I.

J. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

K. Galvanized Surfaces:
1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

L. Ferrous Metal:
1. Solvent clean according to SSPC-SP 1.
2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and SSPC-SP 3. Protect from corrosion until coated.

M. Cleaning Existing Walls: Remove all loose paint, plaster and other coatings.
1. Working from bottom to top, apply prepared cleaning solution to a dry surface.
2. Leave solution on the surface for 5-20 minutes. If solution begins to dry, reapply.
3. Gently scrub heavily soiled areas.
4. Rinse thoroughly with clean water with by masonry washing equipment generating 400-1000 psi with a water flow rate of 6-8 gallons per minute delivered through a 15-45 degree fan spray tip.
5. Apply after wash. Let the Afterwash stay on the surface for three to five minutes.
6. Pressure rinse from the bottom of the treated area to the top.

N. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.3 APPLICATION

A. Apply products in accordance with manufacturer's written instructions.

B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

D. Sand metal surfaces lightly between coats to achieve required finish.

E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

3.5 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.6 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 09 9300
STAINING AND TRANSPARENT FINISHING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Surface preparation.

B. Field application of stains and transparent finishes.

1.3 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 09 9123 - Interior Painting: Stains and transparent finishes for concrete substrates.

1.4 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.

C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2016.

D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category.
   2. MPI product number (e.g. MPI #33).
   3. Manufacturer's installation instructions.

C. Samples: Submit two samples, illustrating selected colors and sheens for each system with specified coats cascaded. Submit on actual wood substrate to be finished, 18 x 18 inch in size.

D. Certification: By manufacturer that stains and transparent finishes comply with VOC limits specified.

E. Manufacturer's Instructions: Indicate special surface preparation procedures.

F. Maintenance Materials: Furnish the following for Yonkers Public Schools's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Stain and Transparent Finish Materials: 1 gallon of each color and type; from the same product run, store where directed.
   3. Label each container with color and type in addition to the manufacturer's label.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum ten (10) years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five (5) years experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of stain or transparent finish, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Stain and Transparent Finish Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.8 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by manufacturer of stains and transparent finishes.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply materials when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.

D. Minimum Application Temperature: 50 degrees F unless required otherwise by manufacturer's instructions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide finishes used in any individual system from the same manufacturer; no exceptions.

B. Transparent Finishes:
1. PPG Paints Deft Interior Clears/Polyurethanes: www.ppgpaints.com.
2. Sherwin-Williams Company: www.sherwin-williams.com.

C. Stains:
1. PPG Paints Deft Interior Stains: www.ppgpaints.com.
2. Sherwin-Williams Company: www.sherwin-williams.com.

D. Substitutions: .See Section 01 2500 Substitution Procedures

2.2 STAINS AND TRANSPARENT FINISHES GENERAL

A. Finishes:
1. Provide finishes capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
3. Supply each finish material in quantity required to complete entire project's work from a single production run.
4. Do not reduce, thin, or dilute finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content: Comply with Section 01 6116.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Fuller and D'Angelo, P.C. .

E. Colors: Color to match Plastic Laminiate Wall Panel. See finish schedule.

2.3 INTERIOR STAIN AND TRANSPARENT FINISH SYSTEMS

A. Finish on Wood - Trim:
1. Three (3) coat(s) varnish over One (1) coat(s) stain.

2. Stain: Semi-Transparent Stain for Wood, Water Based; MPI #186.
   a. Products:
      a) PPG Paints Deft Interior Water-Based Wood Stain, DFT300 Series. (MPI #186)
      b) Substitutions: See Section 01 2500 Substitution Procedures
3. Top Coat(s): Polyurethane Varnish, Oil Modified.
   a. Products:
      a) PPG Paints Deft Interior Polyurethane Oil-Based Satin 350, DFT129.

2.4 ACCESSORY MATERIALS

A. Accessory Materials: Cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of finished surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

3.2 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

3.3 APPLICATION

A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

D. Sand wood surfaces lightly between coats to achieve required finish.

E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

F. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

3.5 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.6 PROTECTION

A. Protect finishes until completion of project.

END OF SECTION

SECTION 10 1200
DISPLAY CASES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 RELATED REQUIREMENTS

A. Section 09 2116 - Gypsum Board Assemblies: Concealed supports in metal stud walls.

B. Section 10 1100 - Visual Display Units.

C. Division 26 Sections for wiring and other electrical work associated with illuminated display cases.

1.3 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).

B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.

D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit complete printed data and installation details indicating products to be provided as specified.

C. Shop Drawings: Submit complete installation details. Include dimensioned elevations. Provide dimensioned elevations for each type of display case and bulletin board required; include large-scale sections of typical members and other components. Show anchors, grounds, reinforcement and layout, and indicate finishes.

1. Include setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as a unit of Work in other Sections
2. Show location of tack assembly seams and joints.
3. Wiring Diagrams: Power, signal, and control wiring for illuminated units.

D. Samples: Submit samples of material and trim to illustrate finish, color, and texture including message strips, letters, and other graphics, as required, and for verification of compliance with requirements indicated.

1. Aluminum Trim and Accessories: Samples of each finish type and color, on 6-inch-long sections of extrusions and not less than 4-inch squares of sheet or plate, showing the full range of colors available.

E. Certificates: In lieu of laboratory test reports, when permitted by the Architect, submit the manufacturer's certification that vinyl-fabric-faced cork tackboard materials furnished comply with requirements specified for flame spread ratings.

F. Maintenance Data: For tack assemblies to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.

B. Installer Qualifications: Company with at least three years of experience in the installation of display units.

C. Conform to applicable code for flame/smoke rating in accordance with ASTM E84.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver display cases and materials to the Project site with manufacturer's protective crate covering and do not open until ready for use.

B. Protect display cases before, during, and after installation. In case of damage, immediately provide necessary repairs and replacements.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify field measurements for recessed application for display cases before preparation of shop drawings and before fabrication to ensure proper installation.

1.8 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Claridge Products and Equipment, Inc; 370 Series: www.claridgeproducts.com/#sle.

B. Substitutions: See Section 01 2500 Substitution Procedures.

2.2 DISPLAY CASES

A. Recessed Display Case: Factory-fabricated wood-framed display case with adjustable glass shelves, finished interior, and aluminum trim on face to cover edge of recessed opening.
   1. Width: 6 feet.
   2. Height: 4 feet.
   3. Depth: 12 inches.
   4. Components:
      a. Glazed Doors: Sliding.
         a) Number of Doors: Two pair.
      b. Side Panels: Stained veneer plywood.
      c. Back Panel: Tackable.
      d. Top Panel: Stained veneer plywood.
      e. Bottom Panel: Stained veneer plywood.
      f. Lighting: LED.

2.3 COMPONENTS

A. Wood Case Construction: 3/4 inch 7-ply maple veneer plywood with manufacturer's standard stain.

B. Aluminum Framed Case Construction: 1-1/2 inch by 2 inch extruded aluminum tube frame with tempered glass infill panels.

C. Face Frame Trim for Recessed Installation: 2 inch flat face dimension extruded aluminum trim mitered with corner clips and mechanical fasteners.

D. Glazed Sliding Doors:
   1. 1/4 inch clear tempered glass with plastic finger pulls.
   2. Door track: Extruded aluminum glass shoe with bottom rollers and top plastic guide.
   3. Lock: Glass door cylinder lock.

E. Glass Shelves:
   1. 1/4 inch clear tempered glass with flat-polished edges.
   2. Shelf Depth: 8 inches.
   3. Shelves per Unit: Two.

F. Shelf Standards and Brackets: Single-slotted channel standards for brackets adjustable in 1 inch increments along entire length of standard, drilled and countersunk for screws.
   1. Standards Mounting: Recess-mounted into back panel.
   2. Face Width: 5/8 inch.
   3. Material: 16 gage, 0.0598 inch sheet steel.
   4. Finish: Anochrome.

G. Tackable Back Panel: Fabric laminated to cork on hardboard.
   1. Cork Thickness: 1/8 inch.
   2. Fabric: Vinyl fabric; minimum fabric weight: 13 oz/sq yd.
   3. Color, Texture, Weave, and Pattern: As selected from manufacturer's full range.
   4. Backing: Hardboard, 1/4 inch thick, factory laminated to tack surface.
   5. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.

2.4 MATERIALS

A. Aluminum Extrusions for Framing and Trim: Alloy as recommended by manufacturer for construction and specified finish; nominal 1/8 inch wall thickness.

B. Aluminum Extrusions: ASTM B221 (ASTM B221M), 6063 alloy, T5 temper.

C. Plywood: Softwood plywood with veneer core, waterproof glue, 3/4 inch thick.

PART 3 EXECUTION

3.1 INSTALLATION

A. Provide factory trained installers.

B. Locate fastening devices to secure cases securely to back and sides of rough opening.

C. Refer to drawings for display case mounting heights.

D. Clean case and glass using manufacturers recommended procedures.

E. Provide mitered and wrapped hairline joints for all trims.

3.2 ADJUSTING AND CLEANING

A. Verify that all accessories are installed as detailed for each unit.

B. At completion of work, clean glass surfaces, back panels and trim in accordance with manufacturer’s recommendations leaving units ready for use.

3.3 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

END OF SECTION

SECTION 10 1400
SIGNAGE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Room and Corridor Door signs.

1.3 RELATED REQUIREMENTS

A. Section 01 5000 - Temporary Facilities and Controls for temporary Project identification signs and for temporary information and directional signs

1.4 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

C. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Store tape adhesive at normal room temperature.

1.8 WARRANTY

PART 2 PRODUCTS

2.1 PANEL SIGN

A. Manufacturers
   1. Flat Signs:
      a. Crown Signs, 4 Executive Plaza, Yonkers, NY 10701; (914) 375-2118.
   2. Substitutions: Section 01 2500 Substitution Procedures.

B. Manufacturer’s standard monolithic tactile plaque constructed utilizing a thermoforming process, which provides a fully homogeneous plaque sign. The sign body, face, raised text and Braille are compression molded to form a single dimensional component that results in a sign surface that exhibits a toughness that resists scratching, cracking, gouging and graffiti.
   1. Sign Thickness: 1/8 inch (3mm).
   2. Lettering/ Tactile Characters/Symbols: Integral Raised 1/32 inch (1 mm) from sign plate face

3. Color of Background: As selected from manufacturer's standard background colors to match existing.
4. Color of Text and Raised Characters: As selected from standard colors to match existing.

C. Interior: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally from corner to corner, complying with the following requirements:
1. Graphic content and Style to match existing.
2. Fasteners: Use fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.
a. All fastener shall one way security torx head type.
3. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for installations as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work
4. Substitutions: Section 01 2500 Substitution Procedures.

2.2 MATERIALS

A. Aluminum Castings: ASTM B 26/B 26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.

B. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.

C. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.

D. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).
1. Plastic (self-extinguishing material) engraving stock with face and core piles in contrasting colors, in finishes and color combinations indicated or, if not indicated, as selected from the manufacturer's standard.

2.3 SIGNAGE APPLICATIONS

A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
1. Flame Spread: Less than 25.
2. Smoke Development: Less than 450

B. Room and Door Signs: Refer to location on drawings.
1. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.
a. Provideat Balcony storage room.
2. Rest Rooms: Identify with pictograms, the names as shown on drawings and braille.
a. Provide for Girls and Boys toilet.

2.4 SIGN TYPES

A. Flat Signs: Signage media to match existing.

B. Color and Font: Unless otherwise indicated to matching existing.

2.5 ACCESSORIES

A. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. All signs to be mechanically fastened and taped.

C. Install neatly, with horizontal edges level.

D. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.

E. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

END OF SECTION

SECTION 10 2113
PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Solid polymer toilet compartments. (HDPE Toilet Partitions and NFPA 286 certification)

B. Urinal costume screens. NFPA 286

1.3 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry.

B. Section 10 2800 - Toilet And Bath Accessories.

C. Section 22 0300 Plumbing Fixtures and Equipment.

1.4 REFERENCE STANDARDS

A. ASTM A 666 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

C. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials

D. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.

1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications: A company regularly engaged in manufacture of products specified in this section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.

B. Installer's Qualifications: A Company or Individual, regularly engaged in installation of products specified in this Section, with a minimum of 5 years experience.

C. Materials: Doors, panels and pilasters, constructed from high density polyethylene (HDPE) resins. Partitions to be fabricated from polymer resins compounded under high pressure, forming a single component which is waterproof, nonabsorbent and has a self-lubricating surface that resists marks from pens, pencils, markers and other writing instruments. Cover all plastic components with a protective plastic masking.

D. Performance Requirements:

1. Fire Resistance: Partition materials shall comply with the following requirements, when tested in accordance with ASTM E 84:
   a. Class A flame spread/smoke developed rating.
2. Material Fire Ratings:
   a. National Fire Protection Association (NFPA) 286: Pass.
   b. International Code Council (ICC): Class B.

1.6 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.7 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall and floor supports, door swings.

C. Samples: Submit two samples of partition panels, 3 x 3 inch in size illustrating panel finish, color, and sheen.

D. Sustainable Design Submittals:
   1. Recycled Content: Certify percentages of post-consumer and pre-consumer recycled content.
   2. Regional Materials: Certify distance between manufacturer and Project and between manufacturer and extraction or harvest point in miles

E. Manufacturer's Installation Instructions: Indicate special procedures.

F. Manufacturer’s guarantee.

1.8 WARRANTY

A. Manufacturer's guarantees its plastic against breakage, corrosion, and delamination under normal conditions for 25 years from the date of receipt by the customer. If materials are found to be defective during that period for reasons listed above, the materials will be replaced free of charge.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Scranton Products; Hiny Hiders Partitions: 801 E. Corey St.; Scranton, PA 18505; Toll Free Tel: 800-445-5148; Fax: 855-376-6161; Email; info (info@scrantonproducts.com); Web:www.scrantonproducts.comwww.scrantonproducts.com.
   1. Substitutions: Refer to 01 2500 Substitution Procedures.

2.2 MATERIAL

A. Plastic Panels: High density polyethylene (HDPE) suitable for exposed applications, waterproof, non-absorbent, and graffiti-resistant textured surface.
   1. Recycled Content; Post Industrial: 25 percent.
   2. Recycled Content; Post Industrial: 100 percent.
   3. Recycled Content; Post Consumer: 100 percent.

B. Zinc Aluminum Magnesium and Copper Alloy (Zamac): ASTM B 86.

C. Stainless Steel Castings: ASTM A167, Type 304.

D. Aluminum: ASTM 6463-T5 alloy.

2.3 PLASTIC TOILET COMPARTMENTS

A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE) resins, floor-mounted headrail-braced (Floated HDPE is not acceptable.)
   1. Waterproof and nonabsorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments
   2. Color: As indicated on the Finish Schedule..
   3. Doors, Panels, and Pilasters: 1 inch (25 mm) thick with all edges rounded to a radius.
   4. Mount doors and dividing panels based on height of specified system.

B. Doors:
   1. Thickness: 1 inch.
   2. Width: 24 inch.
   3. Width for Handicapped Use: 36 inch, out-swinging.
   4. Height: 55 inch.
   5. Aluminum heat sink fastened to bottom edges

C. Panels:
1. Thickness: 1 inch.
2. Height: 55 inch.
3. Depth: As indicated on drawings.
4. Aluminum heat sink fastened to bottom edges

D. Pilasters: Pilasters shall be 82-0” high finished height. Pilasters shall include a mounting system comprised of a one piece 20 gauge, 304 stainless steel with #4 finish 3” high shoe with an integral plate in the bottom secured to pilasters with a stainless steel tamper resistant Torx head sex bolt. The shoe shall be mounted to the floor utilizing concrete anchors supplied by Manufacturer or equal. The concrete anchors shall be driven through the plate affixing it to the concrete floor. The concrete anchors shall have 2,700 lbs of holding strength when used in 5,000 psi concrete flooring. The pilaster height shall be adjusted by utilizing the machine thread bolt supplied which is placed into a metal insert installed in the bottom of the pilaster at the manufacturing facility.

E. Pilasters:
1. Thickness: 1 inch.
2. Width: As required to fit space; minimum 3 inch.

F. Urinal Screens: Custom to match compartments; mounted to wall with continuous Heavy duty Aluminum 6463-T5 alloy panel brackets .
1. Provide screen with one piece pedestal leg.
2. Aluminum heat sink fastened to bottom edges.
3. Height: 56".
4. Width: 18".
5. Wall Brackets:

2.4 ACCESSORIES

A. Pilaster Shoes: Stainless steel, satin finish, 3 inches high; concealing floor fastenings.
1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.

B. Head Rails: Extruded aluminum, anti-grip profile secured to pilaster with stainless steel tamper resistant Torx head sex bolt.
1. Size: Manufacturer's standard size.

C. Wall Brackets: Continuous aluminum brackets, heavy-duty aluminum 6463-T5 alloy.
1. Use for all wall attachment for partitions and screens.

D. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.

E. Hinges: Anodized aluminum; satin finish.
1. Continuous-type hinge, self closing.
2. Length: 54 inches.

F. Door Hardware: Anodized aluminum, manufacturer's standard finish.
1. Door Latch: Slide type with exterior emergency access feature.
2. Door Strike and Keeper with Rubber Bumper: Mount on pilaster in alignment with door latch.
3. Provide door pull for outswinging doors.
4. Equip outswing handicapped doors with second door pull and door stop

G. Coat Hook with Rubber Bumper: One per compartment, mounted on door, chrome plated Zamak.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

D. Start of work constitutes acceptance of job.

3.2 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 1/4 inch to 3/8 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

E. No evidence of cutting, drilling, and/or patching shall be visible on the finished work.

F. All panels shall typically be mounted at 14" above finished floor

G. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.3 TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.

B. Maximum Variation From Plumb: 1/8 inch.

3.4 ADJUSTING/CLEANING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

D. Finished surfaces shall be cleaned after installation and be left free of all imperfections.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

C. Remove factory protective coverings and clean finish surfaces in accordance with manufacturer's instructions before substantial completion.

END OF SECTION

SECTION 10 2800
TOILET AND BATH ACCESSORIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Grab bars.

B. Mirror Units.

C. Double Roll Toilet Tissue Dispenser. (Provided by Owner Installed by Contractor).

D. Liquid Soap Dispenser. (Provided by Owner Installed by Contractor).

E. Lavatory protective enclosure.

F. Partition Mounted Sanitary Napkin Disposal.

G. Recessed Sanitary Napkin Disposal.

H. Utility Shelf Mop/Broom Holder

I. Surface mounted sensor hand dryer.

J. Surfaced Sanitary Napkin/Tampon Vendor

1.3 RELATED REQUIREMENTS

A. Section 10 2113 - Plastic Toilet Compartments.

1.4 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

C. ASTM A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip; 1999 (Reapproved 2009).

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.

E. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

F. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2017.

G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

H. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2018.

I. ASTM C1822 - Standard Specification for Insulating Covers on Accessible Lavatory Piping; 2015.

J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.

K. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

1.6 WARRANTY

A. Warranty: Contractor shall provide a warranty for two (2) years after the date of Substantial Completion of the Contractor’s work or designated portion thereof.

B. Manufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within minimum warranty period indicated.
   1. Minimum Warranty Period: 5 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Bobrick Washroom Equipment, Inc.. www.bobrick.com.

B. Substitutions: Refer to Section 01 2500 - Product Requirements

C. Under-Lavatory Pipe Supply Covers:
   1. Truebro LavShield.
   2. Substitutions: Refer to Refer to Section 01 2500 - Product Requirements.

D. Substitutions: Section 01 2500 - Product Requirements.

E. Provide products of each category type by single manufacturer.

2.2 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
   1. Grind welded joints smooth.
   2. Fabricate units made of metal sheet of seamless sheets with flat surfaces.

B. Keys: Provide two (2) keys for each accessory to Yonkers Public Schools; master key lockable accessories.

C. Stainless Steel Sheet: ASTM A666, Type 304.

D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.

E. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

F. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

2.3 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

B. Chrome/Nickel Plating: ASTM B456, SC 2, polished finish, unless otherwise noted.

C. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.

2.4 COMMERCIAL TOILET ACCESSORIES

A. Toilet Paper Dispenser: Double roll, surface mounted, for coreless type rolls.
   1. Provided by Owner Installed by Contractor.

B. Electric Hand Dryer:
   1. Operation: Automatic, IR sensor-operated.
   2. Electrical: 110-120, Volts, 50/60 Hertz, 10.4 Amps max.; 840 - 1000 watts.
   3. Motor: Brush Type Dual Ball Bearings:
      a. HP: 0.5.

b. RPM: 20,000-30,000 ADJ
c. Fan Type: Multi Inlet centrifugal.
d. Heating Element: 550Watt with auto reset circuit breaker.
e. Decibel Level: 68.9dB-A min @2 min, adjustable by Owner
f. Depth: 4"

4. Drying Time: less than 15 seconds.
5. Internal resetting automatic thermal protection.
6. Automatic 60 second shut off.
7. Self-adjusting time-out and fail-safe off protection controlled by a microprocessor that shall detect and reject false signals and shall automatically self-calibrate to provide uniform sensitivity over its entire life span.
8. Air Nozzle: Fixed directional heavy-duty, rust proof and highly tamper resistant. Air intake slots shall not allow access to internal parts.
9. Cover Material: Heavy-duty, one piece formed 18 gage stainless steel satin finished on all exposed surfaces.
10. Mounting Height: to the bottom of the nozzle.
    a. As indicated on drawings.
11. Warranty: Unit shall be warranted against defects in materials or workmanship for five (5) years
12. Manufacturers:
    a. Excel Dryer Co. ; TA_SB
    b. Substitutions: Refer to Section 01 2500 - Product Requirements

C. Soap Dispenser: Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and horizontal stainless steel tank and working parts; push type soap valve, check valve, and window gage refill indicator, tumbler lock.
1. Owner supplied Contractor install.

D. Mirror: Stainless steel,18-8 stainless steel, type 304, 20 gauge with No8 mirror finish.
1. Stretcher leveled stainless steel with reflective, highly polished strip finish. Tempered Masonite backing.
2. Size: 18" x 30".
3. Frame — 18-8 S, type-304, heavy-gauge stainless steel, 3/4" x 3/4" (19 x 19mm) angle with vertical-grain satin finish. Onepiece, roll-formed construction forms continuous integral stiffener on all sides. Bevel design on front of angle holds frame tightly against mirror. Corners are welded, ground, and polished smooth. Galvanized steel back is fastened to frame with concealed screws and equipped with integral horizontal hanging brackets. Concealed Phillips-head locking screws securely fasten mirror to wall hanger(s).
4. Backing: 1/4" (6mm) thick tempered water resistant masonite
5. Products:
    a. Model #B-2906.

E. Grab Bars: Stainless steel, smooth surface.
1. Standard Duty Grab Bars:
    a. Push/Pull Point Load: 250 pound-force, minimum to meet and exceed ADA requirements.
    b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
    c. Finish: Satin.
    d. Length and Configuration: As indicated on drawings.
    e. Snap-On Flange Covers, shall be 22 gauge for concealed mounting, type 304 stainless steel alloy 18-8.
    f. Products:
        a) B-5806 Series manufactured by Bobrick.

F. Combination Sanitary Napkin/Tampon Dispenser: Stainless steel, semi-recessed and recessed as indicated on the drawings.
   1. Door: Seamless 0.05 inch door with returned edges and tumbler lock.
   2. Cabinet: Fully welded, 0.03 inch thick sheet.
   3. Operation: No charge; no coin slots.
   4. Identify dispensers slots without using brand names.
   5. Minimum capacity: 30 napkins and 27 tampons.
   6. Products:
      a. Contura Series B-47064C.

G. Sanitary Napkin Disposal Unit: Partition, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
   1. Capacity: 1.5 gallon.
   2. Unit shall be 22 gauge type 304 stainless steel alloy 18-8 with satin finish and shall have contoured cover finger lift relief and be protected during shipment with PVC film.
   3. Full top door shall be 22 gauge type 304 stainless steel alloy 18-8 with satin finish and shall be attached to the cabinet at back with a concealed full-width 9/64" dia. meter heavy-duty stainless steel multi-staked piano hinge spring loaded.
   4. Structural assembly of body and door components shall be of welded construction and shall have no exposed fastening devices or spot-welded seams
   5. Receptacle: Removable waste container shall be captured internally by full width - retainer and shall have a safety-edged finger grip.
   6. Product: #B-354 manufactured by Bobrick.

H. Sanitary Napkin Disposal Unit: Partition Mounted Dual Access Sanitary Napkin Disposal, back-to-back partition mounting with adjustable flanges, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
   1. Capacity: 1.5 gallon
   2. Unit shall be 22 gauge type 304 stainless steel alloy 18-8 with satin finish and shall have contoured cover finger lift relief and be protected during shipment with PVC film.
   3. Doors shall operate independently and shall be attached to cabinet with a full-length 3/16" dia. meter (Ø4.8) stainless steel multi-staked piano hinge and shall be spring loaded to hold in closed position.
   4. International graphic symbol for waste disposal label shall be adhered to doors.
   5. Structural assembly of body and door components shall be of welded construction and shall have no exposed fastening devices or spot-welded seams.
   6. Face trim mounting flanges shall be of one piece construction 1" (25) wide with no welded miters and shall have square 1/4" (6) returns with an Adjustability range for partition thickness of 1/2" (13) to 3" (76).
   7. Waste container shall have hemmed edges for safety and shall be retained by a tumbler lock keyed alike to other ASI washroom equipment and shall have a fully hemmed finger-grip for safety and service removal from one side only.
   8. Product: Model # 0472-1 manufactured by ASI.

2.5 UNDER-LAVATORY PIPE AND SUPPLY COVERS

A. Under-Lavatory Pipe and Supply Covers:
   1. Insulate exposed drainage piping, including hot, cold, and tempered water supplies under lavatories or sinks to comply with ADA Standards.
   2. Exterior Surfaces: Smooth non-absorbent, non-abrasive surfaces.
   3. Construction: 1/8 inch flexible PVC.
      a. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.

b. Microbial and Fungal Resistance: Comply with ASTM G21.

4. Color: White.
5. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces.
6. Products:
   a. Lav-Shield manufactured by Truebro, Inc..

2.6 UTILITY ROOM ACCESSORIES

A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
   1. Drying rod: Stainless steel, 1/4 inch diameter.
   2. Hooks: Two, 0.06 inch stainless steel rag hooks at shelf front.
   3. Mop/broom holders: Three spring-loaded rubber cam holders at shelf front.
   4. Length: 36 inches.
   5. Products:
      a. B-#324 manufactured by Bobrick.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.

D. Verify that field measurements are as indicated on drawings.

E. See Section 06 1000 for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

3.2 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.3 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.4 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

1.3 RELATED REQUIREMENTS

A. 04 2000 - Unit Masonry.

B. Section 05 5000 - Metal Fabrications. Steel lintels.

C. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

D. Section 09 2116 - Gypsum Board Assemblies.

1.4 REFERENCE STANDARDS

A. NFPA 10 - Standard for Portable Fire Extinguishers; 2017.

B. UL (DIR) - Online Certifications Directory; Current Edition.

1.5 PERFORMANCE REQUIREMENTS

A. Conform to NFPA 10.

B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide color and finish.

C. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.

D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.7 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Fire Extinguishers:
   1. Larsens's Manufacturing Co., 7421 Commerce Ln, Minneapolis, MN 55432, (800) 527-7367.
   2. Substitutions: Section 01 2500 Substitution Procedures.

B. Fire Extinguisher Cabinets and Accessories:
   1. Larsen's Manufacturing Co; -: www.larsensmfg.com.

2.2 FIRE EXTINGUISHERS

A. Refer to Part 3 for Fire Extinguisher Schedule.

2.3 FIRE EXTINGUISHER CABINETS

A. Cabinet Construction: Non-fire rated.
   1. Formed stainless steel sheet; 0.036 inch thick base metal.

B. Cabinet Configuration: Recessed and Semi-Recessed.
   1. Size to accommodate fire extinguishers and accessories.
   2. Trim: Flat for Recessed ans Rolled for Semi-recessed, with 1/2 inch wide face.

C. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.

D. Fabrication: Weld, fill, and grind components smooth.

E. Finish of Cabinet Exterior Trim and Door: No. 4 - Brushed stainless steel.

F. Finish of Cabinet Interior: White colored enamel.

G. Recessed Model #C2409-6R.

H. Semi-Recessed Model#C2409-R.

2.4 ACCESSORIES

A. Extinguisher Brackets: Formed steel, galvanized and enamel finished.

B. Cabinet Signage: "FIRE EXTINGUISHER".

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level in wall openings, as indicated on drawings from finished floor to inside bottom of cabinet.

C. Secure rigidly in place.

D. Place extinguishers in cabinets and on wall brackets.

3.3 SCHEDULES

A. Fire Extinguishers
   1. Model MP10
      a. Capacity: 10 lbs
      b. Weight: 18 lbs
      c. Cylinder Diameter: 5”
      d. Height: 20”
      e. Width: 7-3/4”
      f. UL rating: 4A-80B: C
      g. Standard Bracket: 5525
      h. Location: in all areas except Auditorium rooms.

END OF SECTION

SECTION 11 5213
PROJECTION SCREENS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Front projection, electrically operated screen assemblies.

1.3 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Supports for suspended projection screens.

B. Section 11 6010 - Stage Curtains and Rigging.

C. Division 26 Electrical.

1.4 REFERENCES

A. Society of Motion Picture and Television Engineers (SMPTE):
   1. SMPTE RP 94-2000, Gain Determination of Front Projection Screens

B. NFPA 70 - National Electrical Code.

C. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.

D. Underwriters Laboratories Inc. (UL).

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's catalog cuts and descriptive information on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Manufacturer’s technical product data sheet
   3. Storage and handling requirements and recommendations.
   4. Installation methods.
   5. Wiring diagrams for motor operators, actuators, controls and switches.

C. Shop Drawings: For installations, indicate dimensions, verified field measurements, mounting details, and interface with adjacent construction.

D. Samples: For screen fabrics, submit two samples 6 by 6 inch in size.

E. Operation and Maintenance Data: Provide manufacturer's operation and maintenance instructions.

F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Yonkers Public Schools's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Experienced in manufacturing products with minimum of ten (10) years experience in the fabrication of projection screen specified in this section.

B. Installer Qualifications: Experienced in installation of the work of this section with minimum of five (5) years.

C. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

D. Certificates: Product certificates signed by manufacturer certifying that materials comply with specified performance characteristics, criteria and physical requirements.

E. Regulatory Requirements: Refer to Section 01 4100.

F. Manufacturer's installation instructions.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver projection screens to project site in manufacturer's original unopened packaging, and inspect for damage and proper size before accepting delivery.

B. Store in a protected, clean, dry area with temperature maintained above 50 degrees F, and stack in accordance with manufacturer's recommendations.

C. Acclimate screens to building temperatures for 24 hours prior to installation, in accordance with manufacturer's recommendations.

1.8 COORDINATION

A. Coordinate work with installation of electric service power characteristics and location.

1.9 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide two (2) year manufacturer warranty for projection screen assembly.

C. Warranty: Commencing on date of acceptance by YPS Office of Facilities Management.

PART 2 PRODUCTS

2.1 FRONT PROJECTION SCREENS

A. Manufacturers:
   1. Draper, Inc (Motorized); Paragon: Series V, 411 S. Pearl St. Spiceland, IN 47385, 800.238.7999 www.draperinc.com.
   2. Substitutions: Section 01 2500 Substitution Procedures.

B. Front Projection Screens: Factory assembled unless otherwise indicated.
   1. In High School Auditorium: Motorized screen, horizontally tensioned.
      a. Screen Viewing Area: 160 inch high by 284 inch wide.

C. Matte Light Diffusing Fabric: Light diffusing screen fabric; washable, flame retardant and mildew resistant.
   1. Matt White XT1000V (1.0 gain).
   2. Seams: No seams permitted in fabric up to 160 inch high by 284 inch wide.

D. Masking Borders: Same color as viewing servace, on four sides.

E. Extra Drops: White; 60 inch.

F. Exposed Screen Cases: Aluminum, with integral roller brackets.
   1. Finish: Baked enamel.
   2. Color: Black.
   3. End Caps: Aluminum; finished to match case.
   4. Provide supports for suspension from ceiling where indicated.
   5. Bottom of case fully enclosed except for slot allowing fabric passage.
   6. Bottom closure panel shall be extruded aluminum, finished white, and may be removed manually for access to roller and drive unit.
   7. Mounting: Wall and ceiling, as indicated on drawings.

G. Electrically-Operated Screens:
   1. Type 2: Tensioned System.
      a. Screen Operation: Electrically operated, UL and ULC listed, retractable, heavy duty, with rigid metal roller and motor housed within the roller. Tab guide cable tensioning system to

maintain even, lateral tension and hold viewing surface flat. Bottom end of fabric to be inserted into a custom aluminum slat bar with added weight to provide vertical tension on the screen surface.

a) Motor: Single motor, UL and ULC certified, 3-wire permanently lubricated reversal-type, attached to header, with preset adjustable limit switches to automatically stop viewing surface in UP or DOWN position. Includes automatic thermal overload protection, integral gears, capacitor and electric brake to prevent coasting.
   (a) Voltage, Frequency:115 V, 60 Hz.
   (b) Amperage: 2.5 amps.
   (c) Limit Switches: Preset and adjustable to automatically stop viewing surface in UP or DOWN position, instantly reversible and lifetime lubricated
   (d) Housing: Inside metal roller.
   (e) Motor mounted on sound absorber.
   (f) J-box inside case accessible via 22 ga. steel cover plate.
   (g) Entire roller and drive assembly easily removable through bottom of case.
   (h) Roller to be 6" OD x 1/8" wall steel tube.

2. Accessories:
   a. Key Locking Cover Plate: Hinged cover plate with brushed stainless steel finish provides keyed access to 120 wall switch.
   b. Video Projector Interface Control: External, DC controls and low voltage 3-button switch with cover plate for wall switch operation.
      a) Coordinate controls with projector controls for proper interface.
3. Paragon/Series V: Large electrically operated, tab tensioned, extruded aluminum case. Projection screen with motor in roller. Case fully enclosed except for slot allowing viewing surface passage. Roller: 6 inches (152 mm) diameter steel tube. Viewing surface securely attached to roller at top and at bottom to weighted dowel. Provided with universal mounting brackets for attachments to structure above.
4. Motor Screen Controls, UL certified.
   a. Key operated 3-position control switch rated 115V AC, 60 Hz to stop or reverse screen at any point.
5. Roller: Aluminum, as required in diameter, with locking device.
6. Vertical Tensioning: Screen fabric weighted at bottom with steel bar and plastic end caps.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate is finished and ready to accept screen installation.

B. If substrate preparation is the responsibility of another installer, notify Fuller and D'Angelo, P.C. of unsatisfactory preparation before proceeding.

C. Verify that openings for recessed screens are correctly sized.

D. Verify type and location of electrical connections.

E. Do not install projection screens until climate control systems are in place and interior painting and other finishes are completed.

3.2 PREPARATION

A. Coordinate screen installation with installation of projection systems.

B. Coordinate installation with adjacent construction and fixtures, including ceilings, walls, lighting, fire suppression, and registers and grilles.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions, using manufacturer's recommended hardware for relevant substrates.

B. Do not field cut screens.

C. Install screens in mountings as specified and as indicated on drawings.

D. Install front projection screens with screen cases in position and relationship to adjoining construction as indicated, securely anchored to supporting substrate, and in manner that produces a smoothly operating screen with plumb and straight vertical edges and plumb and flat viewing surfaces when screen is lowered

E. Install plumb and level.

F. Adjust projection screens and related hardware in accordance with manufacturer's instructions for proper placement and operation.

G. Test electrically operated units to verify that screen, controls, limit switches, closure and other operating components are in optimum functioning condition.

3.4 FIELD QUALITY CONTROL

A. Manufacturer’s Field Services: Have manufacturer’s technical representative schedule site visits to review work as follows:

1. When preparatory work for which work of this Section depends is complete, but before installation begins.
2. Upon completion of work, after cleaning is carried out.

B. Testing and Inspection: Operate each screen [3] times to ensure viewing surfaces extend and retract through full range of motion.

1. Verify controls, limit switches, and other components function as designed and meet project requirements.
2. Ensure viewing surface raising operation fully engages and lifts screen closure door into closed position.
3. Adjust motors, controls and components to allow for smooth, unobstructed screen operation

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch up, repair, or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 11 6010
STAGE CURTAINS AND RIGGING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SUMMARY

A. This Section includes replacement and refurbishment of stage curtain and rigging as follows:
   1. Remove all curtains including proscenium and valance.
   2. Wash, clean, anti-bacterial and fireproof all curtains.
   3. Remove and reinstalled all rigging, components and hardware.
   4. Reinstall all curtains,

1.3 SUBMITTALS

A. Drawings: Submit component and installation drawings and schedules showing all information necessary to fully explain the function, installation, and use of system components in all phases of operation.
   1. Do not proceed with fabrication, installation, or erection until approved by the YPS Office of Facilities Management. Such approval does not relieve the rigging subcontractor of the responsibility of providing equipment in accordance with the specifications.

B. Shop Drawings: Include plans, elevations, and detail sections of typical track and rigging elements. Show anchors, hardware, operating equipment, and other components not included in manufacturer's Product Data.

C. Product Data: Include types, styles, materials, operating instructions, and maintenance recommendations.

D. Catalog Cuts: Submit catalog cuts for standard equipment items. These must contain full information on dimensions, construction, applications, etc. to permit proper evaluation. In addition, they must be properly identified as to their intended use. Any options or variations must be clearly noted.
   1. Substitutions: Refer to Section 01 2500 Substitution Procedures

E. Schedule: Prior to the commencement of the installation work, the rigging subcontractor shall submit an outline of the proposed schedule and requirements for approval.

F. Product Certificates: Signed by stage curtains subcontractor certifying that products washed comply with requirements of flame-retardant chemical used, identification of applicator, treatment method, application date, allowable life span for treatment, and details of any restrictions and limitations.

G. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer with five (5) experience, who has completed installation of and similar products and/or material, in design and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Rigging subcontractor shall be an approved rigging manufacturer or an authorized representative or dealer of an approved manufacturer. The contractor shall have been installing stage rigging systems for a period of five (5) years or more, and shall have completed at least ten (10) installations of this type and scope. The YPS Office of Facilities Management shall be the final judge of the suitability of experience.

1. The Rigging subcontractor shall employ an Entertainment Technician Certification Program (ETCP) Certified Theatre Rigger. The Certified Rigger shall be either the project manager or site foreman, and be responsible for the overall project including the layout, inspection, and training.

C. Fire-Test-Response Characteristics: Cleaning of stage curtains with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or a testing and inspecting agency acceptable to authorities having jurisdiction. Permanently attach label to each fabric of curtain assembly indicating whether fabric is inherently and permanently flame resistant, or treated with flame-retardant chemicals, and whether it will require retreatment after designated time period or cleaning.
   1. Flame-Resistance Ratings: Passes NFPA 701.

1.5 INSTRUCTION

A. The Rigging subcontractor shall go through the manual and provide a safety and instruction class with personnel designated by the owner to demonstrate and explain the operation and maintenance of the systems.

B. Refer to Section 01 7800 - Closeout Submittals and Section 01 7900 - Demonstration and Training for additional requirements.

C. Signage with basic operating instructions and warnings shall be posted in the area where the equipment will be operated.
   1. Signage shall be in conformance with ANSI-Z535.

PART 2 - PRODUCTS

2.1 RIGGING MANUFACTURERS

A. Acceptable Rigging Manufacturer:
   1. J.R. Clancy, Inc, 7041 Interstate Island Road, Syracuse, New York 13209; Voice: 215-625-3603, Fax: 215-625-3527; E-mail: rigging@jrclancy.com.
   2. M. Cramer & Associates, Inc, 229 N. 12th Street, Philadelphia, PA 19107; Voice 215-625-3603, Fax: 215-625-3527, E-mail: info@mcramer.com
   3. Substitutions: Refer to Section 01 2500 Substitution Procedures

B. The manufacturer must have a product testing program, including determination of recommended working loads for products based on destructive testing by an independent laboratory and review by an independent licensed New York State Engineer.

C. The manufacturer of the stage equipment must have a quality management system registered to the ISO 9001:2000 standard.

D. The manufacturer must carry primary product and general liability insurance of $2,000,000 each, with excess liability coverage of $10,000,000 and a Contractors Professional Liability policy with $2,000,000 coverage.
   1. Evidence that the manufacturer has been in business for a minimum of ten (10) years manufacturing stage equipment
   2. A listing of five equivalent installations including:
      a. Name, address and telephone number of Owner;
      b. Name, address and telephone number of Architect;
      c. Scope of work.
   3. A brief written description of the contractor’s operation including facilities, financial capabilities, and experience of key personnel.
   4. A copy of the ETCP Certified Theatre Rigger’s certification credentials.
   5. Written, third party evidence showing that the manufacturer has the testing, quality management required in paragraph B in place

2.2 TRACKS

A. Curtain Track:

1. All cord operated tracks shall have new operating cord. ADC 2828 or ADC 1728 as appropriate for track.
2. All cord operated tracks to have new tension floor pulleys. ADC 2865.
3. All track carriers, end pulleys, end stops and master carriers shall have three (3) links of trim chain added if not already present. ADC TC-2.

2.3 RIGGING GENERAL

A. Standards:
1. Materials shall conform to the following ASTM and ANSI standard specifications:
   a. A-36 - Specification for structural steel
   b. A-47 - Specification for malleable iron casting
   c. A-48 - Specification for gray iron casting
   d. A-120 - Specification for black and hot-dipped zinc-coated (galvanized) steel pipe for ordinary use
   e. B18.2.1&2 - Specification for square and hex bolts and nuts
2. In order to establish minimum standards of safety, the following factors shall be used:
   a. Cables and fittings - 8:1 Safety Factor
   b. Cable bending ratio - Sheave tread diameter is 30 times cable diameter
   c. Tread Pressures -
      500 lbs. for cast iron
      900 lbs. for Nylatron
      1000 lbs. for steel
   d. Maximum fleet angle - 1-1/2 degrees
   e. Steel 1/5 of yield
   f. Bearings Two times required load at full speed for 2000 hours
   g. Bolts Minimum SAE J429 Grade 5 (ISO R898 Class 8.8), zinc plated
   h. Gear boxes Factor 1.25 Mechanical Strength Service Factor

B. Materials: All materials used in this project shall be new, unused and of the latest design. Re-furbished and obsolete materials are not permitted.

C. Sheaves:
1. Sheaves shall be of the following materials, as specified:
   a. ASTM A-48 Class 30 grey iron castings
   b. Nylatron or Polyamide Nylon (PA6-G)
   c. Steel
2. Groove depths shall be sufficient to encompass fully the cables and ropes. Grooves shall have sloped sides (8 degree minimum) and conform to rope and cable manufacturers' standards for groove shape and tolerance.
3. Sheaves shall be supported by bearings and a machined steel shaft, which shall be keyed to one side plate to prevent rotation. Proper adjustment of the bearing shall be accomplished by means of a fine thread, self-locking nut on the opposite end of the shaft. Each sheave shall run plumb and true without rubbing its side plates when rotated.

2.4 RIGGING FABRICATION

A. The mechanical fabrication and workmanship shall incorporate best practices for good fit and finish. There shall be no burrs or sharp edges to cause a hazard nor shall there be any sharp corners accessible to personnel.

B. All moving parts shall have specified tolerances. Sheaves shall run plumb and true and shall not scrape housings.

C. All equipment shall be built and installed to facilitate future maintenance and replacement.

2.5 RIGGING FINISHES

A. Paint shall be the manufacturer's standard finish and color except as noted.

B. All turnbuckles, clips, tracks, chains and other items of incidental hardware shall be furnished plated or painted.

2.6 RECOMMEDEND WORKINGG LOAD

A. This specification calls for minimum recommended working loads for many hardware items. This is the maximum load which the manufacturer recommends be applied to properly installed, maintained, and operated new equipment. Manufacturer's recommended working loads shall be determined by calculations by a Licensed Professional Engineer and destructive testing by an independent testing laboratory. These calculations and reports shall be available for review.

2.7 MANUAL WINCH SETS

A. 12" Head Block:
   1. The sheave shall be Nylatron® or Polyamide (PA6-G) nylon with a 12" outer diameter. The cable grooves shall have equal pitch diameters. The sheave shall be equipped with a 1" diameter machined steel shaft and two tapered roller bearings.
   2. Base angles shall be a minimum 2" x 1-½" x 1/4" angle with the short leg turned in.
   3. Side plates shall be a minimum of 10-gauge steel, and shall fully enclose the sheave. Side plates shall be bolted and welded to the base angles for extra strength. There shall be a minimum of six bolts with spacers between the side plates, four of which prevent cables from escaping the sheave grooves.
   4. The block and associated mounting hardware shall have a recommended working load of at least 2,500 lbs.
   5. Blocks used in wire guide systems shall have tie-off points for the guide wires.
   6. Head blocks shall be J. R. Clancy 1255 series, grooved for six or eight ¼" lift lines.

B. Loft Block:
   1. The sheave shall have an 8-½" outside diameter, and shall be Nylatron® or Polyamide (PA6-G) nylon. The sheave shall be equipped with a 17 mm diameter machined steel shaft and two sealed, precision ball bearings.
   2. Base angles shall be a minimum 1-½" x 1-½" x 3/16" angle punched with a universal hole pattern for easy installation.
   3. Side plates shall be a minimum of 12-gauge steel, and shall fully enclose the sheave. Side plates shall be bolted to the base angles. There shall be a minimum of seven ¼" bolts with spacers between the side plates, four of which prevent cables from escaping the sheave grooves.
   4. The block and associated mounting hardware shall have a recommended working load of at least 500 lbs, and shall be designed for use in either upright or underhung usage.
   5. Loft blocks shall be J. R. Clancy 2NC-10855R, grooved for one ¼" lift line.

C. Idler assemblies:
   1. Loft block idlers shall be provided to carry the weight of the cables and prevent rubbing against adjacent block side plates. They shall not be installed to carry line loads or to act as deflector or mule blocks.
   2. Idler assemblies shall consist of one or two 3-1/2 inch diameter, 3 line NylatronÒ idler pulleys mounted on the side of the loft block in a steel housing.
   3. The sheaves shall have 1/4 inch cable grooves and shall ride on a 3/8-inch shaft.
   4. The housing shall consist of a 12-gauge side plate and two 1/4 inch bolts and pipe spacers to mount the housing and captivate the cables in the grooves.
   5. All nuts shall be of the nylon insert self-locking type.

D. Manual Hand Winch:
   1. Manual hand winch shall be Thern CW11-2M.

2. Include Thern clew guide.
3. Include all additional mounting hardware to fasten winch to building structure. This shall include Thern Clew Winch Pedestal or appropriate Unistrut.

E. Lift Cables:
1. All lift cables shall be 7 x 19 construction, galvanized aircraft cable, sized as required, and with breaking strengths as follows:
   a. 1/8" diameter -2,000 pounds
   b. 3/16" diameter - 4,200 pounds
   c. 1/4" diameter - 7,000 pounds
   d. 5/16" diameter - 9,800 pounds
   e. 3/8" diameter - 14,400 pounds

F. Damaged or deformed cable shall not be used. All wire rope rigging shall be installed so as to prevent abrasion of the wire rope against any part of the building construction or other equipment.

G. Cable Fittings:
1. Cable clips shall conform to wire rope manufacturer's recommendations as to size, number, and method of installation. Clips shall be drop forged ACrosby@ or approved equal. Under no circumstances may malleable cable clips be used in suspension or lifting lines.
2. Swaged sleeve fittings shall be copper Nicopress™. Swaged fittings shall be installed per the fitting manufacturer's instructions, using the appropriate tools, and checked with the appropriate Nicopress™ "Go - No go" gauge.
3. Eyes shall be formed over galvanized wire rope thimbles of correct size.

H. Trim Chains:
1. Trim chains shall be 36" long, made of 1/4" plated, grade 30 Proof Coil chain. Connection between the end link and the lifting cable shall be made with a thimble and copper Nicopress sleeve. Chains shall be wrapped one and one half turns around the batten and attached back to the thimble at the end of the lift line with a ¼" forged shackle. Adjustment is made by connecting the shackle into a link along the return side of the chain.
2. Provide and install one 3/8" diameter safety bolt, one nylon insert nut and two flat washers per trim chain after batten is leveled.
3. Trim chains shall have a recommended working load of at least 750 lbs.
4. Trim chains shall be J.R. Clancy No. 031-1192.

I. Pipe Battens:
1. All battens shall be 1-1/2" nominal diameter, schedule 40 pipe in lengths as shown on the drawings or Bill of Materials. All joints shall be spliced with 18" long sleeves with 9" extending into each pipe and held by two 3/8" hex bolts and lock nuts on each side of the joint.
2. Each end shall be covered with a bright yellow, closed end, soft vinyl safety cap at least 4 inches in length.
3. Pipe battens shall be J.R. Clancy No. 015-67R, match existing lengths.

2.8 DEAD HUNG RIGGING

A. Dead Hung Rigging
1. All existing dead hung rigging suspension hardware shall be replaced.
2. Existing dead hung pipe battens shall remain.
3. Chains shall be ¼" grade 30 proof coil. Zinc plated finish.
4. Beam clamps shall be J. R. Clancy 015-698 or 015-798 as applicable. Side beam clamps are not acceptable. Wrapping of chain around beams is not acceptable.
5. Chain shall be attached to pipe battens with two wraps and ¼" domestic screw pin anchor shackle.
6. Chain shall be attached to traveler tracks with 3/8" x 6" turnbuckles.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for supporting members, blocking, installation tolerances, clearances, and other conditions affecting performance of stage curtain work. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Examine inserts, clips, blocking, or other supports required to be installed by others to support tracks and battens. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. The Rigging Contractor shall be responsible for storage of stage equipment, tools, and equipment during the period of the installation.

B. Extent: All specified equipment shall be installed by fully trained superintendents and workmen. Equipment shall be installed in a workman like manner, per plans and specifications. Equipment shall be aligned, adjusted, and trimmed for the most efficient operation, the greatest safety and for the best visual appearance.

C. Standards: Installation practices shall be in accordance with OSHA Safety and Health Standards and all local codes. All welding must be performed in full compliance with the latest edition of the Structural Welding Code (ANSI/AWS D1.1).

D. Alignment: Mule blocks, cable rollers and guides shall be installed, as required, to provide proper alignment, to maintain specified fleet angles, and to prevent contact with other surfaces.

E. Attachments: All equipment shall be securely attached to the building structure. Underhung blocks and mule blocks shall be welded in place unless otherwise directed.

F. Finishes:

1. All welds must be touched up to match disturbed finishes.
2. All finishes which are disturbed during shipping and installation shall be touched up to match the original.

3.4 CURTAIN INSTALLATION

A. Track Hung: Secure curtains to track carriers with track manufacturer's special heavy-duty S-hooks or snap hooks.

B. Batten Hung: Secure curtains to pipe battens with tie lines.

END OF SECTION

SECTION 12 3600
SOLID SURFACING SILLS AND COUNTERTOPS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Countertop fin-tube cabinet.

B. Wall cap.

1.3 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications for metal grill.

B. Section 06 1000 - Rough Carpentry for plywood substate.

C. Section 09 7700 - Plastic Wall Surfaces.

1.4 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.

B. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.

C. PS 1 - Structural Plywood; 2009.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Specimen warranty.

C. Shop Drawings: Complete details of materials and installation .

D. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.

E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

F. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

B. Manufacturer: Company specializing in manufacturing the products specified in this section, with minimum ten years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Manufacturer Warranty: Provide manufacturer’s standard warranty for material only for period of 10 years against defects and/or deficiencies.

C. Correct defective Work within a two year period after Date of Substantial Completion, at no additional cost to Yonkers Public Schools. Defects include, but are not limited to:
   1. Cracks.
   2. Failure of adhesives.

PART 2 PRODUCTS

2.1 COUNTERTOP ASSEMBLIES

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Solid Surfacing Countertops and wall cap: Solid surfacing sheet or plastic resin casting over continuous substrate:
   1. Flat Sheet Thickness: 1/2 inch, minimum.
   2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
      a. Manufacturers:
         a) Dupont: www.corian.com.
         b) Meganite, Inc: www.meganite.com.
         c) Substitutions: See Section 01 2500 Substitution Procedures.
      b. Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 25, maximum; when tested in accordance with ASTM E84.
      c. Finish on Exposed Surfaces: Polished, gloss rating of 55 to 80.
      d. Color and Pattern: As indicated on finish schedule.
      e. Exposed Edge Treatment: Built up to minimum 1 inch thick; radiused edge.
      f. Fabricate in accordance with manufacturer's standard requirements.

2.2 MATERIALS

A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 1/2 inch thick; join lengths using metal splines.

B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

C. Joint Sealant: Mildew-resistant silicone sealant, color as selected..
   1. Mildew resistant conforming to FDA NSF 51, UL listed.

D. Joint Sealant: Refer to Section 07 9200 - Joint Sealants.

2.3 FABRICATION

A. Field measure and verify all dimensions before fabrication is complete.

B. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using best method recommended by manufacturer.
   2. Fabricate to overhang fronts and sides as shown on drawings.

3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

C. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
2. Height: 4 inches, unless otherwise indicated.

D. Solid Surfacing: Fabricate tops up to 72 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions. Form joints between components to be non conspicuous.

E. Edge treatment as shown on drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Fuller and D'Angelo, P.C. of unsatisfactory preparation before proceeding.

C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.2 PREPARATION

A. Verify dimensions of all existing countertops to be replaced.

B. Clean surfaces thoroughly prior to installation.

C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Attach solid surfacing countertops using compatible silicone bonding material.

B. Provide products in largest pieces available.

C. Cut and finish edges with clean sharpe returns.

D. Provide radius at outside corners.

E. Dress joints smooth, remove surface scratches and clean entire surfaces.

F. Installation of Countertops
1. Abut top and edge surfaces in one true plane with flush hairline joints and with internal supports placed to prevent deflection. Locate joints only where shown on Shop Drawings.
a. Field Jointing: Where possible, make in same manner as shop-made joints using dowels, splines, fasteners, adhesives, and sealants recommended by manufacturer. Prepare edges in shop for field-made joints.
a) Use concealed clamping devices for field-made joints in plastic-laminate countertops. Locate clamping devices within 6 inches of front and back edges and at intervals not exceeding 24 inches (600 mm). Tighten according to manufacturer's written instructions to exert a uniform heavy pressure at joints.

G. Install to comply with all manufactures written instructions, including for adhesive, sealers, fabrication and finishing.

3.4 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.

3.5 CLEANING

A. Clean surfaces thoroughly. Remove adhesives, sealant and other stains.

3.6 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 22 0100

GENERAL CONDITIONS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 GENERAL CONDITIONS

A. Before submitting a proposal, Bidders shall examine all Drawings related to this work and shall become fully informed as to the extent and character of the work required and its relation to the other work in the building.

B. Before commencing work, the Contractor will examine all conditions of the project upon which his work is in any way dependent for perfect workmanship according to the intent of this Specification. No "waiver of responsibility" for incomplete, inadequate or defective adjoining work will be considered unless notice has been filed by this Contractor and acceded to by the Owner's representative in writing before the Contractor begins any part of the work.

C. The Contractor will pay for all licenses, permits and inspection fees required by civil authorities having jurisdiction. Comply with all laws, ordinances, regulations, fire Underwriters requirements applicable to work herein specified without additional expense to the Owner. (Also, local building code requirements.).

D. It is specifically intended that anything (whether material or labor) which is usually furnished as a part of such equipment as is hereinafter called for (and which is necessary for the completion and proper operation) shall be furnished as part of this Contract without additional cost the Owner, whether or not shown in detail on the Drawings or described in the Specifications.

E. When Drawings and Specifications conflict or there is a question as to the proper intent of this Contract, the Contractor shall assume the more expensive method in his pricing. All questions shall be directed to the Architect/Engineer in writing only and only up to ten (10) days prior to bidding.

F. The Drawings indicate the general runs of the piping, ductwork, etc. systems and the location of equipment and apparatus, but is shall be understood that the right is reserved by the Architect/Engineer to change the location of piping work, ductwork, equipment and apparatus to a reasonable extent as building conditions may dictate, prior to their installation without extra cost to the Owner.

G. Small scale drilling through walls and floors which may contain asbestos shall be performed by a person with a “restricted asbestos handler allied trades certificate” and shall have a copy of it in his possession at all times while working on the project.

H. Any changes from the Drawings and Specifications and any interpretation thereof shall have the prior approval of the Architect/Engineer. The Contractor shall submit in writing, at the time of signing the Contract, any items of necessary labor and materials, which, in his opinion, are lacking in requirements of the Drawings and Specifications to insure a complete job in all respects. No consideration will be granted to alleged misunderstanding of materials to be furnished, work to be done, or conditions to be complied with, it being understood that the tender of a proposal carries with it the agreement to all items and conditions referred to herein or indicated on the accompanying Drawings.

END OF SECTION

SECTION 22 0125

SCOPE OF WORK

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 SCOPE OF WORK

A. The work under this section includes all labor, materials, equipment, tools, transportation, cutting and patching, excavation and backfill and the performance of all work necessary and required for the furnishing and installation complete of all Plumbing and Drainage work as shown on Contract Drawings, as specified herein and as otherwise required by job conditions or reasonably implied, including but not necessarily limited to the following:

1. Provide complete new and altered sanitary, storm, and vent piping from all new plumbing fixtures connecting to existing sanitary and vent system. See front end spec for bedding requirements.

2. Provide complete new and altered hot and cold water piping to all new plumbing fixtures, equipment, etc. as indicated.

3. Provide all new plumbing fixtures where indicated, complete including traps, stops, drains, strainers, tailpieces, faucets, escutcheons, etc.

4. Provide transformer and wire to auto-faucets and flush valves for complete installation. Junction box by Electrical Contractor. Select proper transformer based on number of fixtures. All low voltage wiring by Plumbing Contractor. Furnish access door of proper size for GC to install. Coordinate with Electrical Contractor and General Contractor.

5. Provide complete new piping and final connections to equipment furnished under other Divisions.

6. Provide all demolition, removal disconnecting, capping, sealing of all existing plumbing piping, apparatus, equipment, fixtures, specialties, accessories, etc. which are not included or incorporated in the new layout.

7. Provide all required temporary connections to maintain all plumbing services without interruption.

8. Pipe insulation.

9. Tests and adjustments.

10. This Contractor shall obtain all permits, bonds, approvals, etc. at no additional cost to the Owner.

11. This Contractor shall provide shop drawings for all plumbing fixtures, piping, valves, insulation, equipment, etc.

12. Cutting and Patching see Front End Specifications for Trade responsibilities.

13. Excavation and Backfill see Front End Specifications for Trade responsibilities.

14. Furnish minimum 18” x 18” access doors for all valves, cleanouts, etc. in all inaccessible walls, ceilings, etc. Installation by General Contractor.

15. Fire stopping per FM/UL and NFPA. Refer to Division 1.

B. Coordination Drawings: Attention is directed to Division 1 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the work and failure to honor these requirements may become the basis for denial of any and all claims for either or both “time” and “money”.

1.2 ALTERATION WORK

A. All equipment, piping, plumbing, fixtures, etc. to be removed, shall be disposed of or salvaged as directed by the Owner. They shall not be removed from the premises without Owners approval.

B. All piping to be removed shall be properly plugged or capped so that upon completion of all new work, all abandoned piping shall be concealed in finished areas.

C. No dead ends shall be left on any piping upon completion of job.

D. The existing systems shall be left in perfect working order upon completion of all new work.

E. Location and sizes of existing piping are approximate. Exact sizes and locations of all existing piping shall be verified on the job.

F. All removals shall be removed from the site.

END OF SECTION

SECTION 22 0130

WATER SUPPLY SYSTEM

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. Furnish and install a complete cold-water distribution system to supply water to all new fixtures, water consuming equipment, and valved outlets for the use of other trades and connect to existing piping.

B. The water supply system shall be complete with all pipe, fittings, valves, mains, risers, branches, shock absorbers, air chambers, hangers, anchors, expansion loops, connections to existing piping, covering, tests, etc. all as shown on the Drawings, as hereinafter specified.

C. Furnish and install a complete hot water distribution system to supply water to all new fixtures and equipment requiring heated water.

PART 2 - PRODUCTS

2.1 PIPING, FITTINGS AND MATERIALS

A. All components of water supply system shall confirm to all “No Lead” requirements including NSF/ANSI-372.

B. The domestic water systems shall be of the following material and shall be in accordance with the latest ASTM and ASME Standards.

C. Domestic water piping within the buildings shall be seamless drawn or extruded tubing type "L" copper. Both shall be of Chase, Anaconda, Revere, and approved equal, hard temper ASTM B88 with solder joint sweat end fittings. Fittings for use with copper tubing shall be cast brass of Muellers "Streamlin" pattern or approved equal.

D. Joints for copper tubing shall be made with 95-5 (lead and antimony free) solder. Flanges where required shall be cast brass. Provide dielectric adapters between ferrous and non-ferrous pipe joints.

2.2 VALVES

A. All shut-off valves 2” and smaller shall be ball valves equal to Apollo 70 Series or Milwaukee BA100 Series Valve. Bronze body with chrome plated trim

B. This Contractor shall furnish all valves as indicated on the Drawings, or as may be required for the proper control of the pipe lines installed under this Specification, so that any fixture, line or piece of apparatus may be cut out for repair without interference or interruption of the service to the rest of the Facility.

C. All domestic water valves shall have a minimum working pressure of 125 psig, steam rated unless otherwise noted on the Drawings or specified herein. All valves shall be of one manufacture as manufactured by Milwaukee Valve or Hammond.

D. All gate valves within the buildings shall be wedge gauge valves with painted iron wheel handles, shall have gland followers in stuffing boxes, and shall be so constructed that they may be repacked while open and under pressure. All valves shall have the name of the manufacturer and working pressure cast or stamped thereon.

E. All gate valves shall be all bronze with sweat or screwed joint ends as required by the piping system in which they are installed.

F. Globe valves shall be of all bronze with composition disc, threaded or sweat joint ends as required by piping system in which they are installed.

G. Check valves shall be all bronze swing check type with threaded or sweat joint ends. Check valves 4 inch and larger shall be iron body bronze mountings and shall be provided with screwed or flanged joint ends as required by piping system in which they are installed.

H. Drain valves, at risers and at low points, shall be 3/4 inch heavy cast brass with composition washers with male thread for hose connections.

2.3 SHOCK ABSORBERS

A. Shock absorbers shall be similar and equal to J.R. Smith 5000 series or Zurn Z1700 series with stainless steel pressurized shell sized in accordance with P.D.I. Bulletin WH-201.

B. Provide shock absorbers on all fixtures and equipment having quick closing valves whether or not indicated on the Drawings.

C. Provide access doors where shock absorbers are concealed.

2.4 VACUUM BREAKERS

A. Provide vacuum breakers on water supply piping to each fixture and equipment with submerged inlets, and on faucets and outlets, within the facility to which hose can be, or is attached forming a submerged inlet.

B. Set vacuum breakers in exposed readily accessible locations at least four inches above floor rim level of fixture, or high point of equipment.

C. Vacuum breakers shall be chrome-plated brass. "Watts" or other approved.

D. Vacuum breakers under constant pressure shall be of the continuous pressure type No. 9 "Watts" or Wilkins BFP-8CH or approved equal.

2.5 EXPANSION JOINTS, ANCHORS AND GUIDES

A. The entire piping installation shall be installed with adequate provision for expansion. No rigid connections will be permitted. Refer to Drawings for locations of expansion joints and related guides and anchors. The joints, guides and anchors shall be as manufactured by Flexonics Products, Metraflex or Flex-weld.

B. Branches shall be of sufficient length and have three elbow swings to allow for pipe expansion.

C. Any breaks in the piping within the guarantee period due to improper provision for expansion must be replaced at the expense of this Contractor, and the conditions corrected to prevent future recurrence.

D. Any damages to surrounding areas and equipment due to this failure shall also be repaired and paid for at the expense of this Contractor.

E. Joints to have 150 psi rating, ANSI-B16.5 with liner and cover.

2.6 STERILIZATION

A. The entire domestic water piping system shall be thoroughly sterilized with chlorine before acceptance for domestic operation.

B. The amount of chlorine applied shall be such as to provide a dosage of not less than 50 parts per million for 24 hours or 200 p.p.m. for one hour. The chlorinating material shall be either liquid chlorine or sodium hypochlorite solution and shall be introduced into the system and drawn to all points of the system. If possible to do so, the lines shall be thoroughly flushed before introduction of the chlorinating material. After a contact period of not less than 24 hours, the system shall be flushed with clean water until the residual content is not greater than 0.2 parts per million. All valves in the lines being sterilized shall be opened and closed several times during the contact period.

C. Sterilization and tests for purity of water in the entire piping system shall be performed by the Contractor through an approved independent testing laboratory and a certificate shall be furnished to the Architect certifying the quality of purity.

D. Per ANSI/AWWA Standard C651-15.

PART 3 - EXECUTION

3.1 INSTALLATION

A. It is the intent that each part of the plumbing system shall be complete in all details and water lines provided with all control valves as indicated on Drawings, or as may be required for the proper control of the pipe lines under this Specification so that any fixture, line or piece of apparatus may be cut out for repair without interference or interruption of the service to the rest of the facility.

B. This Contractor shall carefully examine the Architectural Drawings in detail and familiarize himself with all conditions relative to the installation of piping, particularly where same is concealed behind furring or in hung ceilings.

C. In no case shall this Contractor permit his pipes to be exposed beyond finished walls or ceilings unless specifically shown on Drawings. He shall consult with the Contractors of other trades in the building and install his piping in such a way as to least interfere with the installation of other trades.

D. The water piping shall all be installed so as to drain to a valve provided by this Contractor and branches shall not be trapped but shall have continuous pitch. Where necessary to raise or lower mains, the same shall be provided with a drip and shall be properly valved.

E. Piping shall be installed, whether indicated or not, so as to rise and/or drop to clear any and all conduits, lighting fixtures, ductwork and heating mains to maintain the desired clear heights. This Contractor shall consult with the Contractors of other trades and facilitate the erection of the equipment and piping.

F. Run piping straight and as direct as possible, in general forming right angles with or parallel to walls or other piping. Risers shall be erected plumb and true.

G. After cutting, all pipes shall be reamed out to full bore and before erection the inside of all pipes shall be thoroughly cleaned.

H. No piping or work shall be concealed or covered until all required tests have been satisfactorily completed and work has been approved by the Architect.

I. All materials shall be new and installed in a first class manner.

J. In erecting pipe, friction wrenches and vises shall be used exclusively, and any pipe cut, dented or otherwise damaged shall be replaced by this Contractor.

K. All ferrous to non-ferrous pipe connections shall be made with approved dielectric pipe or flange unions isolating joints to prevent any electrolytic action between dissimilar materials.

L. Any piece of pipe 6 inches in length or less shall be considered a nipple. All nipples with unthreaded portion 1-1/2 inch and less shall be of weight corresponding to fitting connected. Only shoulder nipples shall be used, close nipples will not be accepted.

M. Revised water service shall be in accordance with the local water supply department requirements. All water lines are to be protected from freezing. Install new piping for water service below frost line and provide concrete separations when crossing other utilities. Provide concrete thrust mass at changes of pipe direction conforming to authorities having jurisdiction.

END OF SECTION

SECTION 22 0160

SANITARY AND STORM DRAINAGE SYSTEMS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. The work under this section includes all labor, materials, equipment and appliances necessary and required to completely install all drainage systems as required by the Drawings; code and as specified herein, including but not limited to the following:

B. Complete sanitary drainage and venting systems including connections to the existing sanitary drainage and venting systems.

C. Piping and final connections for equipment furnished under other Divisions.

D. Alterations and removals to existing sanitary and vent systems.

E. Tests.

1.2 QUALITY ASSURANCE

A. All Cast Iron soil pipe and fittings shall bear the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.

B. Hubless Couplings:
Standard, Stainless-Steel Shielded, Couplings: Standard Couplings shall conform to CISPI 310 and ASTM C 1277. Shield Assemblies shall consist of a stainless steel bi-directional corrugated shield; stainless-steel bands and tightening devices; and an ASTM C 564, rubber sleeve with integral center stop. Couplings shall bear the NSF Trademark, and be manufactured in the USA.

PART 2 - PRODUCTS

2.1 PIPING AND FITTING MATERIALS

A. All indoor underground storm soil, waste and vent piping shall be service weight cast iron with fittings of bell and spigot type. Each length shall have the size, weight per foot and the manufacturer's name clearly cast or stamped thereon. Fittings and traps shall be similarly marked and of corresponding weights.

B. All aboveground storm, soil, waste and vent piping and fittings 3" and larger shall be service weight and fittings of bell and spigot type as specified in paragraph above. Above ground waste and vent piping 2" and smaller shall be galvanized steel, fittings on waste piping shall be galvanized cast iron, recessed drainage pattern, fitting on vent piping shall be galvanized cast iron, beaded pattern, screwed joints shall be made up to be perfectly tight without the use of lead or filler of any kind, except oil or graphite. Nipples for galvanized pipe shall be shoulder type. No close nipples shall be permitted.

C. Joints shall be made with compression gaskets conforming to ASTM C.564 and IPC 705.4.2. See 2.1, E. for underground joint options where permitted.

D. All galvanized pipe and fittings shall be galvanized with prime western spelter by hot drip process.

E. The Contractor has the option of using the following types of joints with hubless cast iron pipe only if approved by the governing agencies. These joints shall be used throughout the project. No mixing of joints shall be permitted.

1. Neoprene gasketed joints similar to Ty-Seal (for above and underground application).

2. Hubless cast iron pipe with neoprene gaskets and stainless steel clamps (by Clamp-All or equal) above ground only. All in accordance with Cast Iron Soil and Pipe Institute Standard 301 latest edition. Hangers and supports shall be in accordance with manufacturer's recommendations.

3. Copper DWV system with 50-50 tin antimony solder, DWV with solvent welded or screwed joints meeting CS-270-65.

2.2 CLEANOUTS

A. Provide easily accessible cleanouts where indicated at base of vertical stacks at ends of horizontal drainage lines and at intervals not exceeding 50 ft.; at each change of direction; on handholes of running traps, and where necessary to make entire drainage system accessible for rodding. Provide at least 18" clearance to permit access to cleanout plugs.

B. Cleanouts for cast iron pipe shall consist of tarpped extra heavy cast iron ferrule caulked into cast iron fittings and extra heavy brass tapered screw plug with solid hexagonal unit. Cleanouts for wrought iron pipe shall consist of extra heavy brass screw plug in drainage fitting.

C. Cleanouts turning out through walls and up through floors shall be made by long sweep ells or "Y" and 1/8 bends with plugs and face or deck plates to conform to Architectural finish in the room. Where no definite finish is indicated on the Architectural and/or Mechanical Drawings, wall plates shall be chrome plated cast brass and floor plates shall be nickel bronze.

D. Cleanouts shall be full size at the pipe up to 6" inclusive. On larger size piping 6" size plugs shall be used.

E. Cleanout fittings in vertical stacks shall consist of tapped tees capable of receiving a rough brass raised head cleanout plug, J.R. Smith S-4730, Zurn Z1445-A-BP or approved equal.

F. All cleanout plugs shall be brass lubricated with graphite before installation.

G. Cleanouts occurring in cast iron soil pipe above floor at change of direction of pipe run and at ends of horizontal runs shall be J.R. Smith S-4425, Zurn Z1441-A-BP or approved equal with cast iron ferrule for caulk connection and fitted with a straight threaded tapered bronze plug with raised hex head.

H. Cleanout deck plates for finished areas shall be similar and equal to J.R. Smith 4020 series, Zurn ZB1400-X or approved equal with cast iron ferrule, scoriated cutoff sections, brass cleanout plus collar with brass bolts for waterproofed slabs. In tile floor areas the cleanout deck plates shall be recessed to tile.

2.3 FLASHING

A. Provide 6 lb. lead flashing extending at least 10" beyond edge of all floor drains and vents through roof and all floor sleeves in floors with waterproofing or vapor barriers. Flashing shall be held securely in by clamping devices.

B. All floor drains shall be provided with flashing rings and 24" square 6 lb. sheet lead flashing, properly flashed into flashing ring of the drain.

2.4 SANITARY DRAINAGE

A. A complete system of drainage shall be provided as shown on the Drawings. The system shall include all drains, leaders, branches, house drains with all pipe fittings, hangers, anchors, etc. to make a complete sanitary drainage system. The systems shall extend through house drains and terminate as indicated on the Drawings.

B. Piping shall be sizes as indicated on the Drawings. The sanitary drains shall have a pitch of 1/8" per ft. minimum unless otherwise noted. Branch connections to stacks and house drains shall pitch a minimum of 1/8" per ft.

2.5 PIPING AND FITTINGS

A. Provide piping of one of the following materials, of weight/class indicated. Provide pipe fittings and accessories of same material and weight/class as pipes, with joining method as indicated.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPING

A. The size of soil, waste and vent piping shall be as determined by the State codes, rules and regulations for plumbing and drainage, except where specifically noted to be larger by the Specifications or Drawings and all fixed rules of installation, as set forth in the codes, rules and regulations, shall be followed as part of the Specifications.

B. This Contractor shall carefully examine the Architectural plans in detail and familiarize himself with all conditions relative to the installation of piping, particularly where same is concealed behind furring or in hung ceilings.

C. In no case shall this Contractor permit his pipes to be exposed beyond finished plaster lines unless specifically shown on Drawings. He shall consult with the Contractors of other trades in the building and install his piping in such a way as to least interfere with the installation of other trades.

D. Piping shall be installed, whether indicated or not, so to rise and/or drop to clear any and all conduits, lighting fixtures, ductwork and heating mains to maintain the desired cleat heights. This Contractor shall consult with the Contractors of other trades and facilitate the erection of the equipment and piping.

E. Run piping straight and as direct as possible in general forming right angles with or parallel to walls or other piping. Risers and stacks shall be erected plumb and true. After cutting, all pipes shall be reamed out to full bore and before erection the inside of all pipes shall be thoroughly cleaned.

F. No piping or work shall be concealed or covered until all required tests have been satisfactorily completed and work had been approved by the Architect and all other authorities having jurisdiction.

G. Branch connections shall be made with "Wye" and long "Tee-Wye" fittings, short 1/4 bends, common offsets and double hubs will not be permitted. Short "Tee-Wye" fittings are to be used in vertical piping only. All fittings shall conform to code requirements.

H. Cleanouts shall be provided at foot of all stacks, at changes of directions, at the ends of branch runs where shown and as required by code and shall be terminated as described under cleanouts.

I. The house drains must be run at a minimum grade of 1/8" per ft. downward in the direction of flow. Wherever possible, a 1/4" per ft. pitch shall be maintained. Branch connections to stacks from fixtures shall pitch 1/4" per ft. where possible. Attention is again called to the necessity of maintaining the ceiling heights established.

J. Furnish and install complete systems of vent pipes from the various plumbing fixtures and other equipment to which drainage connections are made. Vent pipes shall be connected to the discharge of each trap and shall be carried to a point above the ultimate overflow level of the fixture before connecting with any other vent pipe; in general, this will be approximately 3'-6" above the finished floor. Branches shall be arranged to pitch back to fixtures.

K. The individual vent pipes shall be collected together in branch vent lines and connected to existing vent connections through roof.

L. Any existing vents through roof, damaged, or if flashing on roof comes loose while connecting new vent to them shall be repaired and reflashed to the roof as required to maintain waterproofing the satisfaction of the Architect.

END OF SECTION

SECTION 22 0300

PLUMBING FIXTURES AND EQUIPMENT

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. The work under this section shall consist of furnishing all labor, materials, equipment and appliances necessary and required to completely do all plumbing fixture work, as required by the Drawings and as specified herein, including but not limited to the following: plumbing fixtures, traps, fittings, trimmings, brackets, plates, anchor, chair carriers and supports.

B. Just before the Owner's taking over the work in the building, this Contractor shall thoroughly clean all fixtures furnished and set under this Contract, leaving every fixture in perfect condition and ready for use.

C. Submit shop drawings and roughing sheets for all equipment for checking and approval.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES AND EQUIPMENT

A. All fixtures shall be free from imperfections, true as to line angles, curves and color, smooth, watertight, complete in every respect and practically noiseless in operation, Fixtures specified are given as the typical standard required as manufactured by American Standard and they or other similar approved fixtures as made by Kohler, Zurn or Eljer Companies shall be furnished, set and connected in good substantial, neat workmanlike manner.

B. The letter designations hereinafter correspond with the schedule on the Drawings.

1. Water Closet - Type A1
   Flush valve type, wall mounted 2856.128 "Afwall" vitreous china, siphon jet action, elongated bowl, 1-1/2" top spud, Zurn recessed hard wired 1.6 GPF low consumption flush valve, Model ZEMS 6142AV Olsonite #95 open front seat cover. Provide floor mounted carrier equal to Zurn Z1203 series or Z1204 series. Mount sensor assembly behind Zurn Model ZEMS6199 – BX17-C access panel with Vandal resistant screws. Furnish panel for general contractor installation.

2. Water Closet - Type A2 (Handicapped) Same as above except Handicapped.

3. Lavatory - Type B (Handicapped)
   0355.012 “Lucerne” white vitreous china lavatory with 4” centers, concealed arm support, 7723.018 offset grid drain, adjustable trap, loose key stops and all required trim. Zurn Model Z6915–XL–CWB hard wired faucet with mini junction box. Mount lavatory 34” above finished floor. Lavatory piping guards by general contractor.

4. Urinal - Type C
   6590.501 "Washbrook" white vitreous china, siphon jet urinal, wall hanger, 3/4" top spud, Zurn recessed hard wired Model ZEMS6197AV flush valve with vacuum breaker and angle stop, Josam series 17800 or Zurn Z-1222 concealed chair carrier. Mount sensor assembly behind Zurn Model ZEMS6199-BX17-U access panel with Vandal resistant screws. Furnish panel for general contractor installation.

5. Electric Water Cooler - Type D (Handicapped)
   Elkay EZH20 Bottle Filling Station with Bi-Level Reverse Filtered LZ Cooler Models LZSTL8WS and LZSTLDDWS.

6. Mop Receptor - Type E
   242406 "ACORN Reduced Height Mop Sink TRH-242406-BDS" precast terrazzo square model mop sink with Beehive-Dome Strainer. Provide the following accessories: "KBGS" 24" stainless steel bumper guard, "KDG3" rubber drain gasket for 3" waste pipe, "KFC" chrome finish (H&C) faucet, "KH36" 36" long hose with wall hanger, "KMH" mop hanger with 3 grips on a stainless steel bracket, and "KWG" 3 side wall guard (shipped loose). All exposed surfaces shall be ground smooth and sealed. No airhole or pits shall be allowed on the finish surface. Sink shall have covered corners and be pitched to the drain outlet for positive drainage. Integral drain shall have a stainless steel strainer and provide for an inside caulked connection to a 3" pipe.

7. Floor Drains:
   Josam series 30000A or Zurn Z415 type "B" coated cast iron, two piece body with double drainage flange, flashing collar, weepholes, bottom outlet and adjustable strainer.

8. Trap Primers: Provide trap primers on all floor drains equal to JR Smith 2698 with 1/2" primer tube from floor drain connected to nearest lavatory.

9. Wall Hydrants (Interior):
   J.R. Smith 5609 QT bronze nickel plated quarter turn with 3/4" hose connection, integral vacuum breaker with vandal resistant cap and T-handle key. Install under lavatories in all toilet rooms.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All fixtures shown on Drawings shall be set, connected and tested by the Contractor. He shall also make all water; soil, waste, vent and other service connections to fixtures as shown on Drawings or as directed and shall set, furnish, connect and test all necessary fittings.

B. All pipes at fixtures passing into walls, floors or partitions shall be provided with heavy cast brass escutcheons and security (tamperproof) set screws finished to match the pipe. No "waiving" of this section will be permitted.

C. All fittings escutcheons, faucets, traps, exposed piping etc. shall be brass, chrome plated over nickel plate with polished finish. Any visible hanger nuts shall be security (tamperproof) type and shall likewise be chrome plated over nickel plate.

D. This Contractor shall be responsible for protecting all plumbing fixtures including in these Specifications against injury from the building materials, tools and equipment. Any fixtures damaged during the construction period shall be replaced new. After all fixtures are set, this Contractor shall carefully grout all around fixtures.

END OF SECTION

SECTION 22 0420

SUPPORTS, SLEEVES AND PLATES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. This Contractor shall furnish and install all plates, hangers and supports for his piping.

B. All piping shall be hung or supported from structural members only.

PART 2 - PRODUCTS

2.1 PIPING

A. All piping shall be supported from building structure in a neat and workmanlike manner wherever possible, parallel runs of horizontal piping shall be grouped together on trapeze hangers. Vertical risers shall be supported at each floor line with steel pipe clamps. Use of wire perforated metal to support pipes will not be permitted. Hanging pipes from other pipes will not be permitted.

B. Necessary structural members, hangers and supports of approved design to keep piping in proper alignment and prevent transmission of injurious thrusts and vibrations shall be furnished and installed. In all cases where hangers, brackets, etc., are supported from concrete construction, care shall be taken not to weaken concrete or penetrate waterproofing.

C. All hangers and supports shall be capable of screw adjustment after piping is erected. Hangers supporting piping expanding into loops, bends and offsets shall be secured to the building structure in such a manner that horizontal adjustment perpendicular to the run of piping supported may be made to accommodate displacement due to expansion. All such hangers shall be finally adjusted, both in the vertical and horizontal direction, when the supported piping is hot.

D. Pipe hangers shall be as manufactured by Grinnell, whose catalog numbers are given herein, or equivalent Carpenter and Paterson, or F&S Mfg. Co.

E. Piping shall be supported as follows unless otherwise indicated on the Drawings:

1. Piping: 1-1/2 inch and smaller Fig. #260 adjustable clevis hanger. 2 inch and larger Fig. #174 one-rod swivel roll hanger.

2. Two-rod hangers shall be used for piping close to the ceiling slab or where conditions prohibit use of other hanger types.

3. Anchors for hanger rods shall be Phillips "Red Head" self-drilling type. Anchors shall be placed only in vertical surfaces.

4. Spacing of pipe supports shall not exceed 6 feet for pipes up to 1-1/2 inch and 10 feet on all other piping.

5. Hangers shall pass around insulation and a 16 gauge steel protective band; 12 inch long shall be inserted between hangers and insulation.

6. All piping shall be supported to allow free movement where expanding or contracting. Pipe shall be anchored as required or directed.

7. All lateral runs of piping shall be securely supported on hangers, rolls, brackets, etc. and in a manner to allow for proper expansion and elimination of vibration.

8. 2 inch and smaller pipe, where run on walls, shall be supported on wrought iron "J" hook brackets with anchor bolts.

9. All horizontal pipe, where run overhead or on walls, shall be supported as follows unless otherwise indicated: On adjustable steel clevis type hangers suspended on hanger rods, pipe sizes up to and including 4 inch.

F. Space limitations in hung ceilings spaces and conditions in other locations may require use of other type of hangers than those specified above. Suitable and approved pipe hangers shall be provided for such job conditions.

G. All supports shall be fastened to structural members or additional steel supports furnished by this Contractor.

H. Hanger rods shall be steel, threaded with nuts and lock nuts, sizes in accordance with following schedule:

Pipe Size	Rod Size
3/4" to 2" inclusive	3/8”
2-1/2" and 3" inclusive	1/2”
4" and 5" inclusive	5/8”
6”	3/4”
8" to 12" inclusive	7/8”

I. Cast iron piping shall be supported at intervals of not more than (5) feet (at each hub) on straight runs.

PART 3 - EXECUTION

3.1 PIPING

A. Where pipes pass through masonry, concrete walls, foundations, or floors, this Contractor shall set sleeves as are necessary for passage of pipes. These sleeves shall be of sufficient size to permit insulation where required to be provided around pipe passing through. This Contractor shall be responsible for exact location of these sleeves.

B. Sleeves shall not be used in any portion of building where use of same would impair strength or construction features of the building. Inserts for supporting lateral pipes and equipment shall be placed and secured to form work, and all sleeves inserts locations shall be thoroughly checked with Architect so as not to conflict with other trades.

C. Where pipes pass through floor or walls, they shall be provided with chromium plated escutcheons.

D. Anchor horizontal piping where indicated and wherever necessary to localize expansion or prevent undue strain on branches. Anchors shall be heavy forged construction entirely separate from supports.

E. Anchor vertical piping wherever indicated and wherever necessary to prevent undue strains on offsets and branches. Anchors, unless otherwise noted shall be heavy steel clamps securely bolted and welded to pipes. Extension ends shall bear on building construction.

F. Auxiliary steel supports that may be required for all mechanical equipment shall be furnished and installed by this Contractor.

G. All operating equipment including pumps, piping, etc. shall be supported so as to produce minimum amount of noise transmission.

END OF SECTION

SECTION 22 0430

INSULATION

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. The work under this section shall consist of furnishing all labor, materials, equipment and appliances necessary and required to completely do all insulation work as required by the Drawings and as specified herein including but not limited to the following: Insulation, covering, bands, tie wire.

PART 2 - PRODUCTS

2.1 INSULATION

A. The materials as specified have been selected from the catalogs of Owens-Corning Fiberglass Corp. and Johns-Manville Sales Corporation and are representative of the quality, design and finish desired. Insulation as manufactured by Gustin Bacon Co., or other approved manufacturer may be submitted for approval provided the product meets fully in all respects (such as density, moisture absorption, alkalinity, thermal-conductivity, jackets) to the materials as delineated below.

B. All insulation shall be UL rated non-combustible type classified flame spread-25, smoke-developed-50.

2.2 PIPING, FITTINGS AND VALVES

A. All insulation thickness shall be in accordance with the latest edition of the New York State Energy Conservation Construction Code.

B. Minimum pipe insulation shall be:

1. Hot water piping up to 1-1/4" – 1" insulation and piping 1-1/2" and larger – 1-1/2" insulation.

2. Cold water piping up to 1-1/2" – 1/2" insulation and piping 1-1/2" and larger – 1" insulation.

C. Domestic Cold, Hot Water Hot Water Return Indirect Waste, Storm and Piping Aboveground: All piping shall be insulated with sectional glass fiber insulation, Owens-Corning 2 piece ASJ/SSL. Joints between sections shall be sealed with factory supplied 3 inch wide sealing strips. Sealing by means of Owens Corning self-sealing lap will also be acceptable. Install (anti-sweat) vapor barriers on all cold water piping.

D. Domestic Hot and Cold Water Valves and Fittings: Fittings, valves, etc. shall be insulated with flexible blanket insulation compressed to 1/2 its thickness, tied on with jute twine over which shall be applied a flood coat of Insul-Coustic IC-102 and 10-20 open weave glass cloth. Glass cloth to be finished within additional coat of IC-102. Insulation blanket shall be Owens-Corning wrap.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All insulation on pipes running through walls, floors, partitions and beams shall be continuous through sleeves and openings.

B. Insulation shall be installed only after all tests of the piping system have been completed.

C. All insulation shall fit snugly.

D. All surfaces shall be clean and dry when insulation is applied.

E. Longitudinal joints shall be on least conspicuous side off the pipe.

F. Valves shall be insulated up to the packing unit.

G. As specified hereinbefore, all horizontal runs of piping will be supported on adjustable clevis or group trapeze type hangers. Pipe hangers will be installed outside of the insulation. Where hangers occur, prefabricated insulation protective saddles shall be "Insul-Shield-Multi-Purpose-Saddle" as manufactured by Insul-Coustic Corp. or approved equal.

H. Hot and cold water branch piping extending through slab or knockout panels to serve equipment shall be insulated to a point 4 inch above the top of sleeve provided for pipe.

I. The use of staples shall not be permitted.

J. It is the intent of this Specification that all vapor barriers be continuous throughout. Reinstate existing piping at point of new pipe connections.

END OF SECTION

SECTION 22 0470

TESTS AND ADJUSTMENTS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 TESTS AND ADJUSTMENTS

A. The Contractor shall, at his own expense, during the progress of the work or upon its completion as ordered make such tests as are specified or as required by and in the presence of the Architects, Building Inspectors, etc. At least 48 hours' notice shall be given in advance of all tests.

B. The Contractors shall provide all apparatus, temporary work or other requirements necessary for all tests. He shall take all due precautions to prevent damage to the building, its contents or the work of the other Contractors, that may be incurred by all tests. This Contractors shall also be responsible for the work of other Contractors that may be damaged or disturbed by the tests or the repair or replacement of his work, and he shall without extra charges, restore to its original condition, any work of other Contractors to do the work of restoration.

C. Tests on the various systems may be conducted in sections as the work progresses or when the systems are completed.

D. No caulking of pipe joints to remedy leaks will be permitted except where joints are made with lead and oakum.

E. Each section of the sanitary, storm and vent piping tested shall have all openings tightly closed with screw plugs, or equal device. The drainage and vent systems shall be filled with water and proven tight under a 10'-0" head for a minimum of four (4) hours. Water level must remain constant through test without adding water.

F. Upon final completion of the sanitary systems and when all fixtures and appurtenances have been set and the systems are in complete working order, all traps in the systems shall be filled with water and a thick penetrating smoke shall be introduced into the entire system.

G. As smoke appears at the stack openings on the roof, such openings on the roof shall be tightly closed and a pressure equivalent to 1-1/2 inch of water shall be maintained during the test. Oils of peppermint shall be added at the smoke making machines so that any leakage is readily discernible.

H. Before any covering is applied to the domestic water piping systems, the entire domestic water piping systems shall be hydrostatically tested for eight (8) hours to a hydraulic pressure of 125 psig.

I. At the completion of the test, Contractor shall furnish the Owner with one (1) copy of test certificates as issued by the insurance company.

J. Adjustments: Tests and adjustments shall be repeated as often as necessary until the systems are tight and are to the entire satisfaction of the Plumbing Inspector, Engineers and any other authorities having jurisdiction.

1. Contractor is to thoroughly instruct the building custodian in the proper care and operation of the entire system. Contractor shall prepare for use by custodian, detailed brochures of instructions in non-technical terms, describing the maintenance and operation of all fixtures, apparatus, valves, controls etc. furnished by him.

2. Should any part of the work performed under this Contract fail to function because of cracked piping, obstructions, debris in piping, leaks in piping or any other cause, this Contractor shall disconnect, clean and reconstruct the work at his own expense and pay for any damages to adjoining work.

3. Water flow is to be balanced and adjusted to all flush valves, faucets, etc.

4. All parts of the plumbing system are to be thoroughly flushed until cleared of all grease and sediment and all dirt pockets cleaned. Repeat as often as necessary, open all cleanouts and reset in graphite.

5. All new valves are to have stuffing boxes packed and adjusted.

END OF SECTION

SECTION 22 0480

TAGS, CHARTS AND IDENTIFICATION

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 TAGS, CHARTS AND IDENTIFICATION

A. Every valve installed under this Contract shall be tagged or labeled as follows: Tag shall be etched brass securely fastened to valve handwheels with heavy brass "S" hooks, soldered closed. At lock shield and similar type valves, tags for same shall be securely wired to valve body.

B. Charts shall be provided for each piping system, as approved and shall consist of schematic diagrams of piping layouts showing and identifying each valve and piece of equipment etc., and its use. Upon completion one (1) copy of diagrams and valve charts suitably framed under glass, shall be furnished and mounted where directed. One (1) copy of diagrams and valve charts shall be delivered to Owner.

C. This Contractor shall provide on all piping, semi-rigid, wrap around plastic identification markers equal to Seton Snap-Around and/or Seton Strap-On pipe markers.

D. Each marker background is to be appropriately color coded with a clearly printed legend to identify the contents of the pipe. Directions of flow arrows are to be included on each marker.

E. Identification of all piping shall be adjacent to each valve, at each pipe passage through wall, floor and ceiling construction and at each branch and riser take-off.

F. Identification shall be on all horizontal pipe runs, marked every 15 ft. as well as at each inlet outlet of equipment at changes in direction.

END OF SECTION

SECTION 22 0490

GUARANTEE

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 GUARANTEE

A. The Contractor shall remove, replace and/or repair at his own expense and at the convenience of the Owner, any defects in workmanship, materials, ratings, capacities and/or characteristics occurring in the work within one (1) year or within such longer period as may be provided in the Drawings and/or Section of the Specifications, which guarantee period shall commence with the final acceptance of the entire Contract in accordance with provisions stated in the General Conditions, and the Contractor shall pay for all damage to the system resulting from defects in the work and all expenses necessary to remove, replace and/or repair and any other work which may be damaged in removing, replacing and/or repairing the work.

END OF SECTION

SECTION 23 0100

GENERAL CONDITIONS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 GENERAL CONDITIONS

A. Before submitting a proposal, Bidders shall examine all related to this work and shall become fully informed as to the extent and character of the work required and its relation to the other work in the building.

B. Before commencing work, the Contractor will examine all conditions of the project upon which his work is in any way dependent for perfect workmanship according to the intent of this Specification. No "waiver of responsibility" for incomplete, inadequate or defective adjoining work will be considered unless notice has been filed by this Contractor and acceded to by the Owner's representative in writing before the Contractor begins any part of the work.

C. The Contractor will pay for all licenses, permits and inspection fees required by civil authorities having jurisdiction. Comply with all laws, ordinances, regulations, and fire underwriter’s requirements applicable to work herein specified without additional expense to the Owner.

D. Small scale drilling through walls and floors or cutting of piping insulation which may contain asbestos shall be performed by a person with a “restricted asbestos handler allied trades certificate” and shall have a copy of it in his possession at all times while working of the project. This shall also apply to removal of piping, ductwork or equipment insulation.

E. It is specifically intended that anything (whether material or labor), which is usually furnished as a part of such equipment, as is hereinafter called for (and which is necessary for the completion and proper operation) shall be furnished as part of this Contract without additional cost the Owner, whether or not shown in detail or described in the Specifications.

F. When Drawings and Specifications conflict or there is a question as to the proper intent of this Contract, the Contractor shall assume the greater quantity, the higher quality and/or the more expensive method in his pricing. All questions shall be directed to the Architect/Engineer in writing only and only up to ten (10) days prior to bidding.

G. The Drawings indicate the general runs of the piping, ductwork, etc. systems and the location of equipment and apparatus, however it shall be understood that the right is reserved by the Architect/Engineer to change the location of piping work, ductwork, equipment and apparatus to a reasonable extent as building conditions may dictate, prior to their installation without extra cost to the Owner.

H. All components supplied by this Contractor shall be UL listed and/or ETL labeled and shall conform to ASHRAE Standard 15.

I. Any changes from the Drawings and Specifications and any interpretation thereof shall have the prior approval of the Architect/Engineer. The Contractor shall submit in writing, at the time of signing the Contract, any items of necessary labor and materials, which, in his opinion, are lacking in requirements of the Drawings and Specifications to insure a complete job in all respects. No consideration will be granted to alleged misunderstanding of materials to be furnished, work to be done, or conditions to be complied with, it being understood that the tender of a proposal carries with it the agreement to all items and conditions referred to herein, or indicated on the accompanying Drawings.

END OF SECTION

SECTION 23 0110

SCOPE OF WORK

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 SCOPE OF WORK

A. The work under this section includes all labor, materials, equipment, tools, transportation, and the performance of all work necessary and required for the furnishing and installation complete of all work as shown on the Contract Documents, including but not necessarily limited to the following:

1. Exhaust, supply fans and related appurtenances.
2. Roof mounted condensing units.
3. Air handling units and related appurtenances.
4. All required piping, valves and related specialties.
5. Fin-tube radiation and convectors.
6. Sheetmetal ductwork and related accessories.
7. Duct and pipe insulation.
8. Registers, diffusers, and dampers..
9. Rigging of equipment.
10. Furnish all combination motor starter/disconnects for equipment (with the exception of starters and electric items already mounted on equipment or equipment not requiring same). Fan motor starter/disconnects shall have contacts for ATC connection and a terminal block connection for Fire Alarm fan shutdown. Starters per manufacturers recommendations. Underwriters inspection and certificate required. Coordinate with Electrical Contractor.
11. Air and Water Balancing.
12. Automatic temperature controls with complete wiring (regardless of voltage).
13. Testing, adjusting and start-up of equipment.
14. Painting and identification of all equipment and piping.
15. Firestopping per NFPA requirements (UL approved systems).
16. Operating and maintenance instructions.
17. As-Built Drawings - Refer to Division 1.
18. Cutting and Patching - Refer to Division 1.
19. Excavation and Backfill - Refer to Division 2.

B. Coordination Drawings (if applicable): Attention is directed to Division 1 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".

1.2 REMOVALS

A. Removals should be coordinated with other trades affected.

B. Piping which penetrates the construction may be cut and capped provided capping is done beneath the finished surfaces so that construction over it can be achieved.

C. All removals shall be removed from the site.

1.3 ALTERATION WORK

A. All equipment, piping, control components, etc. to be removed, shall be disposed of or salvaged as directed by the Owner. They shall not be removed from the premises without the Owner's approval.

B. All piping to be removed shall be properly plugged or capped so that upon completion of all new work, all abandoned piping shall be concealed in finished areas.

C. No dead ends shall be left on any piping upon completion of job. The existing system shall be left in perfect working order upon completion of new work.

D. Location and sizes of existing piping, ductwork, equipment, etc. are approximate. Exact sizes and locations of all existing work shall be verified on the job.

END OF SECTION

SECTION 23 0115

DUCTWORK CLEANING

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 QUALIFICATION OF THE HVAC SYSTEM CLEANING CONTRACTOR

A. Membership: The HVAC system cleaning contractor shall be a certified member of the National Air Duct Cleaners Association (NADCA), or shall maintain membership in a nationally recognized non-profit industry organization dedicated to the cleaning of HVAC systems.

B. Certification: The HVAC system cleaning contractor shall have a minimum of one (1) Air System Cleaning Specialist (ASCS) certified by NADCA on a full time basis, or shall have staff certified by a nationally recognized certification program and organization dedicated to the cleaning of HVAC systems.

C. Supervisor Qualifications: A person certified as an ASCS by NADCA, or maintaining an equivalent certification by a nationally recognized program and organization, shall be responsible for the total work herein specified.

D. Experience: The HVAC system cleaning contractor shall submit records of experience in the field of HVAC system cleaning as requested by the Architect/Engineer. Bids shall only be considered from firms which are regularly engaged in HVAC system maintenance with an emphasis on HVAC system cleaning and decontamination.

E. Equipment, Materials and Labor: The HVAC system cleaning contractor shall possess and furnish all necessary equipment, materials and labor to adequately perform the specified services.

1. The contractor shall assure that its employees have received safety equipment training, medical surveillance programs, individual health protection measures, and manufacturer’s product and material safety data sheets (MSDS) as required for the work by the U.S. Occupational Safety and Health Administration, and as described by this specification.

2. The contractor shall maintain a copy of all current MSDS documentation and safety certifications at the site at all times, as well as comply with all other site documentation requirements of applicable OSHA programs and this specification

3. Contractor shall submit to the Architect/Engineer all Material Safety Data Sheets (MSDS) for all chemical products proposed to be used in the cleaning process.

F. Licensing: The HVAC system cleaning contractor shall provide proof of maintaining the proper license(s), if any, as required to do work in this state. Contractor shall comply with all Federal, state and local rules, regulations, and licensing requirements.

1.2 STANDARDS

A. NADCA Standards: The HVAC system cleaning contractor shall perform the services specified here in accordance with the current published standards of the National Air Duct Cleaners Association (NADCA).

1. All terms in this specification shall have their meaning defined as stated in the NADCA Standards.
2. NADCA Standards must be followed with no modifications or deviations being allowed.

1.3 DOCUMENTS

A. Mechanical Drawings: The General Contractor shall provide the HVAC system cleaning contractor with one copy of the following documents:

1. Project drawings and specifications.
2. Approved construction revisions pertaining to the HVAC system.
3. Any existing indoor air quality (IAQ) assessments or environmental reports prepared for the facility.

PART 2 - HVAC SYSTEM CLEANING SPECIFICATIONS AND REQUIREMENTS

2.1 SCOPE OF WORK

A. Scope: This section defines the minimum requirements necessary to render HVAC components clean, and to verify the cleanliness through inspection and/or testing in accordance with items specified herein and applicable NADCA Standards.

B. The Contractor shall be responsible for the removal of visible surface contaminants and deposits from within the HVAC system in strict accordance with these specifications.

C. The HVAC system includes any interior surface of the facility's air distribution system occupied zones. This includes existing exhaust ductwork risers and distribution supply and return ductwork serving the Kitchen and Cafeteria, from the points where the air enters the system to the points where the air is discharged from the system.

2.2 HVAC SYSTEM COMPONENT INSPECTIONS AND SITE PREPARATIONS

A. HVAC System Component Inspections: Prior to the commencement of any cleaning work, the HVAC system cleaning contractor shall perform a visual inspection of the HVAC system to determine appropriate methods, tools, and equipment required to satisfactorily complete this project. The cleanliness inspection should include air handling units and representative areas of the HVAC system components and ductwork. The cleanliness inspection shall be conducted without negatively impacting the indoor environment through excessive disruption of settled dust, microbial amplification or other debris. In cases where contamination is suspected, and/or in sensitive environments where even small amounts of contaminant may be of concern, environmental engineering control measures should be implemented.

1. Damaged system components found during the inspection shall be documented and brought to the attention of the Architect/Engineer.

B. Site Evaluation and Preparations: Contractor shall conduct a site evaluation, and establish a specific, coordinated plan which details how each area of the building will be protected during the various phases of the project.

C. Inspector Qualifications: Qualified personnel should perform the HVAC cleanliness inspection to determine the need for cleaning. At minimum, such personnel should have an understanding of HVAC system design, and experience in utilizing accepted indoor environmental sampling practices, current industry HVAC cleaning procedures, and applicable industry standards.

2.3 GENERAL HVAC SYSTEM CLEANING REQUIREMENTS

A. Containment: Debris removed during cleaning shall be collected and precautions must be taken to ensure that Debris is not otherwise dispersed outside the HVAC system during the cleaning process.

B. Particulate Collection: Where the Particulate Collection Equipment is exhausting inside the building, HEPA filtration with 99.97% collection efficiency for 0.3-micron size (or greater) particles shall be used. When the Particulate Collection Equipment is exhausting outside the building, Mechanical Cleaning operations shall be undertaken only with Particulate Collection Equipment in place, including adequate filtration to contain Debris removed from the HVAC system. When the Particulate Collection Equipment is exhausting outside the building, precautions shall be taken to locate the equipment down wind and away from all air intakes and other points of entry into the building.

C. Controlling Odors: Measures shall be employed to control odors and/or mist vapors during the cleaning process.

D. Component Cleaning: Cleaning methods shall be employed such that all HVAC system components must be Visibly Clean as defined in applicable standards (see NADCA Standards). Upon completion, all components must be returned to those settings recorded just prior to cleaning operations.

E. Air-Volume Control Devices: Dampers and any air-directional mechanical devices inside the HVAC system must have their position marked prior to cleaning and, upon completion, must be restored to their marked position.

F. Service Openings: The contractor shall utilize service openings, as required for proper cleaning, at various points of the HVAC system for physical and mechanical entry, and inspection.

1. Contractor shall utilize the existing service openings already installed in the HVAC system where possible.

2. Other openings shall be created where needed and they must be created so they can be sealed in accordance with industry codes and standards.

3. Closures must not significantly hinder, restrict, or alter the airflow within the system.

4. Closures must be properly insulated to prevent heat loss/gain or condensation on surfaces within the system.

5. Openings must not compromise the structural integrity of the system.

6. Construction techniques used in the creation of openings should conform to requirements of applicable building and fire codes, and applicable NFPA, SMACNA and NADCA Standards.

7. Cutting service openings into flexible duct is not permitted. Flexible duct shall be disconnected at the ends as needed for proper cleaning and inspection.

8. All service openings capable of being re-opened for future inspection or remediation shall be clearly marked and shall have their location reported to the Architect/Engineer and Westchester County in project report documents.

G. Ceiling sections (tile): The contractor may remove and reinstall ceiling sections to gain access to HVAC systems during the cleaning process.

H. Air distribution devices (registers, grilles & diffusers): The contractor shall clean all air distribution devices.

I. Duct Systems - Contractor shall:

1. Create service openings in the system as necessary in order to accommodate cleaning of otherwise inaccessible areas.

2. Mechanically clean all duct systems to remove all visible contaminants, such that the systems are capable of passing Cleaning Verification Tests (see NADCA Standards).

2.4 HEALTH AND SAFETY

A Safety Standards: Cleaning contractors shall comply with applicable federal, state, and local requirements for protecting the safety of the contractor's employees, building occupants, and the environment. In particular, all applicable standards of the Occupational Safety and Health Administration (OSHA) shall be followed when working in accordance with this specification.

B. Occupant Safety: No processes or materials shall be employed in such a manner that they will introduce additional hazards into occupied spaces.

C. Disposal of Debris: All Debris removed from the HVAC System shall be disposed of in accordance with applicable federal, state and local requirements.

2.5 MECHANICAL CLEANING METHODOLOGY

A. Source Removal Cleaning Methods: The HVAC system shall be cleaned using Source Removal mechanical cleaning methods designed to extract contaminants from within the HVAC system and safely remove contaminants from the facility. It is the contractor's responsibility to select Source Removal methods that will render the HVAC system Visibly Clean and capable of passing cleaning verification methods (See applicable NADCA Standards) and other specified tests, in accordance with all general requirements. No cleaning method, or combination of methods, shall be used which could potentially damage components of the HVAC system or negatively alter the integrity of the system.

1. All methods used shall incorporate the use of vacuum collection devices that are operated continuously during cleaning. A vacuum device shall be connected to the downstream end of the section being cleaned through a predetermined opening. The vacuum collection device must be of sufficient power to render all areas being cleaned under negative pressure, such that containment of debris and the protection of the indoor environment are assured.

2. All vacuum devices exhausting air inside the building shall be equipped with HEPA filters (minimum efficiency), including hand-held vacuums and wet-vacuums.

3. All vacuum devices exhausting air outside the facility shall be equipped with Particulate Collection including adequate filtration to contain Debris removed from the HVAC system. Such devices shall exhaust in a manner that will not allow contaminants to re-enter the facility. Release of debris outdoors must not violate any outdoor environmental standards, codes or regulations.

4. All methods require mechanical agitation devices to dislodge debris adhered to interior HVAC system surfaces, such that debris may be safely conveyed to vacuum collection devices. Acceptable methods will include those, which will not potentially damage the integrity of the ductwork, nor damage porous surface materials such as liners inside the ductwork or system components.

B. Methods of Cleaning Fibrous Glass Insulated Components

1. Fibrous glass thermal or acoustical insulation elements present in any equipment or ductwork shall be thoroughly cleaned with HEPA vacuuming equipment, while the HVAC system is under constant negative pressure, and not permitted to get wet in accordance with applicable NADCA and NAIMA standards and recommendations.

2. Cleaning methods used shall not cause damage to fibrous glass components and will render the system capable of passing Cleaning Verification Tests (see NADCA Standards).

C. Damaged Fibrous Glass Material

1. Evidence of damage: If there is any evidence of damage, deterioration, delaminating, friable material, mold or fungus growth, or moisture such that fibrous glass materials cannot be restored by cleaning or resurfacing with an acceptable insulation repair coating, they shall be identified for replacement.
2. Replacement: When requested or specified, Contractor must be capable of remediating exposed damaged insulation in air handlers and/or ductwork requiring replacement.
3. Replacement material: In the event fiber glass materials must be replaced, all materials shall conform to applicable industry codes and standards, including those of UL and SMACNA.
4. Replacement of damaged insulation is **not** covered by this specification.

D. Antimicrobial Agents and Coatings

1. Antimicrobial agents shall only be applied if active fungal growth is reasonably suspected, or where unacceptable levels of fungal contamination have been verified through testing.
2. Application of any antimicrobial agents used to control the growth of fungal or bacteriological contaminants shall be performed after the removal of surface deposits and debris.
3. When used, antimicrobial treatments and coatings shall be applied in strict accordance with the manufacturer's written recommendations and EPA registration listing.
4. Antimicrobial coatings shall be applied according to the manufacturer's written instructions. Coatings shall be sprayed directly onto interior ductwork surfaces, rather than "fogged" downstream onto surfaces.

2.6 CLEANLINESS VERIFICATION

A. General: Verification of HVAC System cleanliness will be determined after mechanical cleaning and before the application of any treatment or introduction of any treatment-related substance to the HVAC system, including biocidal agents and coatings.

B. Visual Inspection: The HVAC system shall be inspected visually to ensure that no visible contaminants are present.

1. If no contaminants are evident through visual inspection, the HVAC system shall be considered clean; however, the Architect/Engineer reserves the right to further verify system cleanliness through Surface Comparison Testing or the NADCA vacuum test specified in the NADCA standards.

2. If visible contaminants are evident through visual inspection, those portions of the system where contaminants are visible shall be re-cleaned and subjected to re-inspection for cleanliness.

3. NADCA vacuum test analysis should be performed by a qualified third party experienced in testing of this nature.

2.7 PRE-EXISTING SYSTEM DAMAGE

A. Contractor is not responsible for problems resulting from prior inappropriate or careless cleaning techniques of others.

2.8 POST-PROJECT REPORT

A. At the conclusion of the project, the Contractor shall provide a formal report to the Architect/Engineer and Westchester County indicating the following:

1. Success of the cleaning project, as verified through visual inspection and/or gravimetric analysis.

2. Areas of the system found to be damaged and/or in need of repair.

3. Documentation of work performed shall be in compliance with ASHRAE 62.1, Section 7.2.4 Cleanliness.

2.9 APPLICABLE STANDARDS AND PUBLICATIONS

A. The following current standards and publications of the issues currently in effect form a part of this specification to the extent indicated by any reference thereto:

1. National Air Duct Cleaners Association (NADCA): “Assessment, Cleaning & Restoration of HVAC Systems (ACR 2005),” 2004.

2. National Air Duct Cleaners Association (NADCA): “Understanding Microbial Contamination in HVAC Systems,” 1996.

3. National Air Duct Cleaners Association (NADCA): “Introduction to HVAC System Cleaning Services,” 2004.

4. National Air Duct Cleaners Association (NADCA): Standard 05 “Requirements for the Installation of Service Openings in HVAC Systems,” 2004.

5. Underwriters’ Laboratories (UL): UL Standard 181.

6. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE): Standard 62-89, "Ventilation for Acceptable Indoor Air Quality".

7. Environmental Protection Agency (EPA): "Building Air Quality," December 1991.

8. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): “HVAC Duct Construction Standards - Metal and Flexible,” 1985.

END OF SECTION

SECTION 23 0236

INDOOR STATIC PLATE ENERGY RECOVERY VENTILATORS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 PRODUCT SPECIFICATION

A. Shall be a packaged counter flow plate-type, heat and humidity transfer energy recovery ventilator as manufactured by Energy Wall.

1.2 QUALITY ASSURANCE

A. The energy recovery cores used in these products shall be certified by ARI under its Standard 1060 for Energy Recovery Ventilators. ARI published certifications shall confirm manufacture's published performance for airflow, static pressure, temperature and total effectiveness, purge air (OACF) and exhaust air leakage (EATR). Products that are not currently ARI Certified will not be accepted.

B. Manufacturer shall be able to provide evidence of independent testing of the core by Underwriters Laboratory (UL), verifying a maximum flame spread index (FSI) of 25 and a maximum smoke developed index (SDI) of 50 thereby meeting NFPA 90A and NFPA 90B requirements for materials in a compartment handling air intended for circulation through a duct system. The method of test shall be UL Standard 723.

C. Unit shall be listed under UL 1812 Standard for Ducted Air to Air Heat Exchangers.

D. The Energy Wall core shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of ten years from the date of purchase. Balance of Unit shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of two years from the date of purchase.

PART 2 - PRODUCTS

2.1 ENERGY TRANSFER

A. Shall be capable of transferring both sensible and latent energy between air streams.

2.2 FAN MOTORS

A. Fans shall be ECM fans with variable airflow adjustability and balancing with mechanical turn potentiometers. Remote variable airflow adjustability via 0-10V signal.

2.3 CONTINUOUS VENTILATION

A. Unit shall have the capacity to operate continuously without the need for bypass, recirculation, preheaters, or defrost cycles under normal operating conditions.

2.4 POSITIVE AIR STREAM SEPARATION

A. Water vapor transfer shall be through molecular transport by hydroscopic resin and shall not be accomplished by "porous plate" mechanisms. Exhaust and fresh airstreams shall at all times travel in separate passages, and airstreams shall not mix.

2.5 LAMINAR FLOW

A. Airflow through the energy exchange element shall be laminar, avoiding deposition of particulates on the interior of the energy exchange plate material.

2.6 CONSTRUCTION

A. Fixed-plate energy-exchange element. Energy-exchange module shall be of fixed-plate cross-flow construction, with no moving parts.

B. The unit case shall be constructed of corrosion proof, doble wall polypropylene with nano-particle metal oxide insulation.

D. Unit shall have single-point power connection.

E. Flange components shall be provided suitable for connection of ductwork.

F. Access doors shall provide easy access to filters.

G. Energy-exchange element shall be protected by two MERV 13 rated 2” nominal pleated, disposable filters.

END OF SECTION

SECTION 23 0265

VARIABLE REFRIGERANT FLOW INDOOR UNITS

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 SYSTEM DESCRIPTION

A. Indoor units are matched with heat pump or heat recovery VRF (variable refrigerant flow) outdoor unit.

1.2 DELIVERY, STORAGE AND HANDLING

A. Units shall be stored and handled per unit manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 DUCTED – HIGH STATIC

A. General

1. Unit shall be manufactured by LG.
2. Unit shall be designed to be installed for indoor applications.
3. Unit shall be designed to mount fully concealed above the finished ceiling.
4. Unit shall have opening to supply air from front horizontal and a dedicated rear horizontal return.
5. The supply air shall be flanged for field installed ductwork that shall not exceed the external static pressure limitation of the unit.

B. Casing/Panel

1. Unit case shall be manufactured using galvanized steel plate.
2. The cold surfaces of the unit shall be covered internally with a coated polystyrene insulating material.
3. Unit shall be provided with hanger brackets designed to support the unit weight on four corners.
4. Hanger brackets shall have pre-punched holes designed to accept field supplied, all thread rod hangers.

C. Cabinet Assembly

1. Unit shall have horizontal supply air discharge outlets and a return air inlet
2. Unit shall be equipped with factory installed temperature thermistors for:
   a. Return air
   b. Refrigerant entering coil
   c. Refrigerant leaving coil
3. Unit shall have a factory assembled, piped and wired electronic expansion valve (EEV) for refrigerant control.
4. Unit shall have a built-in control panel to communicate with other indoor units and to the outdoor unit.
5. Unit shall have the following functions as standard:
   a. Self-diagnostic function
   b. Auto addressing
   c. Auto restart function
   d. Auto changeover function (Heat Recovery system only)

e. Auto operation function
f. Child lock function
g. Forced operation
h. Dual thermistor control
i. Sleep mode
j. External static pressure (ESP) control
k. Dual set point control
l. Multiple aux heater applications
m. Filter life timer
n. External on/off input
o. Wi-Fi compatible
p. Auto fan operation
q. Leak detection logic

D. Fan Assembly

1. The unit shall have two direct drive Sirocco fans made of high strength ABS GP-2200.
2. The fan impeller shall be statically and dynamically balanced.
3. The fans shall be mounted on a common shaft.
4. The fan motor is Brushless Digitally commutated (BLDC) with permanently lubricated and sealed ball bearings.
5. The fan motor shall include thermal, overcurrent and low RPM protection.
6. The fan/motor assembly shall be mounted on vibration attenuating rubber grommets.
7. The fan speed shall be controlled using microprocessor based direct digitally controlled algorithm that provides a minimum of three pre-programed fan speeds, each setting is also adjustable by field setting to compensate for a limited amount of additional resistance to airflow by adjusting the RPM of the fan motor.
8. In cooling mode, the indoor fan shall have the following settings: Low, Med, High, and Auto.
9. In heating mode, the indoor fan shall have the following settings: Low, Med, High, and Auto.
10. Each of the settings can be field adjusted from the factory setting (RPM/ESP).
11. Unit shall be designed for high speed air volume against an external static pressure of up to 0.98” water gauge, model dependent.

E. Filter Assembly

1. The return air inlet shall have a factory supplied removable, washable filter. MERV 13 filter rack is available as an option, model dependent.
2. The filter access shall be from the rear of the unit.

F. Coil Assembly

1. Unit shall have a factory-built coil comprised of aluminum fins mechanically bonded on copper tubing.
2. The copper tubing shall have inner grooves to expand the refrigerant contact surface for high efficiency heat exchanger operation.
3. Unit shall have a minimum two to three row coil, 18-21 fins per inch.
4. Unit shall have a factory supplied condensate drain pan below the coil constructed of HIPS (high impact polystyrene resin).
5. Unit shall include an installed and wired condensate drain lift pump capable of providing minimum 27.5-inch lift from bottom surface of the unit. Ducted High Static- The unit drain pan is supplied with a secondary drain port/plug allowing the pan to be gravity drained and serviced.
6. The drain pump shall have a safety switch to shut off the unit if condensate rises too high in the drain pan, model dependent.
7. Unit shall have provision of 45° flare refrigerant pipe connections.
8. The coil shall be factory pressure tested at a minimum of 550 psig.

9. All refrigerant piping from outdoor unit to indoor unit shall be field insulated. Each pipe should be insulated separately. Thickness and heat transfer characteristics shall be determined by the design engineer and shall meet all code requirements.

G. Microprocessor Control

1. The unit shall have a factory installed microprocessor controller capable of performing functions necessary to operate the system with or without the use of a wall mounted controller. The unit shall have a factory mounted return air thermistor for use as a space temperature control device. All operating parameters except scheduling shall be stored in non-volatile memory resident on the microprocessor. The microprocessor shall provide the following functions, self-diagnostics, auto re-start after a power failure and a test run mode.
2. The unit shall be able to communicate with other indoor units and the outdoor unit using a field supplied minimum of 18 AWG, two core, stranded, twisted, and shielded communication cable (RS-485).
3. The unit controls shall operate the indoor unit using one of the five operating modes:
   a. Auto changeover (Heat Recovery System only)
   b. Heating
   c. Cooling
   d. Dry
   e. Fan only
4. The unit shall be able to operate in either cooling or heating mode for testing and/or commissioning.
5. The unit shall be able to operate with the fan turned off during system cooling thermal off.
6. The unit shall be able to operate with a continuous fan setting.
7. The unit shall have adjustable, multi-step cooling and heating mode thermal on/off temperature range settings.
8. The system shall include a product check function to access and display indoor unit type and capacity from a wired programmable thermostat controller.

H. Electrical

1. The unit electrical power shall be 208-230/1/60 (V/Ph/Hz).
2. The unit shall be capable of operating within voltage limits of +/- 10% of the rated voltage.

I. Controls

1. Unit shall use controls provided by the manufacturer to perform all functions necessary to operate the system effectively and efficiently and communicate with the outdoor unit over an RS-485 daisy chain.

J. Seismic Installations

1. Provide OSHPD Special Seismic Certification Preapproval (OSP) documents for certified product list of VRF equipment to be installed in high seismic risk areas. Provide LG supplemental installation documents in conformance with CBC 2013, 2016 and 2019 California Building Code and IBC 2012, 2015 and 2018 International Building Code.

K. Warranty

1. Please refer to the respective outdoor unit for applicable warranty.

2.2 BMS INTEGRATION

A. The VRF system shall be able to integrate with Building Management Systems via BACnet™ IP gateway. This gateway converts between BACnet™ IP or Modbus TCP protocol, and RS-485 LGAP (LG Aircon protocol) allowing third party control and monitoring of the LG A/C system, or LonWorks™ gateways. See controls specification for points list

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0267

VARIABLE REFRIGERANT FLOW OUTDOOR UNITS

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 SYSTEM DESCRIPTION

A. Indoor units are matched with heat pump or heat recovery VRF (variable refrigerant flow) outdoor unit.

1.2 DELIVERY, STORAGE AND HANDLING

A. Units shall be stored and handled per unit manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MULTI V™ 5 HEAT RECOVERY AND HEAT PUMP SYSTEM(S) – (6 to 42 tons nominal)

A. Product Design

1. LG Multi V 5 heating and cooling system shall be an air cooled system allowing user to configure in the field a heat pump or a heat recovery system consisting of one to three outdoor unit modules, conjoined to make a 6-42 ton single refrigerant circuit.
   a. Heat recovery systems, employing three pipes, shall be connected to Heat recovery (heat recovery) unit(s) and indoor unit(s). Multi-port heat recovery units shall allow simultaneous heating and cooling of individual zone(s) at various capacities as required to satisfy their zone requirements.
   b. Heat pump systems shall require two pipes, simultaneous heating and cooling shall not be supported. The heat recovery system shall consist of three pipes, liquid, suction and hot gas pipes. Heat recovery systems operating at 0°F that cannot deliver single phase superheated refrigerant vapor at a minimum of 162°F while operating in the heating mode shall not be acceptable.

2. All three-phase VRF heat pump and heat recovery outdoor units shall be from the same product development generation. Mixing of outdoor units from different development generations is not acceptable.

B. Operating Conditions

1. Outdoor Unit shall be capable of continuous compressor operation between the following operating ambient air conditions, operation outside of these conditions are possible and may involve non-continuous operations.

2. Operating Ambient Air Conditions:
   a. Cooling: 5°F DB to 122°F DB - With optional low ambient kit from -9.9°F DB to 122°F DB
   b. Heating: -22°F WB to 61°F WB
   c. Cooling Based (ODU reversing valve in cooling position) Synchronous: 14°F DB to 81°F DB (Heat Recovery Operation Only)
   d. Heating Based (ODU reversing valve in heating position) Synchronous: 14°F WB to 61°F WB (Heat Recovery Operation Only)

C. Electrical

1. All air source heat pump and heat recovery frame(s) shall be designed and electrically protected to maintain stable continuous compressor operation when provided with 208-230/60/3 power with the following specifications:
   a. 208-230/60/3 power and can withstand a voltage fluctuation of ± 10%
   b. Voltage imbalance of up to two percent.
   c. Power surge of up to 5kA RMS Symmetrical.

D. General Features

1. The air-conditioning system shall use R410A refrigerant.

2. Each system shall consist of one, two or three air source outdoor unit modules conjoined together in the field to result in the capacity specified elsewhere in these documents.
3. Dual and triple frame configurations shall be field piped together using manufacturer's designed and supplied Y-branch kits and field provided interconnecting pipe to form a common refrigerant circuit.
4. System shall have following frame configurations vs. capacity.
   a. 6 to 20 ton units shall be a single frame only.
   b. 22 to 34 ton units shall be dual frame only.
   c. 36 to 42 ton heat recovery units shall be triple frame only
5. System shall employ self-diagnostics function to identify any malfunctions and provide type and location of malfunctions via fault alarms.
6. Field Provided Refrigerant Piping:
   a. The refrigerant circuit shall be constructed using field provided ACR copper, de-hydrated, refrigerant rated copper pipe, piped together with manufacturer supplied Heat recovery unit(s) and Y- branches, as may be required, connected to multiple (ducted, non-ducted or mixed combination) indoor units to effectively and efficiently control the heat pump operation or simultaneous heating and cooling operation of the heat recovery VRF system. Other pipe materials, if used, shall perform, at a minimum, as well as that specified above, shall not have any adverse reactions, for example galvanic corrosion, to any other components or materials also in use in the system and shall be installed per manufacturer's instructions.
   b. The unit shall be shipped from the factory fully assembled including internal refrigerant piping, inverter driven compressor(s), controls, temperature sensor, humidity sensor, contacts, relay(s), fans, power and communications wiring as necessary to perform both Heat Pump and Heat recovery operations.
   c. Each outdoor unit refrigeration circuit shall include, but not limited to, the following components:
      i. Refrigerant strainer(s)
      ii. Check valve(s)
      iii. Inverter driven, medium pressure vapor injection, high pressure shell compressors
      iv. 5 Heat- Liquid refrigerant cooled inverter PCB
      v. Oil separator(s)
      vi. Accumulator /controlled volume receiver(s)
      vii. 4-way reversing valve(s)
      viii. Vapor injection valve(s)
      ix. Variable path heat exchanger control valve(s)
      x. Oil balancing control
      xi. Oil Level sensor(s)
      xii. Electronic expansion valve(s)
      xiii. Double spiral tube sub-cooler (s) and EEV
      xiv. Vapor Injection Valve(s)
      xv. High and low side Schrader valve service ports with caps

7. Field Insulation:
   a. All refrigerant pipe, y-branches, elbows and valves shall be individually insulated with no air gaps. Insulation R-value (thickness) shall not be less than the minimum called for by the local building code, local energy code or as a minimum per manufacture installation requirements. In no case shall the insulation be allowed to be compressed at any point in the system.
      i. All joints shall be glued and sealed per insulation manufactures instructions to make an air tight assembly.

8. Microprocessor:
   a. Factory installed microprocessor controls in the outdoor unit(s), heat recovery unit(s), and indoor unit(s) shall perform functions to optimize the operation of the VRF system and communicate in a daisy chain configuration between outdoor unit and heat recovery unit(s) and indoor unit(s) via RS485 network. Controls shall also be available to control other building systems as required from the VRF control system. DIO/AIO capabilities shall be available as well as a central controller to perform operation changes, schedules and other duties as required by this specification. Addition of separate building control system shall not be required. Other control devices and sequences shall be as specified in other sections of this project specification. Multi S- Factory installed microprocessor control in the outdoor unit, heat recovery unit(s), and indoor unit(s) shall communicate using the same protocol. Translators of any kind are not allowed. Communication between VRF system components shall be via field supplied stranded, shielded and twisted wire pair in a RS 485 network configuration. Integrated control system shall perform functions to optimize the operation of the VRF system.

9. Inverter PCB Cooling:
   a. Cooling of the inverter PCB shall be conducted by way of high pressure, sub-cooled liquid refrigerant via heat exchanger attached to the inverter PCB. The full capacity flow of refrigerant shall pass though the heat exchangers to maximize the cooling effect of the PCBs and to aid in the evaporation process and capacity of the outdoor coil during the heating mode. The recovered heat of the PCBs must be used to enhance the overall heating process, other uses or dissipation of heat to ambient shall not be permitted.

10. Compressor Control:
   a. Fuzzy control logic shall establish and maintain target evaporating temperature (Te) to be constant on cooling mode and condensing temperature (Tc) constant on heating mode - by Fuzzy control logic to ensure the stable system performance.

11. Initial Test Run (ITR) (Heating or Cooling) / Fault Detection Diagnosis (FDD) Code:
   a. This control mode shall monitor and display positive or negative results of system initial startup and commissioning. Heating or Cooling ITR mode will be automatically selected. It shall monitor and provide performance metrics for the following, but not be limited to, refrigerant quantity charge, auto-charge, stable operations, connection ratios, indoor unit status, error status, and number of indoor units connected. This control mode shall not replace the system error monitoring control system.

12. BMS Integration:
   a. The VRF system shall be able to integrate with Building Management Systems via BACnet™ IP gateway. This gateway converts between BACnet™ IP or Modbus TCP protocol, and RS-485 LGAP (LG Aircon protocol) allowing third party control and monitoring of the LG A/C system, or LonWorks™ gateways. See controls specification for points list.

13. Wi-Fi Communication:
    a. The outdoor unit shall be Wi-Fi enabled and capable. Wi-Fi shall allow service or maintenance personal access to the complete operating system, via LGMV mobile, without need of tools other than smart phone or tablet. Active live system review, collection of all system data for a field determined duration presented in a .csv file format or collection of all operating conditions, including all indoor units, valves, sensors, compressor speeds, refrigerant pressures, etc., by snapshot of conditions and placing that snapshot into a power point slide to be reviewed at another time.
    b. Systems that require computers, hard wire only connection or other devices to collect, review or record operating conditions shall not be allowed.

14. Indoor Unit Connectivity:
    a. The system shall be designed to accept connection up to 64 indoor units of various configuration and capacity, depending on the capacity of the system.

15. Power and Communication Interruption:
    a. The system shall be capable of performing continuous operation when an individual or several indoor units are being serviced; communication wire cut or power to indoor unit is disconnected. Systems that alarm and/or shut down because of a lack of power to any number of indoor units shall not be acceptable.

16. Connection Ratios:
    a. The maximum allowable system combination ratio for all VRF systems shall be 130% and the minimum combination ratio shall be 50%.

17. Comfort Cooling Mode:
    a. Comfort cooling shall be initiated via a field setting at the outdoor unit during commissioning or anytime thereafter. Comfort cooling shall allow user to select all or some of the zones on a system to automatically adjust their evaporator temperatures, independent of other zones, based on the impending total loads of that zone determined by using the zone controller temperature sensor.

18. The outdoor unit refrigerant circuit shall employ for safety a threaded fusible plug.

19. Refrigerant Flow Control
    a. An active refrigerant control and multi section accumulator-receiver that dynamically changes the volume of refrigerant circulating in the system based on operating mode and operating conditions to ensure maximum system performance and efficiency.
    b. Subcooler: The VRF outdoor unit shall include a factory provided and mounted sub-cooler assembly consisting of a shell and tube-type sub-cooling heat exchanger and EEV providing refrigerant sub-cooling modulation control by fuzzy logic of EEV and by mode of operation to provide capacity and efficiency as required. Brazed plate heat exchangers shall not be allowed for this function.

    c. Smart Load Control- The air source unit shall be provided with Smart Load Control (SLC) enhanced energy saving algorithm that reduces compressor lift during off peak operation.
        i. The SLC algorithm shall be monitoring in real time, the rate of change of the outdoor ambient air temperature, either the outdoor ambient air relative humidity or the indoor air relative humidity (field selectable), and the rate of change of the building load.
        ii. The SLC algorithm shall foresee pending changes in the building load, outdoor temperature and humidity (or indoor humidity) and proactively reset head and/or suction pressure targets in anticipation of the reduction/increase in building load.

iii. The SLC algorithm shall provide no fewer than 3 field selection options to maximize the control of the VRF system operation during morning warm-up or cool-down following night-setback reset. The selection shall be set by the commissioning agent (or at any other time thereafter). Selectable algorithm choices include:
1. Maximize energy savings
2. Balance the rate of temperature change with energy consumed.
3. Quickly cool/heat the building.

20. Refrigerant Volume Management
a. Active Refrigerant Charge
i. The VRF system shall be able to operate at any and all published conditions year round in cooling or heating mode without the need of adding or removing refrigerant from the system.
ii. The air source unit shall be provided with an isolated vessel to store spare refrigerant and actively pass refrigerant to (or from) the accumulator in real time as necessary to maintain stable refrigeration cycle operation.
iii. The air source unit microprocessor shall be provided with an algorithm that monitors the VRF system head pressure, suction pressure, subcooling, superheat, compressor speed, high and low side temperatures and the load on the system to adjust the volume of refrigerant actively circulating.
b. Manual Seasonal Refrigerant Charge Adjustments
(Applicable for VRF systems without Active Refrigerant Charge)
i. Alternates: Systems that CANNOT passively and automatically modify the active refrigerant charge using the method(s) stated to maintain stable cycle operation shall clearly state so in bold capital letters in the proposal. VRF systems that cannot perform active refrigerant control may submit a proposal as an Alternate and must include as part of the equipment price the cost of to provide bi-annual refrigerant charging services for 15 years. Service shall be performed by the factory authorized agent only. Service shall include refrigerant, parts, labor, and fees necessary to analyze the current state of the system and perform the refrigerant charge adjustment. Service must occur one month before the winter season and one month before the summer season.
ii. If the VRF system requires a charge adjustment more frequently to maintain stable operation, the VRF manufacturer shall provide additional services at no additional charge.
iii. The 15 year period shall begin on the date the equipment is commissioned or the date the building occupancy permit was issued for the area(s) served by the system – whichever date is later.
iv. This service shall be underwritten, warranted, and administered by the VRF equipment manufacturer – not the local distributor or applied representative.
v. The selected service provider shall be mutually agreeable between the building owner (or owners agent) and must be licensed, insured, and trained to work on the VRF system. No third party service (subcontracted service) providers will be acceptable.
vi. If the service provider is not an employee of the VRF manufacturer, the service provider shall be reimbursed for services rendered directly from the manufacturer. Labor rate for services shall be paid at the prevailing wage rate in place at the time of service.

21. VRF Systems with Onboard Alternate Operating Mode Selection Capability
    a. All VRF systems which provide field selectable Alternate Operating Modes, for example, High Heat or High Ambient Cooling, published data tables must be available to the public for all modes offered.
    b. Acceptable Alternate Operating Modes must ship with all models of the VRF product offering and must be factory embedded. Custom factory or field modifications to factory provided algorithms created to meet scheduled requirements are not acceptable.
    c. Provide a copy of instructions required to set the Alternate Operation Mode with the initial submittal.
    d. For systems that provide field selectable Alternate Operating Modes, ALL technical data provided in the submittal data sheets showing product rated condition performance data, must also provide separate data sheets that show product performance data at each of the field selectable Alternate Operating Modes available. Capacity, power input, and acoustic performance data for each mode offered shall be reported separately. Mixing of ODU, IDU, or VRF system performance capability operating in one mode with for example the power consumption, sound power rating, or electrical requirements of the same system operating in another mode is not acceptable.

B. Field Supplied Refrigerant Piping Design Parameters

1. The outdoor unit shall be capable of operating at an elevation difference of up to 360 feet above or below the lowest or highest indoor unit respectively without the requirement of field installed subcooler or other forms of performance enhancing booster devices.
2. The outdoor unit shall be capable of operating with up to 3280 equivalent length feet of interconnecting liquid line refrigerant pipe in the network.
3. The outdoor unit shall be capable of operating with up to 656 actual feet or 738 equivalent length feet of liquid line refrigerant pipe spanning between outdoor unit and farthest indoor unit.
4. The piping system shall be designed with pipe expansion and contraction possibilities in mind. Required expansion devices shall be field designed, supplied and installed based on proper evaluation of the proposed piping design. In addition to these requirements, the piping system installation must conform to the VRF equipment manufacturer's published guidelines.
5. The installation of pipe hangers, supports, insulation, and in general the methods chosen to attach the pipe system to the structure must allow for expansion and contraction of the piping system and shall not interfere with that movement.
6. The elevation difference between indoor units on shall be 131 feet.
7. The acceptable elevation difference between two series connected heat recovery units shall be 16 feet.

C. Defrost Operations

1. The outdoor unit(s) shall be provided with a minimum of 4 independent field adjustable defrost cycle algorithms to maximize the effectiveness of the defrost cycle to the local weather conditions. Intelligent Defrost shall melt accumulated frost, snow and ice from the outdoor unit heat exchanger. The defrost cycle length and sequence shall be based on outdoor ambient temperatures, outdoor unit heat exchanger temperature, and various differential pressure variables. Intelligent Heating Mode, when outdoor unit humidistat is engaged, shall extend the normal heating sequences by adjusting the outdoor unit coil target temperature to be above the ambient dew point temperature delaying the need for defrost operations, so long as heating demand is being met.
2. Smart Heating: This feature shall be capable of eliminating several defrost actions per day based on outdoor air temperature and humidity conditions. Smart heating shall extend the heating operation cycle by delaying the frost formation on the outdoor coil by adjusting the surface temperature to keep it above the current outdoor ambient dew point. The algorithm shall delay while maintaining indoor space temperature.

3. Defrost Mode Selection: The outdoor unit shall be provided with a minimum of three field selectable defrost operation modes: Normal, Fast, or Forced.
   a. Normal Defrost: Operation intended for use in areas of the country that experience adverse winter weather with periods of heavy winter precipitation and extremely low temperatures. This strategy shall maximize the systems heating performance and maintain operational efficiency. When the ambient temperature is either: a) above 32°F or b) below 32°F with the humidity level below 60% RH, Intelligent Defrost shall continue heating regardless of ice build-up on the coil until the quality of the heated air (i.e. discharge air temperature) decreases. At temperatures below 4°F, a defrost cycle shall occur every two hours to optimize system heating efficiency.
   b. Fast Defrost: Operation intended for use in areas of the country with mild winter temperatures and light to moderate humidity levels. The strategy minimizes defrost cycle frequency allowing frozen precipitation to build longer in between cycles. Minimum time between defrost cycles shall be 20 minutes. Intelligent Defrost shall choose between split coil/frame and full system methods based on current weather conditions to minimize energy consumption and maximize heating cycle time.
   c. Forced Defrost: Operation shall be available for the service provider to test defrost operations at any weather condition and to manually clear frozen water from the outdoor coil surfaces.
4. Defrost Method Selection: The outdoor unit shall be provided with two field selectable defrost operation methods: Split Coil/Frame and Full System. Split Coil/Frame option provides continuous heating of the occupied space during defrost operation.
   a. Split Coil/Frame method shall be available when Normal Defrost mode is selected. Split Coil method shall be available on all Heat Pump and Heat recovery single-frame VRF systems. Split Frame defrost shall be available on all Heat Pump and Heat recovery multi-frame outdoor units.
   b. Split Coil method shall remove ice from the bottom half of the outdoor unit coil first for a maximum time of six minutes, then the top half for a maximum of six minutes. Next the bottom coil shall be heated again for an additional three minutes to remove any frozen water that may have dripped onto the lower coil during the top coil defrost operation.
   c. When Split Coil/Frame method is selected, a Full System defrost shall occur every 1-9 (field selectable) defrost cycles to assure 100% of the frozen precipitation has been removed to maintain efficient performance.
   d. Full System method shall be available as a field selectable option. All outdoor units located in areas of the country where large volumes of frozen precipitation are common, the commissioning agent shall be able to select the Full System only defrost method.
5. Indoor Unit Fan Operation During Defrost
   a. During partial defrost operation indoor units operating in cooling or dry mode shall continue normal operation.
   b. During partial defrost operation, indoor units that are commissioned with fans set for continuous operation shall maintain normal fan speed unless the leaving air temperature drops, then the fan speed will be reduced to low speed for the remainder of the defrost cycle.
   c. During full system defrost operation indoor unit fans will cycle off and remain off during the remainder of the defrost cycle.

D. Oil Management

1. The system shall utilize a high pressure oil return system to ensure a consistent film of oil on all moving compressor parts at all points of operation. Oil is returned to compressor through a separate high pressure oil injection pipe directly into the oil sump. Oil returned to the compressor via the suction port of the compressor shall not be allowed.
2. Each compressor shall be provided with a high efficiency independent centrifugal cyclone type oil separator, designed to extract oil from the oil/refrigerant gas stream leaving the compressor.

3. The system shall have an oil level sensor in the compressor to provide direct oil level sensing data to the main controller. The sensor shall provide data to main outdoor unit PCB to start oil return mode and balance oil levels between multiple compressors.
4. The system shall only initiate an oil return cycle if the sensed oil level is below oil level target values as determined by the microprocessor. The system shall display an error if the oil sensor signals low oil level for a period of 130 minutes or longer.
5. A default oil return algorithm shall automatically initiate the oil return mode if the system detects a failure of the oil sump sensor. A fault code shall be reported by the system.
6. Timed oil return operations or systems that do not directly monitor compressor oil level shall not be permitted.
7. Indoor Unit Fan Operation during Oil Return Cycle
    a. During oil return cycle indoor units operating in cooling or dry mode shall continue normal operation.
    b. During oil return, indoor units that are commissioned with fans set for continuous operation shall maintain normal fan speed unless the leaving air temperature drops, then the fan speed will be reduced to low speed for the remainder of the oil return cycle.
    c. During oil return cycle indoor unit fans will cycle off and remain off during oil return cycle while operating in all modes.

E. Fan and Motor Assembly

1. 8 to 20 ton frames shall be equipped with two direct drive variable speed propeller fan(s) with BLDC motor(s) with a vertical air discharge.
2. The fan(s) blades shall be made of Acrylonitrile Butadiene Styrene (ABS) material Heat- and incorporate biomimetic technology to enhance fan performance and reduce fan generated noise.
3. The fan(s) motor shall be equipped with permanently lubricated bearings.
4. The fan motor shall be variable speed with an operating speed range of 0-1150 RPM cooling mode and 0-1150 RPM heating mode. Multi S- The fan assembly(s) shall have a minimum operating speed range from 0 RPM to 850 RPM in cooling mode and heating mode.
5. The fan shall have a guard to help prevent contact with moving parts.
6. The cabinet shall have option to redirect the discharge air direction from vertical to horizontal with the addition of optional factory provided air guides.
7. The fan controller shall have a DIP switch setting to raise external static pressure of the fan up to 0.32 inch of W.C. to accommodate ducted installations.
8. The fan control shall have a function setting to remove excess snow automatically.
9. The fan control shall have a function setting to remove access dust and light debris from the outdoor unit and coil.

F. Cabinet

1. Outdoor unit cabinet shall be made of 20 gauge galvanized steel with a weather and corrosion resistant enamel finish. Outdoor unit cabinet finish shall be tested in accordance with ASTM B-117 salt spray surface scratch test (SST) procedure for a minimum of 1000 hours.
2. Cabinet weights and foot prints shall vary between 430 lbs., 7.61 sq. ft. (1.27 sq. ft. per ton), for 6 ton cabinet to 666 lbs., 10.14 sq. ft. (.51 sq. ft. per ton), for 20 ton cabinet for single cabinet configurations. The front panels of the outdoor units shall be removable type for access to internal components.
3. A smaller service access panel, not larger than 7” x 7” and secured by a maximum of (2) screws, shall be provided to access the following
    a. Service tool connection
    b. DIP switches
    c. Auto addressing
    d. Error codes
    e. Main microprocessor
    f. Inverter PCB

4. The cabinet shall have piping knockouts to allow refrigerant piping to be connected at the front, right side, or through the bottom of the unit.
5. The cabinet shall have a factory installed coil guard.

G. Outdoor Unit Coil

1. Outdoor unit coil shall be designed, built and provided by the VRF outdoor unit manufacturer.
2. Multi 5 Heat- The outdoor unit coil for each cabinet shall have lanced aluminum fins with a maximum fin spacing of no more than 17 Fins per Inch (FPI). All the outdoor unit coils shall be 2 or 3 rows consisting of staggered tubes for efficient air flow across the heat exchanger.
3. Outdoor unit coil shall be comprised of aluminum fins mechanically bonded to copper tubing with inner surfaces having a riffling treatment to expand the total surface of the tube interior
4. The aluminum fin heat transfer surfaces shall have factory applied corrosion resistant Black Fin coating. The copper tubes shall have inner riffling to expand the total surface of the tube interior.
   a. ISO 21207 Salt Spray Test Method B – 1500 hours
   b. ASTM B-117 Acid Salt Test – 900 hours
   c. The Black Fin coating shall be certified by Underwriters Laboratories and per ISO 21207. The above conditions shall establish the minimum allowable performance which all alternates must comply.
5. Variable Path Heat Exchanger: System shall have a variable flow and path outdoor heat exchanger function to vary the refrigerant flow and volume and path. Control of the variable path circuits shall be based on system operating mode and operating conditions as targeted to manage the efficiency and minimize or maximize the circulating volume of the operating fluids of the system. This feature allows MV 5 to maintain system head pressure that delivers “gas-furnace leaving air temperature” from the indoor unit at moderate and low ambient outdoor air temperatures.
6. The outdoor unit coil, all indoor units and pipe network shall be field tested to a minimum pressure of 550 psig.

H. Compressor(s)

1. Compressor shall be designed and assembled by the VRF manufacturer specifically for use in the air source VRF product line. Third party manufactured, branded, or designed to the VRF system’s OEM specifications by a third party manufacturer shall not be acceptable.
2. Compressor shall be a hermetic, high-side shell (HSS), commercial grade, compliant scroll direct-drive design.
   a. Compressor Design: The compressor design shall be of the high pressure shell scroll type where the internal pressure below the suction valves of the compressor shall be at the same high pressure and high temperature. The motor shall be cooled by high pressure gas at temperatures above saturation conditions and minimize the mixing of refrigerant liquid with oil in the sump. The system shall employ a high pressure oil return method returning recovered oil from the oil separator directly into the oil sump of the compressor; oil shall not be allowed to return via the suction line. Bearing surfaces are continually coated with oil. The compressor shall employ an Aero-bearing constructed with high lubricity materials increasing operation time in case of low sump oil level. Compressor shall have a nominal operating range from 12Hz to 150 Hz.
3. The fixed and oscillating compressor scroll components shall be made of high grade (GC25) or denser steel material. All scrolls shall be heat treated and tempered.
4. The oscillating scroll shall be finely machined and polished. PVE refrigerant oil shall be used as the sole liquid used to maintain a seal between the high and low sides of the compression chamber. Compressors that requires the use of any type of mechanical or wearable sealant material between the moving surfaces of the compression chamber is NOT ACCEPTABLE.

5. Vapor Injection: System shall have a medium pressure gas vapor injection function employed in the heating and cooling modes to increase system capacity when the outdoor ambient temperatures are low and lower compressor lift when temperatures are high. The compressor vapor injection flow amount shall be controlled by the vapor injection sub-cooling algorithm reset by discharge gas temperatures of the compressor.
6. Bearing surfaces shall be coated with Teflon® equal. Bearings shall be lubricated using a constant flow of PVE refrigerant oil to the bearing surfaces The film of oil separating the crankshaft journals and bearing surfaces shall be consistent at all times the crankshaft is in motion and shall be maintained irrelevant of crankshaft rotational speed.
7. An internal, integrated, mechanically driven gear pump shall draw oil from the compressor sump reservoir, pressurize the oil and inject the oil directly to the crankshaft journals maintaining a consistent film of oil between all moving parts. Auxiliary, indirect, or electronically driven pumps are not acceptable.
8. The viscosity property of the PVE oil in the compressor sump shall be maintained irrelevant or compressor operation and the surrounding ambient temperature.
    a. The compressor shall be equipped with an external thermally protected electric crankcase heater that is automatically activated only when the ambient temperature is below freezing and the compressor is not running to maintain the temperature of the oil in the sump above the refrigerant boiling point.
    b. During stable operation, irrelevant of ambient air temperature outside the water source unit, the temperature of refrigerant vapor in contact with the surface of the oil in the compressor sump shall be maintained above 140°F to prevent foaming and to eliminate refrigerant from mixing with the oil degrading the viscosity of the oil in the sump.
    c. Low side shell (LSS) type compressors that use suction vapor to cool the compressor motor shall not be acceptable.
9. The compressor motor shall be designed to operate at high temperatures.
    a. The motor winding insulation shall be designed to operate continuously at a minimum temperature of 180°F without deterioration.
    b. The motor cooling system shall be designed to maintain acceptable operational temperature at all times and in all conditions using high pressure, hot refrigerant vapor as motor coolant.
    c. Low side shell and compressors that use low pressure, low temperature refrigerant gas to cool the motor are not acceptable.
10. Inverter Compressor Controller(s)
    a. Each compressor shall be equipped with a dedicated inverter compressor drive. The control of multiple compressors using a single drive is not acceptable.
    b. The inverter drive shall vary the speed of the compressor crankshaft between zero (0) Hz and 140 Hz.
    c. The inverter driver controller shall be matched with the physical properties of the compressor. The drive shall be manufactured by the VRF air source unit manufacturer. The inverter drive and matching compressor shall have been thoroughly tested as a matched pair. The inverter drive shall be programmed to avoid operating the compressor at any speed that results in harmonic vibration, nuisance noise, or mechanical damage to either the driver or the compressor with power provided that is within the tolerance specification.
    d. The compressor inverter drive assembly and software must be designed, manufactured, and supplied by the VRF product manufacturer. Third party branded inverter driver hardware and/or driver software or inverter driver hardware and/or software provided by a third party manufacturer to meet OEM specifications of the VRF water source manufacturer will not acceptable.
    e. All inverter drive hardware or software manufactured in, is a product of, or sourced from China, or using a broker or third party provider as an intermediary that obtains the product from CHINA shall not be acceptable.

11. Compressor(s)
    a. Each 6, 8, 10 ton frames shall be equipped with a single hermetically sealed, inverter driven, High Side Shell (HSS) scroll compressor.
    b. 12, 14, 16, 18 and 20 ton frames shall be equipped with dual hermetically sealed, inverter driven, High Side Shell (HSS) scroll compressors.
    c. Each inverter driven, HSS scroll compressor shall be capable of operating from 12 Hz up to 150 Hz in any and all modes (cooling, heating or simultaneous modes).
    d. The compressor shall be designed for a separate port for oil to be directly returned to the compressor oil sump.
    e. The compressor bearing(s) shall have Teflon™ coating and shall be an aero type design using High lubricity materials.
    f. The compressor(s) shall be protected with:
        i. High Pressure switch
        ii. Over-current /under current protection
        iii. Oil sump sensor
        iv. Phase failure
        v. Phase reversal
        vi. Compressor shall be capable of receiving injection of medium pressure gas at a point in the compression cycle where such injection shall allow a greater mass flow of refrigerant at lower outdoor ambient and achieving a higher heating capability. The VRF outdoor unit shall have published performance data for heating mode operation down to -13°F on both heat pump and heat recovery systems.
    g. Standard, non-inverter driven compressors shall not be permitted nor shall a compressor without vapor injection or direct sump oil return capabilities.

I. Operational Sound Levels

1. Each single frame outdoor unit shall be rated with an operational sound pressure level not to exceed as listed on below chart when tested in an anechoic chamber under ISO 3745 standard at the highest field selectable heating operating modes available. Such documentation shall be presented in all submittals, manufactures who elect to rate their equipment at other than tested in an anechoic chamber under ISO 3745 standard at the highest field selectable heating operating modes available and the highest field selectable conditions shall not be allowed.
2. A field setting shall be available to program the outdoor unit to reduce sound levels at night, when desired, to a selectable level while still able to meet building load requirement. This mode is available in both cooling and heating modes.
3. The compressor(s) shall be mounted on rubber isolation grommets. Compressor shall ship with removable clamps that secure the compressor in place while transported. The installing contractor shall remove and discard (or optionally adjust the clamps to allow the isolator to properly function) the clamps prior to commissioning the water source unit.
4. Manufacturers' published data shall include sound pressure and sound power levels.
    a. Sound pressure level shall not exceed 57 dB(A) during cooling operation for Heat Pump and Heat Recovery outdoor units when tested in an anechoic chamber under ISO3745 standard. Other testing conditions shall not be allowed.
    b. Sound power level shall not exceed 69 dB(A) when tested in an anechoic chamber under ISO3745 standard. Other testing conditions shall not be allowed.

J. Sensors

1. Each outdoor unit module shall have:
   a) Suction temperature sensor
   b) Discharge temperature sensor
   c) Oil level sensor
   d) High Pressure sensor
   e) Low Pressure sensor
   f) Outdoor temperature sensor
   g) Outdoor humidity sensor
   h) Outdoor unit heat exchanger temperature sensors

K. Wind Load Installations for Outdoor Units: LG FL Wind load Installation Drawings meet the requirements of the 2017 Florida Building Code, 6th Edition and ASCE Standard 7-2010.

L. Seismic Installations: Provide OSHPD Special Seismic Certification Preapproval (OSP) documents for certified product list of VRF equipment to be installed in high seismic risk areas. Provide LG supplemental installation documents in conformance with CBC 2013, 2016 and 2019 California Building Code and IBC 2012, 2015 and 2018 International Building Code.

M. Warranty

1. Limited Warranty Period
   a. STANDARD ONE-YEAR PARTS WARRANTY FOR A QUALIFIED SYSTEM - The Part(s) of a qualified System, including the compressor, are warranted for a period (the "Standard Parts Warranty Period") ending on the earlier to occur of one (1) year after the date of original installation, or eighteen (18) months from the date of manufacture.
   b. ADDITIONAL SIX (6) YEAR COMPRESSOR PART WARRANTY - The Compressor is warranted for an additional six (6) year period after the end of the applicable Standard Part Warranty Period (the "Compressor Warranty Period").

2. Extended Warranty

   a. The Standard Warranty Period and the Compressor Warranty Period are extended to a total of ten (10) years (the "Extended Warranty Period") for qualified Systems that have been (a) commissioned by a party that has completed the current Training Requirements, (b) such commissioning is pursuant to LG's current published instructions, and (c) the System commissioning results and supporting documents are entered correctly into LG's online commissioning system. Commissioning of a System requires one (1) hour of LG Monitoring View (LGMV) data. Commissioning results must be entered into LG's online commissioning system within sixty (60) days of System startup.

2.2 EEV KIT

A. General:

1. Unit shall be manufactured by LG.
2. Unit shall be factory assembled and wired unit shall be designed to be installed indoors only.
3. Unit shall be capable to be installed with heat pump or heat recovery VRF system.
4. Unit requires one communication kit to provide power and control signals.
5. Connects liquid line piping from outdoor unit to any AHU coil.

B. Electrical:

1. Six conductor, 18 GA shielded and stranded field supplied wiring for 12 volt (low voltage) power and control signal from communication kit.

2.3 AHU COMMUNICATION KIT

A. General:

1. Unit shall be manufactured by LG.
2. Unit shall be factory assembled and wired.
3. Unit shall be capable to be installed with heat pump or heat recovery VRF system.
4. Allows communication between third party air handling unit (AHU) and LG Multi V air-source or water-source outdoor units with combination ratio between 50% to 100%.
5. Requires one EEV kit to control the flow of refrigerant from Multi V outdoor unit to AHU coil.

B. Electrical:

1. The unit electrical power shall be 208-230/1/60 (V/Ph/Hz).

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0290

DIRECT EXPANSION COILS

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 DESIGN PRESSURE AND TEMPERATURES

A. Coil shall be designed to withstand the following maximum operating pressures and temperatures:

1. Evaporator Coils (3/8" Coils) - 400 psig / 300°F.
2. Evaporator Coils (1/2" & 5/8" Coils) - 250 psig / 300°F.
3. Condensing Coils (3/8" Coils) - 600 psig / 300°F.
4. Condensing Coils (1/2" & 5/8" Coils) - 300 psig / 300°F.

2.2 FINS

A. Coils shall be plate fin type construction providing uniform support for all coil tubes. Coils are to be manufactured with die-formed aluminum or copper fins with self-spacing collars which completely cover the entire tube surface.

B. Thickness - 0.0060" +/- 5% unless specified otherwise Tube Holes:

1. 0.625 diameter spaced 1.5 inch equilaterally.
2. 0.500 diameter spaced 1.25 inch equilaterally.
3. 0.375 diameter spaced 1.0 inch equilaterally fins/inch.
4. 0.625 diameter coils 6 through 14 fins / inch.
5. 0.500 diameter coils 6 through 16 fins / inch.
6. 0.375 diameter coils 10 through 20 fins / inch.
7. All fins have a tolerance of +/- 4%.

2.3 TUBING

A. Tubing and return Bends - Standard pressure - constructed from UNS12200 seamless copper conforming to ASTM B75 and ASTM B251 and ASTM B743.

B. Copper Tube Temper - Light annealed with a maximum grain size of 0.040 mm and a maximum hardness of Rockwell 65 on the 15T scale.

C. Tube Expansion - Mechanically expanded to form an interference fit with the fin collars without decreasing tube wall thickness.

D. Minimum Thickness:

1. 0.016 inch for 0.500 and 0.375 inch tubing.
2. 0.020 inch for 0.625 inch tubing unless specified otherwise

2.4 CASING

A. Shall be made from one of the following materials.

1. Copper 0.093-inch-thick meeting ASTM B152.
2. 16 or 14 Gauge, stainless steel meeting ASTM A240.
3. 16 or 14 Gauge, G90 Galvanized steel meeting ASTM A653.

2.5 TESTING REQUIREMENTS

A. Coils shall be submerged in water and tested with dry nitrogen.

B. Evaporator, Condensing and Steam coils are tested to 600 psig.

2.6 HEADERS

A. Headers shall be constructed from UNS 12200 seamless copper conforming to ASTM B75, ASTM B88 and ASTM B251.

B. End caps (1.625" and larger) - Die formed and installed on the inside diameter of the header such that the landed surface area is three times the header wall thickness.

C. End caps (Less than 1.625) - Flat copper sheet stock circle sheared, stamped or punched to header diameter and installed on the header ends.

2.7 CONNECTIONS

A. Male Pipe Thread (MPT) and constructed from red brass conforming to ASTM B43 or schedule 40 steel.

B. Male Pipe thread (MPT) or Female pipe thread (FPT) and constructed from copper.

C. Sweat Connection constructed from UNS 12200 seamless copper conforming to ASTM B75 and ASTM B251

2.8 BRAZING

A. High temperature filler metals shall be used for all brazed joints. Filler metal will containing at least 5% silver.

2.10 CERTIFICATION

A. Acceptable coils are to have ARI Standard 410 certification and bear the ARI symbol. Non-certified coils or coils outside ARI's rating range will be considered if the manufacturer is a current member of the ARI air-cooling and air-heating coils certification program and the coils have been rated in accordance with ARI Standard 410.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0400

SHEETMETAL WORK AND RELATED ACCESSORIES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements shall govern work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 SHEETMETAL DUCTWORK

A. Contractor shall furnish and install all sheetmetal ducts as shown on the Drawings. While the Drawings shall be adhered to as closely as possible, the Engineer reserves the right to vary the run and size to meet the field conditions. Any duct size not shown shall be sized in proportion to the air carried at the same resistance in similar ductwork, or of size as directed.

B. All ductwork shall be constructed of galvanized steel gauges in accordance with the latest edition of the ASHRAE/SMACNA Guide. Bracing angles for ductwork shall be hot dipped galvanized for steel ductwork and appropriate gauge for aluminum ductwork. All ducts 18" and over in width shall be cross broken to prevent flutter.

C. Round ductwork shall be galvanized steel, spiral lock seam construction of gauges in accordance with the latest edition of ASHRAE/SMACNA guide. Fittings shall be constructed in standing seam manner. All seams, joints and collars shall be sealed in accordance with SMACNA guidelines for medium pressure ductwork to minimize noise and streaking. Ductwork and fittings shall be connected with sheetmetal couplings and sealed as to allow no leakage.

D. Ducts shall be braced as follows:

1. All ducts not exceeding 24" on one side shall be assembled with airtight slip joints.
2. 25" to 40" larger dimension 1" x 1" x 1/8" angles.
3. 41" to 60" larger dimension 1-1/2" x 1-1/2" x 1/8" angles.
4. All bracing angles shall be a minimum of 4' apart along the length of the duct.
5. Furnish and install all angles and frames for all registers, diffusers, grilles, and louvers.
6. Support horizontal ducts with hangers spaced not more than 8' apart. Place hangers at all changes in direction. Use strap hangers for cuts up to 30" wide.

E. Comply with all State and Local regulations regarding fire stopping and fireproofing. Provide fusible link fire dampers as required by State, local and Underwriter authorities and where indicated on the Drawings. Each fire damper shall be installed in such a manner as to permit ready access for inspection and maintenance purposes.

F. Provide splitter and butterfly dampers, deflecting vanes for control of air volume and direction and for balancing systems, where indicated, specified, directed and as required for the proper operation of the systems. Dampers shall be of the same material as the duct, at least one gauge heavier that the duct, reinforced where indicating quadrant and locking device for adjusting damper and locking in position.

G. Where ducts fewer than 100 square inches penetrate a rated wall, steel ductwork system of a minimum 0.0127 inch thickness shall be used.

H. All elbows shall have a minimum center line radius of 150% of duct width. If the radius is smaller, turning vanes shall be used: Turning vanes shall be double thickness, fitted into slide strips and screwed or riveted to duct below.

I. Contractor shall furnish and install all access doors in ducts as required. Access doors shall be of the pan type 1" thick and shall be provided with two galvanized hinges and suitable latched. Access doors insulated with same thickness material as duct and shall be double casing construction.

2.2 REGISTERS AND DIFFUSERS

A. Registers and diffusers shall be installed where shown on the Drawings and shall be of the sizes specified and the type indicated on the drawing schedule.

B. All registers and diffusers shall be installed in accordance with manufacturer's recommendations.

C. Registers and diffusers shall be as manufactured by Carnes, Hart and Cooley or Anemostat Co.

2.3 KITCHEN EXHAUST DUCT WORK

A. Duct work or plenums for kitchen exhaust ventilators shall be constructed of not less than 16 gauge black steel or 18 gauge stainless steel with all joints and seams made with a continuous great tight weld on the external surface.

B. Duct system shall be so constructed that grease cannot become pocketed and shall slope not less than 1/4“ per lineal foot toward the ventilator hood. Duct systems shall be equipped with cleanout openings that have tight fitting doors. Doors shall be constructed of same material and gauge as duct and shall be equipped with a latching mechanism to hold the door tightly closed.

C. Kitchen exhaust system shall conform in all respects with NFPA 96.

D. Insulate duct per NFPA requirements (minimum 2” calcium silicate insulation with all service jacket) and all other agencies having jurisdiction.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0420

SUPPORTS, SLEEVES AND PLATES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. This Contractor shall furnish and install all plates, hangers and supports for his equipment including piping, headers, fans expansion tank, ductwork, etc.

B. All ductwork, piping and equipment shall be hung or supported from structural members only.

PART 2 - PRODUCTS

2.1 PIPING, DUCTWORK AND EQUIPMENT

A. All piping shall be supported from building structure in a neat and workmanlike manner wherever possible, parallel runs of horizontal piping shall be grouped together on trapeze hangers. Vertical risers shall be supported at each floor line with steel pipe clamps. Use of wire perforated metal to support pipes will not be permitted. Hanging pipes from other pipes will not be permitted.

B. Necessary structural members, hangers and supports of approved design to keep piping in proper alignment and prevent transmission of injurious thrusts and vibrations shall be furnished and installed. In all cases where hangers, brackets, etc., are supported from concrete construction, care shall be taken not to weaken concrete or penetrate waterproofing.

C. All hangers and supports shall be capable of screw adjustment after piping is erected. Hangers supporting piping expanding into loops, bends and offsets shall be secured to the building structure in such a manner that horizontal adjustment perpendicular to the run of piping supported may be made to accommodate displacement due to expansion. All such hangers shall be finally adjusted, both in the vertical and horizontal direction, when the supported piping is hot.

D. Pipe hangers shall be as manufactured by Grinnell, whose catalog numbers are given herein, or equivalent Carpenter and Paterson, or F&S Mfg. Co.

E. Piping shall be supported as follows unless otherwise indicated on the Drawings:

1. Heating piping shall be 1-1/2 " and smaller Fig. #260 adjustable clevis hanger. 2" and larger Fig. #174 one-rod swivel roll hanger.

2. Two-rod hangers shall be used for piping close to the ceiling slab or where conditions prohibit use of other hanger types.

3. Anchors for hanger rods shall be Phillips "Red Head" self-drilling type. Anchors shall be placed only in vertical surfaces.

4. Spacing of pipe supports shall not exceed 8 feet for pipes up to 1-1/2" and 10 feet on all other piping.

5. Hangers shall pass around insulation and a 16 gauge steel protective cradle; 12" long shall be inserted between hangers and insulation. Insulation under cradle shall be high density calcium silicate or approved equal to prevent crushing.

6. All piping shall be supported to allow free movement where expanding or contracting. Pipe shall be anchored as required or directed.

7. All lateral runs of piping shall be securely supported on hangers, rolls, brackets, etc. and in manner to allow for proper expansion and elimination of vibration.

8. 2" and smaller pipe, where run on walls, shall be supported on wrought iron "J" hook brackets with anchor bolts.

9. All horizontal pipes, where run overhead or on walls, shall be supported as follows unless otherwise indicated:

   a. On adjustable steel clevis type hangers suspended on hanger rods, pipe sizes up to and including 4".

F. Space limitations in hung ceilings spaces and conditions in other locations may require use of other type of hangers than those specified above. Suitable and approved pipe hangers shall be provided for such job conditions.

G. All supports shall be fastened to structural members or additional steel supports furnished by this Contractor.

H. Hanger rods shall be steel, threaded with nuts and lock nuts sizes in accordance with the following schedule:

Pipe Size	Rod Size
3/4" to 2" inclusive	3/8"
2-1/2" and 3' inclusive	1/2"
4" and 5" inclusive	5/8"
6"	3/4"
8" to 12" inclusive	7/8"

I. Hangers for copper tubing shall be tacked up with formed lead sheet on which tubing or pipe shall be placed.

J. Where pipes pass through masonry, concrete walls, foundations, or floors, this Contractor shall set sleeves as are necessary for passage of pipes. These sleeves shall be of sufficient size to permit insulation where required to be provided around pipe passing through. This Contractor shall be responsible for exact location of these sleeves.

K. Sleeves shall not be used in any portion of building where use of same would impair strength of construction features of the building. Inserts for supporting lateral pipes and equipment shall be placed and secured to form work, and all sleeves inserts locations shall be thoroughly checked with Architect so as not to conflict with other trades.

L. Where pipes pass through floor or walls, they shall be provided with chromium plated escutcheons.

M. Anchor horizontal piping where indicated and wherever necessary to localize expansion or prevent undue strain on branches. Anchors: Heavy forged construction entirely separate from supports.

N. Anchor vertical piping wherever indicated and wherever necessary to prevent undue strain on offsets and branches. Anchors, unless otherwise noted: Heavy steel clamps securely bolted and welded to pipes. Extension ends shall bear on building construction.

O. Ducts shall be hung with 1" x 1/8" metal straps. When width of duct is less than 48", hangers shall be fastened to side of ducts. Auxiliary steel supports that may be required for all mechanical equipment shall be furnished and installed by this Contractor. All operating equipment including fans, piping, etc. shall be supported so as to produce minimum amount of noise transmission.

P. Refer to "General Conditions " as well.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0430

INSULATION AND COVERINGS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. Furnish insulation for all piping, equipment and sheetmetal work as noted.

B. Insulate no piping, ducts or equipment until tested and approved for tightness. All piping and ducts shall be dry when covered. Where existing insulation has been damaged, altered of removed during the course of the work, it shall be replaced with new insulation in a neat manner to match the adjacent insulation.

C. All insulation must be done by an approved Sub-Contractor or by mechanics skilled in this line of work.

D. Fire hazard classification shall be 2550 per ASTM E-84, NFPA 255 and UL 723. Insulation shall be rated non-combustible type classified flame spread - 25, smoke developed - 50.

PART 2 - PRODUCTS

2.1 DUCTWORK (INDOOR)

A. All supply, outside air intake and exhaust (on discharge side of fan) and return (in unconditioned spaces) ductwork shall be covered with fiberglass with aluminum foil vapor barrier. All joints shall be lapped so maximum coverage is achieved.

B. All insulated ductwork shall be insulated with fiberglass board insulation with canvas finish in areas where ductwork is exposed.

C. Insulation thickness shall be in accordance with the latest edition of the New York State Energy Conservation Construction Code.

D. Thermal acoustic lining of ductwork where indicated shall be 1” thickness fiberglass unless otherwise noted. The lining shall have a mat facing and shall meet the Life Safety Standards as established by NFPA 90A and 9B and conform to the requirements of ASTMC 1071.

E. Insulate Kitchen exhaust ductwork per NFPA requirements (minimum 2” calcium silicate insulation) and all other agencies having jurisdiction.

2.2 PIPING / EQUIPMENT (INDOOR)

A. All new or altered heating and chilled water system supply and return piping shall be covered with Manville Micro-Lok or equal approved fiberglass insulation with all service (factory applied) vapor retardant jacket. Seal with type H mastic.

B. Fittings shall be insulated with same material and thickness as adjoining pipe insulation and shall be pre-molded fittings or miter cut segmental insulation wired on. Over the insulation, apply a wrapper of OCF glass cloth sealed with type H mastic. Apply aluminum bands on pipe covering in addition to self-sealing feature.

C. Insulation Material: Molded fibrous glass insulation, density not less than 4 lbs. per cubic foot.

D. Insulation Thickness: Shall be in accordance with the latest edition of the New York State Energy Conservation Construction Code.

E. Jacket and Finish: White flame retardant type, meeting all requirements of "Fire Hazard Classification" of NFPA, similar to "Fiberglass" Type FRJ, Insul-Coustic, Johns-Manville or approved equal.

F. Insulation and Finishes for Fittings, Valves and Flanges

1. Valves, fittings and flanges other than vapor seal insulation: Insulated in same manner and same thickness as piping in which installed.
2. Use pre-molded sectional covering where available; otherwise use mitered segments of pipe covering.
3. Obtain written approval prior to using other than molded sectional covering.

G. Vapor seal Insulation for Valves, Fittings and Flanges: Same as above, except joints sealed with vapor barrier adhesive and wrapped with glass mesh tape. Each fitting shall be finished with two coats of vapor seal mastic adhesive.

H. Jacket and Finishes: Exposed fittings - 6 oz. canvas jacket adhered with lagging adhesive.

I. Concealed fittings: Standard weight canvas jacket adhered with lagging adhesive and with bands of 18 gauge copper coated steel - 2 bands at elbows, 3 at tee.

J. Insulation at Pipe Hangers

1. Where shields are specified at hangers on piping with fibrous glass covering, provide load bearing calcium silicate between shields and piping as follows:
   a. For pipe covering without vapor barrier jacket, furnish at each shield 12" - long calcium silicate section with canvas section with canvas jacket continuous between shield and insulation.
   b. For pipe covering with vapor barrier jacket, furnish at each shield 12" - long vapor barrier jacket section with section of fibrous glass replaced with section of calcium silicate. Vapor barrier jacket, continuous between shield and insulation for continuous vapor barrier.

K. Condensate drain and refrigerant piping shall be insulated with 1/2” Imcosheild un-split polyolefin insulation.

L. Equipment

1. Secure fibrous glass block or board insulation in place with wire or galvanized steel bands.
   a. Small Areas: Secure insulation with 16 gauge wire on maximum 6” centers.
   b. Large Areas: Secure insulation with 14 gauge wire or .015” thick by 1/2” wide galvanized steel bands on maximum 10” centers. Stagger insulation joints.
   c. Irregular Surfaces: Where application of block or board insulation is not practical insulate with insulating cement built-up to same thickness as adjoining insulation.
2. Fill joints, voids and irregular surfaces with insulating cement to a uniform thickness.
3. Stretch wire mesh over entire insulated surface and secure to anchors with wire edges laced together.
4. Apply finishing cement, total of 1/2” thick, in 1/4” thick coats. Trowel second coat to a smooth hard finish.
5. Neatly bevel insulation around handholes, cleanouts, ASME stamp, manufacturer’s nametag and catalog number.

M. Insulated Covers for Pumps: Do not extend pump insulation beyond or interfere with stuffing boxes or interfere with adjustment and servicing of parts regular maintenance or operating attention.

2.3 PIPING (OUTDOOR)

A. All supply and return piping shall be covered with 2" thickness insulation.

B. Insulation shall be calcium silicate with aluminum jacket.

C. Calcium silicate insulation shall conform with ASTM C 533, Type I, and shall be Manville "Thermo-12" or approved equal.

D. Insulation jacket shall be 0.016 inch thick aluminum for pipes 2-1/2 inches and larger, and 0.010 inch thick for pipes 2 inches and smaller with a built-in isolation felt. All seams and joints shall be weatherproof.

E. Refrigerant piping shall be insulated with 1/2" Imcosheild un-split polyolefin insulation.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0440

DAMPERS AND MISCELLANEOUS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 DAMPERS AND MISCELLANEOUS

A. Furnish and install where shown on Drawings ARROW PIN-LOCK Dampers No. OBDPL-507 (Opposed) as manufactured by the Arrow Louver & Damper Corp. of Maspeth, NY 11378, or approved equal. Frames and blades to 1/8" extruded aluminum.

B. Blades to be single unit PIN-LOCK design 6" wide, with the PIN-LOCK an integral section within the blade center axis. Frames to be a combination of 4" extruded aluminum channel and angle, with reinforcing bosses and groove inserts for vinyl seals.

C. Pivot rods to be 1/2" diameter extruded aluminum, PIN-LOCK design interlocking into blade section. Bearings to be "Double-Sealed" type with Celcon inner bearing on rod riding in Merlon Polycarbonate outer bearing inserted in frame so that outer bearing cannot rotate.

D. Blade linkage hardware is to be installed in angle or channel frame section out of air stream. All hardware to be of non-corrosive reinforced material or to be cadmium plated.

E. Rod bearing to be designed for minimum air leakage by means of overlapping design and by extruded vinyl seals to fit into integral ribbed groove inserts in both frames and blades. All dampers in excess of 10 sq. ft. free area to have reinforced corners by means of gusset plates.

F. Dampers shall be sized by the Control Manufacturer to properly control the flow of air and ensure minimum air stratification in mixing applications. Sizing shall be submitted for approval with information similar to that submitted on valve when sizing valve.

2.2 FIRE DAMPERS

A. Dampers shall be multi blade construction UL labeled and be installed in accordance with UL 555, with breakaway connections. The units shall have stainless steel actuator springs with locking devices for horizontally mounted type.

2.3 COMBINATION FIRE / SMOKE DAMPERS

A. Furnish and install at locations shown on Drawings, or as described in schedules, combination fire smoke dampers.

B. Frame shall be a minimum of 16 gauge galvanized steel formed into a structural hat channel reinforced at corners for added strength. The blades shall be airfoil shaped single-piece hollow construction with 14 gauge equivalent thicknesses. Blade action shall be opposed. Bearings shall be stainless steel sleeve turning in an extruded hole in the frame for long life. Galvanized bearing shall not be acceptable.

C. Blade edge seals shall be silicone rubber and galvanized steel mechanically locked into blade edge (adhesive or clip fastened seals shall be acceptable) and shall withstand a minimum of 450 degrees F. (232 degrees C.) Jamb seals shall be non-corrosive stainless steel flexible metal compression type to further ensure smoke management.

D. Each combination fire/smoke damper shall be classified for use for fire resistance ratings of less than 3 hours in accordance with UL Standard 555, and shall further be classified by Underwriters Laboratories as a Leakage Rated Damper for use in smoke control systems in accordance with the latest version of UL555S, and bear a UL label attesting to same. Damper manufacturer shall have tested, and qualified with UL, a complete range of damper sizes covering all dampers, required by this Specification. Testing and UL qualifying a single damper size is not acceptable. The leakage rating under UL555S shall be leakage Class I (4 c.f.m./sq. ft. at 1" w.g. and 8 c.f.m./ft. at 4" w.g.).

E. As part of UL qualification, dampers shall have demonstrated a capacity to operate (to open and close) under HVAC system operating conditions, with pressures of at least 4" w.g. in the closed position, and 4000 f.p.m. air velocity in the open position.

F. In addition to the leakage rating already specified herein, the dampers and their actuators shall be qualified under UL555S to an elevated temperature of 350 degrees F. (177 degrees C.). Appropriate electric actuators (equal to Ruskin model MA) shall be installed by the damper manufacturer at time of damper fabrication. Damper and actuator shall be supplied as a single entity, which meets all applicable UL555S qualifications for both dampers and actuators. Damper and actuator assembly shall be factory cycled 10 times to assure operation.

G. Manufacturer shall provide factory assembled sleeve of 17" minimum length (Contractor to verify requirement). Factory supplied caulked sleeve shall be 20 gauge for dampers through 84" wide and 18 gauge above 84" wide.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0460

AUTOMATIC TEMPERATURE CONTROLS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 QUALIFICATIONS OF BIDDER

A. All bidders must be building automation contractors in the business of installing direct digital control building automation systems for a minimum of 10 years.

B. All bidders must have an office in the within 50 miles of jobsite.

C. All bidders must be authorized distributors or branch offices of the manufacturers specified.

D. All bidders must have a trained staff of application Engineers, who have been certified by the manufacturer in the configuration, programming and service of the automation system.

1.2 DESCRIPTION OF WORK

A. Except as otherwise noted, the control system shall consist of all Ethernet Network Controllers, Stand-alone Digital Control Units, workstations, software, sensors, transducers, relays, valves, dampers, damper operators, control panels, along with a complete system of electrical interlocking wiring to fill the intent of the Specification and provide for a complete and operable system. Except as otherwise specified, provide operators for equipment such as dampers if the equipment manufacturer does not provide these. Coordinate requirements with the various Contractors.

B. The BAS Contractor shall review and study all HVAC Drawings and the entire Specification to familiarize himself with the equipment and system operation and to verify the quantities and types of dampers, operators, alarms, etc. to be provided.

C. Prior to commencement of schedule programming meet with Owner to discuss block/individual scheduling of system/equipment and alarm protocols. Review equipment designations and graphics screens to be provided. Take minutes of this meeting and issue them to the Construction Manager/Owner's representative.

D. All interlocking wiring (regardless of voltage) and installation of control devices associated with the equipment listed below shall be provided under this Contract. The BAS Contractor shall provide power wiring for all control equipment from available spare circuits. When the BAS system is fully installed and operational, the BAS Contractor and representatives of the Owner will review and check out the system. At that time, the BAS Contractor shall demonstrate the operation of the system and prove that it complies with the intent of the Drawings and Specifications.

E. The Contractor shall furnish and install a complete building automation system including all necessary hardware and all operating and applications software necessary to perform the control sequences of operation as called for in this Specification,

F. At a minimum, provide controls for the following:
   1. AHU Control
   2. Convector Controls
   3. Exhaust and Supply Fan Controls
   4. Energy Recovery Unit Controls
   5. VRF Controls

G. Provide services and manpower necessary for commissioning of system in coordination with the HVAC Contractor, Balancing Contractor and Owner's representative.

H. All work performed under this section of the Specifications will comply with all codes, laws and governing bodies. If the Drawings and/or Specifications conflict with governing codes, the Contractor shall submit a proposal with appropriate modifications to the project to meet code restrictions. If this Specification and associated Drawings exceed governing code requirements, the Specification will govern. The Contractor shall obtain and pay for all necessary construction permits and licenses.

1.3 TRAINING

A. Provide a minimum of (40) hours of on-site training for (3) system operators. The training will be hands-on type at the Owner's office. The training class will use the actual Operator's Manual that will be submitted for this project. In addition provide (2) weeks of classroom training for one individual at the Manufacturer's sponsored training courses.

1.4 SYSTEM DESCRIPTION

A. The Building Automation System (BAS) shall consist of PC-based workstations and microcomputer controllers of modular design providing distributed processing capability and allowing future expansion of both input/output points and processing/control functions.

B. For this project the system shall consist of the following components:

1. Operator Workstation(s)
   The BAS Contractor shall furnish (1) Operator Workstation Computers and (1) printer(s) as described in Part 2 of the Specification. These workstations must be running the standard workstation software developed and tested by the manufacturer of the network controllers and the standalone controllers. No third party front-end workstation software will be acceptable.

2. Ethernet-based Network Controller(s)
   The BAS Contractor shall furnish Ethernet-based network controllers as described in Part 2 of the Specification. These controllers will connect directly to the Operator Workstation over Ethernet, provide communication to the Standalone Digital Control Units and/or other input/output Modules and serve as a gateway to equipment furnished by others (if applicable).

3. Standalone Digital Control Units (SDCUs)
   Provide the necessary quantity and types of SDCUs to meet the requirements of the project for mechanical equipment control including air handlers, central plant control, and terminal unit control. Each SDCU will operate completely standalone, containing all of the I/O and programs to control its associated equipment.

C. Modem: A modem shall be furnished for remote interrogation of the system. The modem shall operate at a minimum of 28.8 K-Baud and allow for access to the entire network of controllers.

1.5 WORK BY OTHERS

A. The BAS Contractor shall cooperate with other Contractors performing work on this project necessary to achieve a complete and neat installation. To that end, each Contractor shall consult the Drawings and Specifications for all trades to determine the nature and extent of others work.

B. The BAS Contractor shall furnish all control valves, sensor wells, flow meters and other similar equipment for installation by the Mechanical Contractor.

C. The BAS Contractor shall provide field supervision to the designated Contractor for the installation of the following:
   1. Automatic control dampers
   2. Smoke dampers

D. The Electrical Contractor shall provide the following: Furnish smoke detectors and wire to the building fire alarm system.

1.6 CODE COMPLIANCE

A. Provide BAS components and ancillary equipment, which are UL-916 listed and labeled.

B. All equipment or piping used in conditioned air streams, spaces or return air plenums shall comply with NFPA 90A Flame/Smoke/Fuel contribution rating of 25/50/0 and all applicable building codes or requirements.

C. All wiring shall conform to the National Electrical Code.

D. All smoke dampers shall be rated in accordance with UL 555S.

E. Comply with FCC rules, Part 15 regarding Class A radiation for computing devices and low power communication equipment operating in commercial environments.

F. Comply with FCC, Part 68 rules for telephone modems and data sets.

1.7 SUBMITTALS

A. All shop drawings shall be prepared in Visio Professional or AutoCAD software. In addition to the Drawings, the Contractor shall furnish a diskette containing the identical information. Drawings shall be B size or larger.

B. Shop drawings shall include a riser diagram depicting locations of all controllers and workstations, with associated network wiring. Also included shall be individual schematics of each mechanical system showing all connected points with reference to their associated controller. Typical will be allowed where appropriate.

C. Submittal data shall contain manufacturer's data on all hardware and software products required by the Specification. Valve damper and airflow station schedules shall indicate size, configuration, capacity and location of all equipment.

D. Software submittals shall contain narrative descriptions of sequences of operation, program listings, point lists, and a complete description of the graphics, reports, alarms and configuration to be furnished with the workstation software. Information shall be bound or in a three-ring binder with an index and tabs.

E. Submit five (5) copies of submittal data and shop drawings to the Engineer for review prior to ordering or fabrication of the equipment. The Contractor prior to submitting shall check all Documents for accuracy.

F. The Engineer will make corrections, if required, and return to the Contractor. The Contractor will then resubmit with the corrected or additional data. This procedure shall be repeated until all corrections are made to the satisfaction of the Engineer and the submittals are fully approved.

1.8 SYSTEM STARTUP AND COMMISSIONING

A. Each point in the system shall be tested for both hardware and software functionality. In addition, each mechanical and electrical system under control of the BAS will be tested against the appropriate sequence of operation specified herein. Successful completion of the system test shall constitute the beginning of the warranty period. A written report will be submitted to the Owner indicating that the installed system functions in accordance with the Drawings and Specifications.

B. The BAS Contractor shall commission and set in operating condition all major equipment and systems, such as the chilled water, hot water and all air handling systems, in the presence of the equipment manufacturer's representatives, as applicable, and the Owner and Architect's representatives.

C. The BAS Contractor shall provide all manpower and engineering services required to assist the HVAC Contractor and Balancing Contractor in testing, adjusting, and balancing all systems in the building. The BAS Contractor shall have a trained technician available on request during the balancing of the systems. The BAS Contractor shall coordinate all requirements to provide a complete air balance with the Balancing Contractor and shall include all labor and materials in his Contract.

1.9 TRAINING

A. The BAS Contractor shall provide both on-site and classroom training to the Owner's representative and maintenance personnel per the following description:

B. On-site training shall consist of a minimum of (40) hours of hands-on instruction geared at the operation and maintenance of the systems. The curriculum shall include:
   1. System Overview
   2. System Software and Operation
      a. System access
      b. Software features overview
      c. Changing setpoints and other attributes
      d. Scheduling
      e. Editing programmed variables
      f. Displaying color graphics
      g. Running reports
      h. Workstation maintenance
      i. Application programming
   3. Operational sequences including start-up, shutdown, adjusting and balancing.
   4. Equipment maintenance.

1.10 OPERATING AND MAINTENANCE MANUALS

A. The operation and maintenance manuals shall contain all information necessary for the operation, maintenance, replacement, installation, and parts procurement for the entire BAS. This documentation shall include specific part numbers and software versions and dates. A complete list of recommended spare parts shall be included with the lead-time and expected frequency of use of each part clearly identified.

B. Following project completion and testing, the BAS Contractor will submit As-Built Drawings reflecting the exact installation of the system. The as-built documentation shall also include a copy of all applications software both in written form and on diskette.

1.11 WARRANTY

A. The BAS Contractor shall warrant the system for 12 months after system acceptance or beneficial use by the Owner. During the warranty period, the BAS Contractor shall be responsible for all necessary revisions to the software as required to provide a complete and workable system consistent with the letter and intent of the Sequence of Operation section of the Specification.

B. Updates to the manufacturer's software shall be provided at no charge during the warranty period.

PART 2 - PRODUCTS

2.1 SYSTEM ARCHITECTURE

A. General: The Building Automation System (BAS) shall consist of Network Control Units (ICUs), a family of Standalone Digital Control Units (SDCUs), input/output Unit Modules (IOU Modules), Operator Workstations (OWs), and one File Server to support system configurations where more than one operator workstation is required. The BAS shall provide control, alarm detection, scheduling, reporting and information management for the entire facility, and Wide Area Network (WAN) if applicable, from a single ODBC-compliant database.

B. Level 1 Network Description: Level 1, the main backbone of the system, shall be an Ethernet LAN/WAN. Network Control Units, Operator Workstations, and the Central File Server shall connect directly to this network without the need for Gateway devices.

C. Level 2 Network Description

1. Level 2 of the system shall consist of one or more field buses managed by the Network Control Units. The Level 2 field buses may consist of one or both of the following types:

   a. An RS485, token passing bus that supports up to 127 Standalone Digital Control Units (SDCUs) for operation of HVAC equipment and lighting,

   or

   b. An RS485 field bus that supports up to 32 devices from a family of plug-in, IOU modules.
      - These IOU modules may be mounted within the NCU enclosure or remotely mounted via a single, twisted, shielded pair of wires.

D. BAS: The BAS shall be capable of being segmented, through software, into multiple local area networks (LANs) distributed over a wide area network (WAN), sharing a single file server. This enables workstations to manage a single LAN (or building), and/or the entire system with all devices being assured of being updated by and sharing the most current database. In the case of a single workstation system, the workstation shall contain the entire database, with no need for a separate file server.

E. Standard Network Support: All NCUs, Workstation(s) and File Server shall be capable of residing directly on the Owner's Ethernet TCP/IP LAN/WAN with no required gateways. Furthermore, the NCU's, Workstation(s) and File Server shall be capable of using standard, commercially available, off-the-shelf Ethernet infrastructure components such as routers, switches, and hubs. With this design the Owner may utilize the investment of an existing or new enterprise network or structured cabling system. This also allows the option of the maintenance of the LAN/WAN to be performed by the Owner's Information Systems Department as all devices utilize standard TCP/IP components.

F. Remote Communications

1. In addition to the above LAN/WAN architecture support, the same workstation software (front end) must be capable of managing remote systems via standard dial-up phone lines as a standard component of the software. Front-end "add-on" software modules to perform remote site communication shall not be acceptable.
2. The remote system architecture shall consist of two levels providing control, alarm detection, reporting and information management for the remote facility. Level 1 shall contain the Remote Site Control Unit, communicating to the remotely located, Operator Workstation(s) with a modem and a standard dial-up phone line. Level 2 shall consist of one or more field buses controlled by the RSCU. The field buses may consist of one or both of two types:
   a. An RS485, token passing bus that supports up to 127 Standalone Digital Control Units (SDCUs) for operation of HVAC equipment and lighting, or
   b. An RS485 field bus that supports up to 32 devices from a family of plug-in, IOU modules that may be mounted within the RSCU enclosure or remotely mounted on a single, twisted, shielded pair of wires.

G. System Expansion

1. The BAS system shall be scalable and expandable at all levels of the system using the same software interface, and the same Level 1 and Level 2 controllers. Systems that require replacement of either the workstation software or field controllers in order to expand the system shall not be acceptable.
2. The BAS shall be expandable to include Security and Access Control functions at any time in the future with no additional workstations, front-end software or Level 1 controllers required. Standalone Digital Control Units or IOU modules shall be able to be added to the existing Level 1 controller's field bus (es), to perform security and card access applications. In this way, an Owner's existing investment in wiring infrastructure may be leveraged and the cost and inconvenience of adding new field bus wiring will be minimized.
3. Additionally, an integrated video badging option must be able to be included with no additional workstations required. This photo ID option must share the same database as the BAS to eliminate the need for updating multiple databases.
4. The system shall use the same application programming language for all levels: Operator Workstation, Network Control Unit, Remote Site Control Unit and Standalone Digital Control Unit. Furthermore, this single programming language shall be used for all applications; environmental control, card access control, intrusion detection and security, lighting control, leak detection / underground storage tank monitoring, and digital data communication interfaces to third party microprocessor-based devices.

H. Support for Open Systems Protocols

1. The BAS design must include solutions for the integration of the following "open systems" protocols: BACnet, Lon Talk™, and digital data communication to third party microprocessors such as chiller controllers, fire panels and variable frequency drives (VFDs).
2. The system shall also provide the ability to program custom ASCII communication drivers, which will reside in the NCU, for communication to third party systems and devices. These drivers will provide real time monitoring and control of the third-party systems.

2.2 NETWORK CONTROL UNITS (NCUS)

A. General

1. Network Control Units shall be microprocessor based multi-tasking, multi-user, and employ a real time operating system. Each NCU control panel shall consist of modular hardware including power supply, CPU board, and input/output modules. A sufficient number of NCUs shall be supplied to fully meet the requirements of this Specification and the attached point list.

2. NCUs for telephone dialup sites shall be of the same design as the Ethernet control units but without the plug-in Ethernet network interface card (NIC), i.e., NCUs, which include a NIC, shall be interchangeable whether used on a LAN/WAN or a dialup site.

B. Web Server Functionality

1. All NCUs on the Ethernet TCP/IP LAN/WAN shall be capable, out-of-the box, to be set up as a Web Server. The NCU shall have the ability to store HTML code and "serve" pages to a web browser. This provides the ability for any computing device utilizing a TCP/IP Ethernet connection and capable of running a standard Internet browser (Microsoft Internet Explorer™, Netscape Navigator™, etc.) to access real-time data from the entire BAS via any NCUs.
2. Graphics and text-based web pages shall be constructed using standard HTML code. The interface shall allow the user to choose any of the standard text or graphics-based HTML editors for page creation. It shall also allow the operator to generate custom graphical pages and forms.
3. The WEB server interface shall be capable of password security, including validation of the requesting PC's IP address. The WEB server interface shall allow the sharing of data or information between any controller, or process or network interface (BACnet, Lon Talk and TCP/IP) that the BMS has knowledge of, regardless of where the point is connected on the BAS network or where it is acquired from.
4. The BAS network controller must act directly as the WEB server. It must directly generate the HTML code to the requesting user (i.e. WEB browser), eliminating the need for and reliance on any PC-based WEB server hardware or software. To simplify graphic image space allocation, HTML graphic images, if desired, shall be stored on any shared network device. The BAS WEB server shall have the ability to acquire any necessary graphics using standard pathing syntax within the HTML code mounted within the BAS WEB server. External WEB server hardware and software are not acceptable.

C. Hardware Specifications

1. Memory: A minimum of 4MB of RAM shall be provided for NCUs with expansion up to 8MB. The 8MB versions shall include a floating-point math co-processor.

2. Communication Ports: Each NCU shall provide communication to both the Workstation(s) and the field buses. In addition, each NCU must have at least 3 other communications ports that support a telephone modem, serial printer and connection to third party controllers such as a chiller control panel. On a LAN/WAN system the NCU shall be provided with a 10Mbps plug-in Ethernet TCP/IP network interface card (NIC).

3. Input/output (I/O) - Each NCU shall support the addition of the following types of inputs and outputs:
   a. Digital Inputs for status/alarm contacts.
   b. Counter Inputs for summing pulses from meters.
   c. Thermistor inputs for measuring temperatures in space, ducts and thermowells.
   d. Analog inputs for pressure, humidity, flow and position measurements.
   e. Digital Outputs for on/off equipment control.
   f. Analog Outputs for valve and damper position control, and capacity control of primary equipment.

4. Modular Expandability: The system shall employ a modular I/O design to allow easy expansion. Input and output capacity is to be provided through plug-in modules of various types or DIN-mountable IOU modules. It shall be possible to combine I/O modules as desired to meet the I/O requirements for individual control applications.

5. Hardware Override Switches: All digital output units shall include three position manual override switches to allow selection of the ON, OFF, or AUTO output state. These switches shall be built into the unit and shall provide feedback to the controller so that the position of the override switch can be obtained through software. In addition, each analog output shall be equipped with an override potentiometer to allow manual adjustment of the analog output signal over its full range, when the 3 position manual override switch is placed in the ON position.

6. Local Status Indicator Lamps: Provide as a minimum LED indication of CPU status, Ethernet LAN status, and field bus status. For each output, provide LED indication of the value of the output (On/Off). For each output module provide an LED which gives a visual indication of whether any outputs on the module are manually overridden.

7. Real Time Clock (RTC): Each NCU shall include a battery-backed, real time clock, accurate to 10 seconds per day. The RTC shall provide the following: time of day, day, month, year, and day of week. In normal operation the system clock will be based on the frequency of the AC power. The system shall automatically correct for daylight savings time and leap years and be Year 2000 compliant.

8. Power Supply: The power supply for the NCUs shall be auto sensing, 120-220VAC, 60/50 Hz power, with a tolerance of +/- 20%. Line voltage below the operating range of the system shall be considered outages. The controller shall contain over voltage surge protection and require no additional AC power signal conditioning. Optionally, if indicated on the Drawings, the power supply shall accept an input voltage of (–48 VDC).

9. Automatic Restart After Power Failure: Upon restoration of power after an outage, the ECU shall automatically and without human intervention: update all monitored functions; resume operation based on current, synchronized time and status, and implement special start-up strategies as required.

10. Battery Backup: Each NCU with the standard 120-220VAC power supply shall include a programmable DC power backup system rated for a minimum of 72 hours of battery backup to maintain all volatile memory or, a minimum of 2 hours of full UPS including modem power. This power backup system shall be configurable such that at the end of a settable timeframe (such as 1 hour) of running on full UPS, the unit will shut off full UPS and switch to memory retention-only mode for the remainder of the battery power. The system shall allow the simple addition of more batteries to extend the above minimum battery backup times.

D. Software Specifications

1. General: The NCU shall contain flash ROM as the resident operating system. Application software will be RAM resident. Application software will only be limited by the amount of RAM memory. There will be no restrictions placed on the type of application programs in the system. Each NCU shall be capable of parallel processing, executing all control programs simultaneously. Any program may affect the operation of any other program. Each program shall have the full access of all I/O facilities of the processor. This execution of control function shall not be interrupted due to normal user communications including interrogation, program entry, printout of the program for storage, etc.
2. User Programming Language: The application software shall be user programmable. This includes all strategies, sequences of operation, control algorithms, parameters, and setpoints. The source program shall be English language-based and programmable by the user. The language shall be structured to allow for the easy configuration of control programs, schedules, alarms, reports, telecommunications, local displays, mathematical calculations, passwords, and histories. The language shall be self-documenting. Users shall be able to place comments anywhere in the body of a program. Program listings shall be configurable by the user in logical groupings.

E. Control Software

1. The NCU shall have the ability to perform the following pre-tested control algorithms:
   a. Proportional, Integral plus Derivative Control (PID)
   b. Self-Tuning PID
   c. Two Position Control
   d. Digital Filter
   e. Ratio Calculator
   f. Equipment Cycling Protection

2. Mathematical Functions
   a. Each controller shall be capable of performing basic mathematical functions (+, -, *, /), squares, square roots, exponential, logarithms, Boolean logic statements, or combinations of both. The controllers shall be capable of performing complex logical statements including operators such as >, <, =, and, or, exclusive or, etc. These must be able to be used in the same equations with the mathematical operators and nested up to five parentheses deep.

3. Energy Management Applications: NCUs shall have the ability to perform any or all of the following energy management routines:
   a. Time of Day Scheduling
   b. Calendar Based Scheduling
   c. Holiday Scheduling
   d. Temporary Schedule Overrides
   e. Optimal Start
   f. Optimal Stop
   g. Night Setback Control
   h. Enthalpy Switchover (Economizer)
   i. Peak Demand Limiting
   j. Temperature Compensated Duty Cycling
   k. CFM Tracking
   l. Heating/Cooling Interlock
   m. Free Cooling
   n. Hot Water Reset

4. History Logging: Each controller shall be capable of logging any system variable over user defined time intervals ranging from 1 second to 1440 minutes. Any system variables (inputs, outputs, math calculations, flags, etc.) can be logged in history. A maximum of 32767 values can be stored in each log. Each log can record either the instantaneous, average, minimum or maximum value of the point. Logs can be automatic or manual. Logged data shall be downloadable to the Operator Workstation for long term archiving based upon user-defined time intervals, or manual command.

5. Alarm Management
   a. For each system point, alarms can be created based on high/low limits or conditional expressions. All alarms will be tested each scan of the NCU and can result in the display of one or more alarm messages or reports.
   b. Up to 8 alarms can be configured for each point in the controller.
   c. Messages and reports can be sent to a local terminal, to the front-end workstation(s), or via modem to a remote-computing device.
   d. Alarms will be generated based on their priority. A minimum of 255 priority levels shall be provided.
   e. If communication with the Operator Workstation is temporarily interrupted, the alarm will be buffered in the NCU. When communications return, the alarm will be transmitted to the Operator Workstation if the point is still in the alarm condition.

6. Reporting:
   The NCU shall be able to generate user-definable reports to a locally connected printer or terminal. The reports shall contain any combination of text and system variables. Report templates shall be able to be created by users in a word processing environment. Reports can be displayed based on any logical condition or through a user command.

2.3 STANDALONE DIGITAL CONTROL UNITS (SDCUs)

A. General: Standalone Digital Control Units shall provide control of HVAC. Each controller shall have its own control programs and will continue to operate in the event of a failure or communication loss to its associated NCU.

B. Memory: Control programs shall be stored in battery backed-up RAM and EPROM. Each controller shall have a minimum of 32K bytes of user RAM memory and 128K bytes of EPROM.

C. Communication Ports: SDCUs shall provide a communication port to the field bus. It shall be possible from a service port on any SDCU to view, enable/disable, and modify values of any point or program on any controller on the local field bus, any NCU or any SDCU on a different field bus.

D. Input/Output - Each SDCU shall support the addition of the following types of inputs and outputs:

1. Digital Inputs for status/alarm contacts.
2. Counter Inputs for summing pulses from meters.
3. Thermistor Inputs for measuring temperatures in space, ducts and thermowells.
4. Analog inputs for pressure, humidity, flow and position measurements.
5. Digital Outputs for on/off equipment control.
6. Analog Outputs for valve and damper position control, and capacity control of primary equipment.

E. Expandability: Input and output capacity shall be expandable through the use of plug-in modules. A minimum of two modules shall be added to the base SDCU before additional power is required.

F. Networking: Each SDCU will be able to exchange information on a peer-to-peer basis with other Standalone Digital Control Units during each field bus scan. Each SDCU shall be capable of storing and referencing global variables (on the LAN) with or without any workstations online. Each SDCU shall be able to have its program viewed and/or enabled/disabled through a workstation connected to an NCU.

G. Indicator Lamps: SDCUs will have as a minimum, LED indication of CPU status, and field bus status.

H. Real Time Clock (RTC): An SDCU shall have a real time clock in either hardware or software. The accuracy shall be within 10 seconds per day. The RTC shall provide the following information: time of day, day, month, year, and day of week. Each SDCU shall receive a signal, every hour, over the network from the NCU, which synchronizes all SDCU real time clocks.

I. Automatic Restart After Power Failure: Upon restoration of power, the SDCU shall automatically and without human intervention, update all monitored functions, resume operation based on current, synchronized time and status, and implement special start-up strategies as required.

J. Battery Back Up: Each SDCU shall have at least 3 years of battery back up to maintain all volatile memory.

K. Alarm Management

1. For each system point, alarms can be created based on high/low limits or conditional expressions. All alarms will be tested each scan of the SDCU and can result in the display of one or more alarm messages or reports.

2. Up to 8 alarms can be configured for each point in the controller enabling the escalation of the alarm priority (urgency) based upon which alarm(s) is/are triggered.

3. Alarm messages can be sent to a local terminal or modem connected to an NCU or to the Operator's Workstation(s).

4. Alarms will be generated based on their priority. A minimum of 255 priority levels shall be provided.

5. If communication with the NCU is temporarily interrupted, the alarm will be buffered in the SDCU. When communications return, the alarm will be transmitted to the NCU if the point is still in the alarm condition.

L. Air Handler Controllers (To be used on units with less than 40 points)

1. AHU Controllers shall be capable of meeting the requirements of the sequence of operation found in the Execution portion of this Specification and for future expansion.

2. AHU Controllers shall support all the necessary point inputs and outputs as required by the sequence and operate in a standalone fashion.

3. AHU Controllers shall be fully user programmable to allow for modification of the application software.

4. An LCD display shall be optionally available for readout of point values and to allow operators to change setpoints and system parameters.

5. A manual override switch shall be provided for all digital and analog outputs on the AHU controller. The position of the switch shall be monitored in software and available for operator displays and alarm notification.

M. Unitary Controllers

1. Unitary Controllers shall support, but not be limited to, the control of the following systems as described in the Execution portion of this Specification, and for future expansion:
   a. Unit Ventilators
   b. Heat Pumps (Air to Air, Water to Water)
   c. Fan Coils (2 or 4 Pipe)

2. The I/O of each Unitary Controller shall contain the sufficient quantity and types as required to meet the sequence of operation found in the Execution portion of this Specification. In addition, each controller shall have the capability for time of day scheduling, occupancy mode control, after hour operation, lighting control, alarming, and trending.

N. Lighting Controllers

1. Lighting controllers shall provide direct control of 20 Amp, 277 VAC lighting circuits using mechanically held, latching relays. Controllers will contain from 8 to 48 circuits per enclosure. Each controller shall also contain inputs for direct connection to light switches and motion detectors.

2. Each controller shall have the capability for time of day scheduling, occupancy mode control, after hour operation, alarming, and trending.

2.4 OPERATOR WORKSTATION REQUIREMENTS

A. General

1. The BAS workstation software shall be configurable as a single workstation system.
2. Workstations shall be Pentium 4 based personal computers operating under the Microsoft NT operating system. The application software shall be capable of communication to all Network Control Units and Stand-alone Digital Control Units, feature high-resolution color graphics, alarming, reporting, and be user configurable for all data collection and data presentation functions.
3. For multi-workstation systems, a minimum of 256 workstations shall be allowed on the Ethernet network along with the central file server. In this client/server configuration, any changes or additions made from one workstation will automatically appear on all other workstations without the requirement for manual copying of files. Multi-workstation systems with no central database will not be acceptable. Multi-workstation systems with distributed/tiered file servers and a central (master) database will be acceptable.

B. Workstation Requirements (Single workstation or multi-workstation configuration).

1. The workstation shall consist of the following:
   a. 1.9 GHz Pentium 4 processor with 256 MB of RAM
   b. Microsoft NT Workstation™ operating system
   c. Two serial ports
   d. 10MBPS or 10/100MBPS Ethernet NIC
   e. 60 GB hard disk
   f. 3 ½" diskette drive
   g. CD-ROM drive
   h. SVGA compatible, 15" monitor.
   i. Mouse
   j. Full function keyboard
   k. Audio sound card and speakers
   l. License agreement for all applicable software.

C. Provide one NT Workstation-compatible 56k K-baud modem.

D. Printer: Provide an alarm printer and a separate report/graphics printer. The alarm printer shall be an Epson dot matrix or equivalent and the report printer shall be a HP LaserJet.

E. Workstation Software

1. General Description

   a. The software architecture must be object-oriented in design, a true 32-bit application suite utilizing Microsoft's OLE, COM, DCOM and ODBC technologies. These technologies make it easy to fully utilize the power of the operating system to share, among applications (and therefore to the users of those applications), the wealth of data available from the BAS.
   b. The workstation functions shall include monitoring and programming of all DDC controllers. Monitoring consists of alarming, reporting, graphic displays, long term data storage, automatic data collection, and operator-initiated control actions such as schedule and setpoint adjustments.

c. Programming of controllers shall be capable of being done either off-line or on-line from any operator workstation. All information will be available in graphic or text displays. Graphic displays will feature animation effects to enhance the presentation of the data, to alert operators of problems, and to facilitate location of information throughout the DDC system. All operator functions shall be selectable through a mouse.

2. System Database:
The files server database engine must be Microsoft SQL Server, or another ODBC-compliant, relational database program. This ODBC (Open Database Connectivity)-compliant database engine allows for an Owner to utilize "their" choice of database and due to its "open" architecture, allows an Owner to write custom applications and/or reports which communicate directly with the database avoiding data transfer routines to update other applications. The system database shall contain all point configurations and programs in each of the controllers that have been assigned to the network. In addition, the database will contain all workstation files including color graphic, alarm reports, text reports, historical data logs, schedules, and polling records.

3. User Interface:
The BAS workstation software shall allow the creation of a custom, browser-style interface linked to the user that has logged into the workstation software. This interface shall support the creation of "hot-spots" that the user may link to view/edit any object in the system or run any object editor or configuration tool contained in the software. Furthermore, this interface must be able to be configured to become a user's "PC Desktop" – with all the links that a user needs to run other applications. This, along with the Windows NT user security capabilities, will enable a system administrator to setup workstation accounts that not only limit the capabilities of the user within the BAS software but may also limit what a user can do on the PC and/or LAN/WAN. This might be used to ensure, for example, that the user of an alarm monitoring workstation is unable to shutdown the active alarm viewer and/or unable to load software onto the PC.

4. User Security:
The software shall be designed so that each user of the software can have a unique username and password. This username/password combination shall be linked to a set of capabilities within the software, set by and editable only by, a system administrator. The sets of capabilities shall range from view only, acknowledge alarms, enable/disable, and change values, program, and administer. The system shall allow the above capabilities to be applied independently to each and every class of object in the system. The system must allow a minimum of 256 users to be configured per workstation. There shall be an inactivity timer adjustable in software that automatically logs off the current operator after the timer has expired.

5. Configuration Interface

a. The workstation software shall use a familiar Windows Explorer™-style interface for an operator or programmer to view and/or edit any object (controller, point, alarm, report, schedule, etc.) in the entire system. In addition, this interface shall present a "network map" of all controllers and their associated points, programs, graphics, alarms, and reports in an easy to understand structure. All object names shall be alphanumeric and use Windows long filename conventions. Object names shall not be required to be unique throughout the system. This allows consistency in point naming. For example, each VAV controller can have an input called Space Temperature and a setpoint called CFM Setpoint. The VAV controller name shall be unique such as VAV for LAB101. Systems requiring unique object names throughout the system will not be acceptable.

b. The configuration interface shall also include support for template objects. These template objects shall be used as building blocks for the creation of the BAS database. The types of template objects supported shall include all data point types (input, output, string variables, setpoints, etc.), alarm algorithms, alarm notification objects, reports, graphics displays, schedules, and programs. Groups of template object types shall be able to be set up as template subsystems and systems. The template system shall prompt for data entry if necessary. The template system shall maintain a link to all "child" objects created by each template. If a user wishes to make a change to a template object, the software shall ask the user if he/she wants to update all of child objects with the change. This template system shall facilitate configuration and programming consistency and afford the user a fast and simple method to make global changes to the BAS.

6. Color Graphic Displays

a. The system shall allow for the creation of user defined, color graphic displays for the viewing of mechanical and electrical systems or building schematics. These graphics shall contain point information from the database including any attributes associated with the point (engineering units, etc.). In addition, operators shall be able to command equipment or change setpoints from a graphic through the use of the mouse. Requirements of the color graphic subsystem include:

b. SVGA, bit-mapped displays. The user shall have the ability to import AutoCAD generated picture files as background displays.

c. A built-in library of animated objects such as dampers, fans, pumps, buttons, knobs, gauges, ad graphs which can be "dropped" on a graphic through the use of a software configuration "wizard". These objects shall enable operators to interact with the graphic displays in a manner that mimics their mechanical equivalents found on field installed control panels. Using the mouse, operators shall be able to adjust setpoints, start or stop equipment, modify PID loop parameters, or change schedules.

d. Status changes or alarm conditions must be able to be highlighted by objects changing screen location, size, color, text, blinking or changing from one display to another.

e. Graphic panel objects shall be able to be configured with multiple "tabbed" pages allowing an operator to quickly view individual graphics of equipment, which make up a subsystem or system.

f. Ability to link graphic displays through user-defined objects, alarm testing, or the result of a mathematical expression. Operators must be able to change from one graphic to another by selecting an object with a mouse - no menus will be required.

7. Automatic monitoring: The software shall allow for the automatic collection of data and reports from any controller through either a hardwire or modem communication link. The frequency of data collection shall be completely user configurable.

8. Alarm Management: The software shall be capable of accepting alarms directly from controllers, or generating alarms based on evaluation of data in controllers and comparing to limits or conditional equations configured through the software. Any alarm (regardless of its origination) will be integrated into the overall alarm management system and will appear in all standard alarm reports, be available for operator acknowledgment, and have the option for displaying graphics, or reports.

a. Alarm management features shall include:

- A minimum of 255-alarm notification levels. Each notification level will establish a unique set of parameters for controlling alarm display, acknowledgment, keyboard annunciation, alarm printout and record keeping.

- Automatic logging in the database of the alarm message, point name, point value, connected controller, timestamp, username and time of acknowledgement, username and time of alarm silence (soft acknowledgement)
- Automatic printing of the alarm information or alarm report to an alarm printer or report printer.
- Playing an audible beep or audio (wav) files on alarm initiation or return to normal.
- Sending an e-mail or alphanumeric page to anyone listed in a workstation's email account address list on either the initial occurrence of an alarm and/or if the alarm is repeated because an operator has not acknowledged the alarm within a user-configurable timeframe. The ability to utilize email and alphanumeric paging of alarms shall be a standard feature of the software integrated with the operating system's mail application interface (MAPI). No special software interfaces shall be required.
- Individual alarms shall be able to be re-routed to a workstation or workstations at user-specified times and dates. For example, a critical high temp alarm can be configured to be routed to a Facilities Dept. workstation during normal working hours (7am-6pm, Mon-Fri) and to a Central Alarming workstation at all other times.
- An active alarm viewer shall be included which can be customized for each user or user type to hide or display any alarm attributes.
- The font type and color, and background color for each alarm notification level as seen in the active alarm viewer shall be customizable to allow easy identification of certain alarm types or alarm states.
- The active alarm viewer can be configured such that an operator must type in text in an alarm entry and/or pick from a drop-down list of user actions for certain alarms. This ensures accountability (audit trail) for the response to critical alarms.

9. Custom Report Generation

a. The software will contain a built-in custom report generator, featuring word processing tools for the creation of custom reports. These custom reports shall be able to be set up to automatically run or be generated on demand. Each workstation shall be able to associate reports with any word processing or spreadsheet program loaded on the machine. When the report is displayed, it will automatically spawn the associated report editor such as MS Word™, WordPerfect™, Notepad, or Lotus 123™.

- Reports can be of any length and contain any point attributes from any controller on the network.
- The report generator will have access to the user programming language in order to perform mathematical calculations inside the body of the report, control the display output of the report, or prompt the user for additional information needed by the report.
- It shall be possible to run other executable programs whenever a report is initiated.
- Report Generator activity can be tied to the alarm management system, so that any of the configured reports can be displayed in response to an alarm condition.

b. Standard reports shall include:
- Points in each controller
- Points in alarm
- Disabled points
- Overridden points
- Operator activity report

- Alarm history log
- Program listing by controller with status
- Network status of each controller

10. Spreadsheet-Style Reports:
The software shall allow the simple configuration of row/column (spreadsheet-style) reports on any class of object in the system. These reports shall be user-configurable and shall be able to extract live (controller) data and/or data from the database. The user shall be able to set up each report to display in any text font, color and background color. In addition, the report shall be able to be configured to filter data, sort data and highlight data, which meets user-defined criteria.

11. HTML Reporting:
The above spreadsheet-style reports shall be able to be run to an HTML template file. This feature will create an HTML "results" file in the directory of the HTML template. This directory can be shared with other computer users, which will allow those users with access to the directory to "point" their web browser at the file and view the report.

12. Scheduling

a. It shall be possible to configure and download from the workstation schedules for any of the controllers on the network.
b. Time of day schedules shall be in a calendar style and shall be programmable for a minimum of one year in advance. Each standard day of the week and user-defined day types shall be able to be associated with a color so that when the schedule is viewed it is very easy, at-a-glance, to determine the schedule for a particular day even from the yearly view. To change the schedule for a particular day, a user shall simply click on the day and then click on the day type.
c. Each schedule will appear on the screen viewable as the entire year, monthly, week and day. A simple mouse click shall allow switching between views. It shall also be possible to scroll from one month to the next and view or alter any of the schedule times.
d. Schedules will be assigned to specific controllers and stored in their local RAM memory. Any changes made at the workstation will be automatically updated to the corresponding schedule in the controller.

13. Programmer's Environment: The programmer's environment will include access to a superset of the same programming language supported in the controllers. Here the programmer will be able to configure application software off-line (if desired) for custom program development, write global control programs, system reports, wide area networking data collection routines, and custom alarm management software. On the same screen as the program editor, the programming environment shall include dockable debug and watch bars for program debugging and viewing updated values and point attributes during programming. In addition, a wizard tool shall be available for loading programs from a library file in the program editor.

14. Saving/Reloading: The workstation software shall have an application to save and restore field controller memory files. This application shall not be limited to saving and reloading an entire controller. It must also be able to save/reload individual objects in the controller. This allows off-line debugging of control programs, for example, and then reloading of just the modified information.

15. Data Logging: The workstation software shall have the capability to easily configure groups of data points with trend logs and display the trend log data. A group of data points shall be created by drag-and-drop method of the points into a folder. The trend log data shall be displayed through a simple menu selection. This data shall be able to be saved to file and/or printed.

16. Audit Trail: The workstation software shall automatically log and timestamp every operation that a user performs at a workstation, from logging on and off a workstation to changing a point value, modifying a program, enabling/disabling an object, viewing a graphic display, running a report, modifying a schedule, etc.

17. Fault Tolerant File Server Operation

    a. The system shall provide the option to provide fault tolerant operation in the event of the loss of the CPU, disk drives, or other hardware required to maintain the operational integrity of the system. Operational integrity includes all user interfaces, monitoring of alarm points and access points, and executing access control functions.

    b. The switchover mechanism provided shall be automatic. Should the failure be caused by hardware, then the system shall immediately switch to the backup computer. Should the system failure be caused by software (instruction or data), the system shall not pass the faulted code to the backup computer, otherwise the backup shall fail in the same manner of the primary computer.

    c. Switchover to the backup computer shall be initiated and effective (complete) in a manner and time frame that precludes the loss of event data, and shall be transparent to the system users, except for an advisory alarm message indicating that the switchover has occurred.

    d. When the system fails-over from the primary to the backup computer, no alarm or other event shall be lost, and the backup computer shall take control of all system functions.

    e. A single component failure in the system shall not cause the entire system to fail. All system users shall be informed of any detectable component failure via an alarm event. System users shall not be logged off as a result of a system failure or switchover.

    f. The primary computer shall provide continual indication that the backup computer is unavailable until such time that the fault has been purged.

2.5 PORTABLE OPERATOR'S TERMINAL

A. Full screen, laptop shall communicate directly to all controllers. The laptop software shall enable users to monitor both instantaneous and historical point data, modify control parameters, and enable/disable any point or program in any controller on the network.

B. The laptop computer will be a Pentium-based portable computer with a minimum of 16MB of RAM memory, a 3 ½" floppy disk drive and a 500MB hard disk drive.

C. The laptop will connect to any Ethernet controller or standalone controller via a dedicated service port. From this single connection, the user shall be able to communicate with any other controller on the LAN.

D. The laptop will limit operator access by passwords. The laptop must support, at a minimum, the following password-protected user types: Administrator, Modify Parameters, View Only.

E. The laptop software shall include built-in menus for viewing points by controller, enabling, disabling and viewing programs, configuring controllers, and communicating to other controllers on the network.

2.6 DDC SENSORS AND POINT HARDWARE

A. Temperature Sensors

1. All temperature devices shall use precision thermistors accurate to +/- 1 degree F over a range of – 30 to 230 degrees F. Space temperature sensors shall be accurate to +/- .5 degrees F over a range of 40 to 100 degrees F.

2. Standard space sensors shall be available in an off white enclosure for mounting on a standard electrical box.

3. Where manual overrides are required, the sensor housing shall feature both an optional sliding mechanism for adjusting the space temperature setpoint, as well as a push button for selecting after hours operation.

4. Where a local display is specified, the sensor shall incorporate either an LED or LCD display for viewing the space temperature, setpoint and other operator selectable parameters. Using built in buttons; operators shall be able to adjust setpoints directly from the sensor.

5. Duct temperature sensors shall incorporate a thermistor bead embedded at the tip of a stainless steel tube. Probe style duct sensors are useable in air handling applications where the coil or duct area is less than 14 square feet.

6. Averaging sensors shall be employed in ducts, which are larger than 14 square feet. The averaging sensor tube must contain at least one thermistor for every 3 feet, with a minimum tube length of 12 feet.

7. Immersion sensors shall be employed for measurement of temperature in all chilled and hot water applications as well as refrigerant applications. Thermal wells shall be brass or stainless steel for non-corrosive fluids below 250 degrees F. and 300 series stainless steel for all other applications.

8. A pneumatic signal shall not be allowed for sensing temperature.

B. Humidity Sensors

1. Humidity devices shall be accurate to +/- 5% at full scale for space and +/- 3% for duct and outside air applications. Suppliers shall be able to demonstrate that accuracy is NIST traceable.

2. Provide a hand held field calibration tool that both reads the output of the sensor and contains a reference sensor for ongoing calibration.

C. Pressure Sensors

1. Air pressure measurements in the range of 0 to 10” water column will be accurate to +/- 1% using a solid-state sensing element. Acceptable manufacturers include Modus Instruments and Mamac.

2. Differential pressure measurements of liquids or gases shall be accurate to =/- 0.5% of range. The housing shall be NEMA 4 rated.

D. Current and KW Sensors

1. Current status switches shall be used to monitor fans, pumps, motors and electrical loads. Current switches shall be available in solid and split core models, and offer either a digital or an analog signal to the automation system. Acceptable manufacturer is Veris or approved equal.

2. Measurement of three-phase power shall be accomplished with a kW/kWH transducer. This device shall utilize direct current transformer inputs to calculate the instantaneous value (kW) and a pulsed output proportional to the energy usage (kWH). Provide Veris Model 6000 Power Transducer or approved equal.

E. Flow Sensors

1. Provide an insertion vortex flowmeter for measurement of liquid or gas flows in pipe sizes above 3 inches.

2. Install the flow meter on an isolation valve to permit removal without process shutdown.

3. Sensors shall be manufactured by EMCO or approved equal.

2.7 CONTROL VALVES (With Electric Actuator)

A. Provide automatic control valves suitable for the specified controlled media (water or glycol). Provide valves, which mate and match the material of the connected piping. Equip control valves with the actuators of required input power type and control signal type to accurately position the flow control element and provide sufficient force to achieve required leakage specification.

B. Control valves shall meet the heating and cooling loads specified, and closes off against the differential pressure conditions within the application. Valves should be sized to operate accurately and with stability from 10% to 100% of the maximum design flow.

C. Trim material shall be stainless steel for hot water and high differential pressure applications.

D. Electric actuation should be provided on all terminal unit reheat applications.

2.8 DAMPERS (With Electric Actuators)

A. Automatic dampers, furnished by the Building Automation Contractor shall be single or multiple blade as required. Dampers are to be installed by the HVAC Contractor under the supervision of the BAS Contractor. All blank-off plates and conversions necessary to install smaller than duct size dampers are the responsibility of the Sheetmetal Contractor.

B. Damper frames are to be constructed of 13 gauge galvanized sheet steel mechanically joined with linkage concealed in the side channel to eliminate noise as friction. Compressible spring stainless steel side seals and acetyl or bronze bearings shall also be provided.

C. Damper blade width shall not exceed eight inches. Seals and 3/8 inch square steel zinc plated pins are required. Blade rotation is to be parallel or opposed as shown on the schedules.

D. For high performance applications, control dampers will meet or exceed the UL Class I leakage rating.

2.9 DAMPER ACTUATORS

A. Electronic Actuators: The actuator shall be direct coupled over the shaft, enabling it to be mounted directly to the damper shaft without the need for connecting linkage. The actuator shall have electronic overload circuitry to prevent damage. For power-failure/safety applications, an internal mechanical, spring return mechanism shall be built into the actuator housing. Non-spring return actuators shall have an external manual gear release to allow positioning of the damper when the actuator is not powered.

2.10 SMOKE DETECTORS

A. Air duct smoke detectors shall be by Air Products & Controls or approved equal. The detectors shall operate at air velocities from 300 feet per minute to 4000 feet per minute.

B. The smoke detector shall utilize a photoelectric detector head.

C. The housing shall permit mechanical installation without removal of the detector cover.

D. The detectors shall be listed by Underwriters Laboratories and meet the requirements of UL 268A.

PART 3 - EXECUTION

3.1 GENERAL

A. All DDC Controllers shall be networked to Central Communications controller.

B. Communications cabling shall be run in hallways above hung ceiling with plenum cable and wiremold where exposed.

3.2 CONTRACTOR RESPONSIBILITIES

A. General: The Contractor or a Sub-Contractor shall perform installation of the building automation system. However, all installation shall be under the personal supervision of the Contractor. The Contractor shall certify all work as proper and complete.

B. Demolition: Remove controls, which do not remain as part of the building automation system, all associated abandoned wiring and conduit and all associated pneumatic tubing. The Owner will inform the Contractor of any equipment, which is to be removed, that will remain the property of the Owner. The Contractor will dispose of all other equipment that is removed.

C. Access to Site: Unless notified otherwise, entrance to building is restricted. No one will be permitted to enter the building unless their names have been cleared with the Owner or the Owner’s representative.

D. Code Compliance: All wiring shall be installed in accordance with all applicable electrical codes and will comply with equipment manufacturer's recommendations. Should any discrepancy be found between wiring Specifications in Division 26 and Division 22, wiring requirements of Division 26 will prevail for work specified in Division 26.

E. Cleanup: At the completion of the work, all equipment pertinent to this Contract shall be checked and thoroughly cleaned, and all other areas shall be cleaned around equipment provided under this Contract. Clean the exposed surfaces of tubing, hangers, and other exposed metal of grease, plaster, or other foreign materials.

3.3 WIRING, CONDUIT, TUBING AND CABLE

A. All wire will be copper and meet the minimum wire size and insulation class listed below:

Wire Class	Wire Size	Isolation Class
Power	12 Gauge	600 Volt
Class One	14 Gauge Std.	600 Volt
Class Two	18 Gauge Std.	300 Volt
Class Three	18 Gauge Std.	300 volt
Communications	Per Mfr.	Per Mfr.

B. Power and Class One wiring may be run in the same conduit. Class Two and Three wiring and communications wiring may be run in the same conduit.

C. Where different wiring classes terminate within the same enclosure, maintain clearances and install barriers per the National Electric Code.

D. Where wiring is required to be installed in conduit, EMT shall be used. Conduit shall be minimum 1/2-inch galvanized EMT. Setscrew fittings are acceptable for dry interior locations. Watertight compression fittings shall be used for exterior locations and interior locations subject to moisture. Provide conduit seal off fitting where exterior conduits enter the building or between areas of high temperature/moisture differential.

E. Flexible metallic conduit (max. 3 feet) shall be used for connections to motors, actuators, controllers, and sensors mounted on vibration producing equipment. Liquid-tight flexible conduit shall be use in exterior locations and interior locations subject to moisture.

F. Junction boxes shall be provided at all cable splices, equipment termination, and transitions from EMT to flexible conduit. Interior dry location J-boxes shall be galvanized pressed steel, nominal four-inch square with blank cover. Exterior and damp location JH-boxes shall be cast alloy FS boxes with threaded hubs and gasket covers.

G. Where the space above the ceiling is a supply or return air plenum, the wiring shall be plenum rated. Teflon wiring can be run without conduit above suspended ceilings. EXCEPTION: Any wire run in suspended ceilings that is used to control outside air dampers or to connect the system to the fire management system shall be in conduit.

H. Coaxial cable shall conform to RG62 or RG59 rating. Provide plenum rated coaxial cable when running in return air plenums.

3.4 HARDWARE INSTALLATION

A. Installation Practices for Wiring and Tubing

1. All controllers are to be mounted vertically and per the manufacturer's installation documentation.

2. The 120 VAC power wiring to each Ethernet or Remote Site controller shall be a dedicated run, with a separate breaker. Each run will include a separate hot, neutral and ground wire. The ground wire will terminate at the breaker panel ground. This circuit will not feed any other circuit or device.

3. A true earth ground must be available in the building. Do not use a corroded or galvanized pipe, or structural steel.

4. Wires are to be attached to the building proper at regular intervals such that wiring does not drop. Wires are not to be affixed to or supported by pipes, conduit, etc.

5. Wiring in finished areas will be concealed in ceiling cavity spaces, plenums, and furred spaces and wall construction. Exception: metallic surface raceway may be used in finished areas on masonry walls. All surface raceway in finished areas must be color matched to the existing finish within the limitations of standard manufactured colors.

6. Wiring, in non-finished areas where possible, will be concealed in ceiling cavity spaces, plenums, furred spaces, and wall construction. Exposed conduit will run parallel to or at right angles to the building structure.

7. Wires are to be kept a minimum of three (3) inches from hot water or condense piping.

8. Where sensor wires leave the conduit system, they are to be protected by a plastic insert.

B. Installation Practices for Field Devices

1. Well-mounted sensors will include thermal conducting compound within the well to insure good heat transfer to the sensor.

2. Actuators will be firmly mounted to give positive movement and linkage will be adjusted to give smooth continuous movement throughout 100 percent of the stroke.

3. Relay outputs will include transient suppression across all coils. Suppression devices shall limit transients to 150% of the rated coil voltage.

4. Water line mounted sensors shall be removable without shutting down the system in which they are installed.

5. For duct static pressure sensors, the high-pressure port shall be connected to a metal static pressure probe inserted into the duct pointing upstream. The low-pressure port shall be left open to the plenum area at the point that the high-pressure port is tapped into the ductwork.

6. For building static pressure sensors, the high-pressure port shall be inserted into the space via a metal tube. Pipe the low-pressure port to the outside of the building.

C. Enclosures

1. For all I/O requiring field interface devices, these devices, where practical, will be mounted in a field interface panel (FIP). The Contractor shall provide an enclosure, which protects the device(s) from dust, moisture, conceals integral wiring and moving parts.

2. FIP's shall contain power supplies for sensors, interface relays and Contractors, safety circuits, and I/P transducers.

3. The FIP enclosure shall be of steel construction with baked enamel finish; NEMA 1 rated with a hinged door and keyed lock. The enclosure will be sized for 20% spare mounting space. All locks will be keyed identically.

4. All wiring to and from the FIP will be to screw type terminals. Analog or communications wiring may use the FIP as a raceway without terminating. The use of wire nuts within the FIP is prohibited.

5. All outside mounted enclosures shall meet the NEMA-4 rating.

6. The wiring within all enclosures shall be run in plastic track. Wiring within controllers shall be wrapped and secured.

D. Identification

1. Identify all control wires with labeling tape or sleeves using either words, letters, or numbers that can be exactly cross-referenced with As-Built Drawings.

2. All field enclosures, other than controllers, shall be identified with a Bakelite nameplate. The lettering shall be in white against a black or blue background.

3. Junction box covers will be marked to indicate that they are a part of the BAS system.

4. All I/O field devices (except space sensors) that are not mounted within FIP's shall be identified with nameplates.

5. All I/O field devices inside FIP's shall be labeled.

E. Control System Switch-Over

1. Demolition of the existing control system will occur after the new temperature control system is in place including new sensors and new field interface devices.

2. Switch over from the existing control system to the new system will be fully coordinated with the Owner. A representative of the Owner will be on site during switch over.

3. The Contractor shall minimize control system downtime during switch over. Sufficient installation mechanics will be on site so that the entire switch over can be accomplished in a reasonable time frame.

F. Location

1. The location of sensors is per Mechanical and Architectural Drawings.

2. Outdoor air sensors will be mounted on the north building face directly in the outside air. Install these sensors such that the effects of heat radiated from the building or sunlight is minimized.

3. Field enclosures shall be located immediately adjacent to the controller panel(s) to which it is being interfaced.

3.5 SOFTWARE INSTALLATION

A. General: The Contractor shall provide all labor necessary to install, initialize, start-up and debug all system software as described in this section. This includes any operating system software or other third-party software necessary for successful operation of the system.

B. Database Configuration: The Contractor will provide all labor to configure those portions of the database that are required by the points list and sequence of operation.

C. Color Graphic Slides: Unless otherwise directed by the Owner, the Contractor will provide color graphic displays as depicted in the Mechanical Drawings for each system and floor plan. For each system or floor plan, the display shall contain the associated points identified in the point list and allow for set point changes as required by the Owner.

D. Reports - The Contractor will configure a minimum of 6 reports for the Owner as listed below:
1. Central Plant Status Report
2. Air Handler Status Report
3. Energy Consumption Report
4. Space Temperature Report
5. Specialty Equipment Status Report

E. Documentation - As-built software documentation will include the following:
1. Descriptive point lists
2. Application program listing
3. Application programs with comments
4. Printouts of all reports
5. Alarm list
6. Printouts of all graphics

3.6 COMMISSIONING AND SYSTEM STARTUP

A. Point-to-Point Checkout:
Each I/O device (both field mounted as well as those located in FIP's) shall be inspected and verified for proper installation and functionality. A checkout sheet itemizing each device shall be filled out, dated and approved by the Project Manager for submission to the Owner or Owner's representative.

B. Controller and Workstation Checkout:
A field checkout of all controllers and front-end equipment (computers, printers, modems, etc.) shall be conducted to verify proper operation of both hardware and software. A checkout sheet itemizing each device and a description of the associated tests shall be prepared and submitted to the Owner or Owner's representative by the completion of the project.

C. System Acceptance Testing

1. All application software will be verified and compared against the sequences of operation. Control loops will be exercised by inducing a setpoint shift of at least 10% and observing whether the system successfully returns the process variable to setpoint. Record all test results and attach to the Test Results Sheet.

2. Test each alarm in the system and validate that the system generates the appropriate alarm message, that the message appears at all prescribed destinations (workstations or printers), and that any other related actions occur as defined (i.e. graphic panels are invoked, reports are generated, etc.). Submit a Test Results Sheet to the Owner.
3. Perform an operational test of each unique graphic display and report to verify that the item exists, that the appearance and content are correct, and that any special features work as intended. Submit a Test Results Sheet to the Owner.

4. Perform an operational test of each third-party interface that has been included as part of the automation system. Verify that all points are properly polled, that alarms have been configured, and that any associated graphics and reports have been completed. If the interface involves a file transfer over Ethernet, test any logic that controls the transmission of the file, and verify the content of the specified information.

3.7 SEQUENCES OF OPERATION

A. Auditorium System AHU-1/Exist

1. Point List

a. Space Temperature (See Drawings for Quantity)
b. Space Temperature Setpoint(s)
c. Discharge Temperature
d. Freeze-stat Status
e. Fan Start/Stop
f. Steam Valve Modulation
g. Radiation Valve Modulation
h. DX Cooling Staging
i. OA, EA, RA Damper Modulation

2. Sequence of Operation
a. Unoccupied: During the unoccupied heating mode, the outside air damper shall be closed, the return damper and unit coil valve shall be open. The radiation valve shall modulate to maintain night setback setpoint. Should the radiation alone fail to maintain the setpoint, the unit fan shall be energized. During the unoccupied cooling mode, the, the

outside air damper shall close, the return damper shall be open. The unit fan and DX cooling shall be energized and modulate as necessary to maintain the setpoint. Unoccupied set points shall be 65 ºF (adj.) for heating mode and 80 ºF (adj.) for cooling mode.

b. Occupied: Unit fan and return fan shall run continuously. During morning warm-up mode (room temperature more than 2 degrees below daytime setpoint), outside air damper shall be closed. As room temperature rises, OA/RA and EA dampers shall modulate to minimum position. Should room temperature continue to rise past setpoint, radiation valve and unit coil valves shall modulate closed and then dampers shall modulate further to provide free cooling (based on differential enthalpy). Upon further room temperature rise past setpoint the dampers shall return to minimum OA position and DX cooling shall be energized. As room temperature decreases the reverse shall occur. A manual freezestat shall stop fan, close outside air damper and open unit coil valve.

B. Heat Pump HP - 1

1. Point List

a. Space Temperature.
b. VRF Space Temperature Set Point.
c. Occupied/Unoccupied.
d. VRF Indoor Mode (Heating/Cooling)
e. VRF Indoor Unit Fan Speed
f. VRF Outdoor Mode/Status.
g. D/X Condensing Unit Start/Stop

(Provide all required hardware and software to interface the BMS with the VRF system.)

2. Sequence of Operation

a. Un-Occupied Mode: During the heating mode, radiation shall be the first stage of heat to the space. If additional heat is required, unit fan shall energize, and heat-pump shall modulate to maintain night setback temperature set point (adj.). During cooling mode, the unit fan shall energize, and heat pump shall modulate to maintain night setback temperature (adj.). Associated ERU shall be off and outdoor air and exhaust dampers closed.
b. Occupied Mode: Unit fan shall energize, and heat-pump shall modulate to maintain set point temperature (adj.). Heat Pump system shall activate as needed to maintain occupied cooling/heating setpoint (adj.). Any associated ERU shall start and outdoor air and exhaust dampers open. When associated ERU is in economizer mode, unit fan shall remain energized, but D/X Condensing unit shall stop

C. Indoor Energy Recovery Unit (ERU-1)

2. Point List
a. Outside Air Fan Status
b. Exhaust Fan Status
c. Space Temperature
d. Space Temperature Setpoint(s)
d. OA, EA, Damper
f. Discharge Temperature
g. Radiation Valve Modulation

2. Sequence of Operation
   a. Unoccupied: The unit shall be off, and all dampers closed.

   b. Occupied: Unit fan and exhaust fan shall run continuously. Should room temperature continue to rise past setpoint, radiation valves shall modulate closed and associated DX condensing unit shall stop to provide free cooling (based on differential enthalpy). Upon further room temperature rise past setpoint the dampers shall return to minimum OA position and associated DX condensing unit shall start. As room temperature decreases the reverse shall occur.

D. Convectors

1. Point List
   a. Space Temperature
   b. Valve Modulation

2. Sequence of Operation
   a. Unoccupied: Modulate control valve to maintain night setback temperature setpoint (adj.).
   b. Occupied: Modulate control valve to maintain daytime temperature setpoint (adj.).

3.8 CERTIFICATION

A. After completion of installation and after equipment has been placed on operation, the temperature control manufacturer shall submit in writing, a complete and detailed report and certification that the entire installation is operating exactly as specified and shall be guaranteed for two (2) years. Report shall state temperature and throttling range readings and settings of all control instruments. Submit to the Engineer preliminary for checking and approval.

3.9 INSTALLATION

A. All work under the automatic temperature control Sub-Contract shall be done by competent skilled mechanics regularly in the employ of the temperature control manufacturer.

B. The ATC Sub-Contractor must be a control manufacturer currently involved in the production of commercial pneumatic/electric temperature controls. Franchises and associations all on considered control manufacturers.

C. Provide start-up supervision, complete with all programming and instructions for use to the owners/operators of the system.

3.10 INSTRUCTIONS TO OWNER'S PERSONNEL

A. The Automatic Temperature Control Sub-Contractor shall provide the services of competent instructors to fully instruct designated personnel in the adjustment, operation and maintenance, including pertinent safety requirements of the equipment and systems specified. The training shall be oriented toward the installed system rather than being a general (canned) training course. Each instructor shall be thoroughly familiar with all aspects of the subject to be taught.

B. All equipment and materials required for classroom training shall be provided by the DDC Contractor.

END OF SECTION

SECTION 23 0470

TESTING, START-UP AND ADJUSTMENTS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 TESTING, START-UP AND ADJUSTMENTS

A. Furnish all materials, supplies, labor and power required for testing. Make preliminary tests and prove work satisfactory. Notify Architect and all authorities having jurisdiction in ample time to be present for final testing of all piping. Test before insulating or concealing any piping. Repair defects disclosed by tests, or if required by Architect, replace defective work with new work without additional cost to Owner. Make tests in stages if so ordered by Architect to facilitate work of others. Use of wicking in tightening leaking joints not permitted.

B. HVAC Contractor is responsible for work of other trades disturbed or damaged by tests and/or repair and replacement of his work, and shall cause work so disturbed or damaged to be restored to its original condition at his own expense.

C. Unless otherwise specified, all piping systems shall be hydrostatically tested to 150 psig. Tests shall be of four (4) hour duration during which time piping shall show no leaks and during time no sealing of leaks will be permitted.

D. HVAC Contractor shall balance out system and submit test reports showing operating data to include the following:

1. C.F.M. of all air handling equipment.

2. C.F.M. at each air outlet.

3. G.P.M. for equipment.

4. R.P.M. for each fan and fan motor.

5. Motor power consumption.

6. Air temperature readings before and after coils.

7. Water temperature readings in and out of coils and through equipment.

8. Pressure gauge readings before and out of all pertinent equipment.

E. If the performance of the systems does not conform to the design parameters the Contractor shall return to the site until the systems perform as designed.

F. HVAC Contractor shall furnish services of qualified personnel, thoroughly familiar with job, to operate and make all adjustments so that system and control equipment shall operate as intended. This shall include adjustment/replacement of sheaves/impellers to achieve design performance. Adjustments shall be made including balancing of water and air systems in cooperation with qualified representatives of mechanical equipment manufacturers and temperature control manufacturer. This shall include any required adjustment/replacement of sheaves, belts, impellers, etc. to achieve design performance. Architect/Engineer is to be notified when this balancing is to be performed.

G. When all work is in an acceptable operating condition, furnish operating and maintenance manuals as specified in General Requirements.

H. All HVAC equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces.

I. Contractor shall include in his Bid, adjustment of air quantity below scheduled C.F.M. for air systems deemed “noisy” by Owner subsequent to initial balancing.

J. The Contractor shall be required to rectify of replace at his own expense, any equipment not complying with the foregoing requirements.

K. Final inspection and approval shall be made only after proper completion of all of above requirements.

END OF SECTION

SECTION 23 0480

GENERAL LABELING, VALVE CHARTS AND PIPING IDENTIFICATION

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 GENERAL LABELING AND VALVE CHARTS

A. This Contractor shall have appropriate descriptive labels, identification tags and nameplates of equipment, valves, etc. furnished and installed under this Contract and shall be properly placed and permanently secured to (or adjacent to) the item being installed. All such labels, identifications, tags, nameplates, etc. shall be selected by the Architect/Engineer.

B. In general, labels shall be the lamacoid type of sufficient size to permit easy identification, black coated, white edged, with letters 3/16" high. Major equipment, apparatus, control panels, etc. shall have 8" x 4" lamacoid plates with lettering of appropriate size.

C. Provide tags for all valves, automatic and manual dampers. Tags shall be Type #2020 anodized aluminum of #1420 lamacoid engraved. Tags may not necessarily be standard. Fasten tags to valve or damper with brass chain.

D. All nameplates, labels, identifications and tags shall be as manufactured by the Seton Name Plate Co., of New Haven, CT or approved equal. Submit complete schedules, listings and descriptive data together with samples for checking and approval before purchasing. Labeling shall include the "number" of the equipment, valve, dampers, switch, etc. and service of the valve.

E. Mount on laminated plastic boards with transparent surface all valves, wiring diagrams, control diagrams, instruction charts, permits, etc. Valve chart shall be non-fading with original copies laminated.

1.2 IDENTIFICATION OF PIPING

A. This Contractor shall provide on all piping, semi-rigid, wrap around plastic identification markers equal to Seton Snap-Around and/or Seton Strap-On pipe markers.

B. Each marker background is to be appropriately color coded with a clearly printed legend to identify the contents of the pipe. Directions of flow arrows are to be included on each marker.

C. Identification of all piping shall be adjacent to each valve, at each pipe passage through wall, floor and ceiling construction and at each branch and riser take-off.

D. Identification shall be on all horizontal pipe runs, marked every 15 ft. as well as at each inlet outlet of equipment.

END OF SECTION

SECTION 23 0485

HVAC SYSTEMS COMMISSIONING

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 RELATED DOCUMENTS

A. Section 01 9113 – Commissioning Requirements, including drawings and general provisions of the Contract, including General and Supplementary Conditions, and other Division 01 Specification Sections.

B. In the case of a conflict between this and any other section in the project specifications, the more stringent or detailed requirements shall apply.

1.2 DEFINITIONS

A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

B. CxA: Commissioning Authority.

1.3 DESCRIPTION

A. The systems that shall be commissioned in this project include but are not limited to the following:
   1. Central Building Automation System including packaged unitary controllers.
   2. Equipment of the heating, ventilating and air conditioning systems.

1.4 OVERVIEW OF CONTRACTOR'S RESPONSIBILITIES

A. Perform commissioning inspections and tests at the direction of the CxA.

B. Attend construction phase controls coordination meeting.

C. Attend testing, adjusting, and balancing (TAB) review and coordination meetings.

D. Participate in HVAC systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.

E. Provide information requested by the CxA for final commissioning documentation.

F. Provide measuring instruments and logging devices to record test data and provide data acquisition equipment to record data for the complete range of testing for the required test period.

G. Provide detailed startup procedures.

H. Provide copies of all submittals, including all changes thereto, with details as required in the appropriate subsection of 3.1 Responsibilities.

I. Facilitate the coordination of the commissioning process and incorporate commissioning activities into overall project schedule (OPS).

J. Ensure all subcontractors and vendors execute their commissioning responsibilities according to the contract documents and the OPS.

K. Provide required demonstration and training of owner's personnel.

L. Review and accept construction checklists provided by commissioning authority (CxA).

M. Prepare O&M manuals, according to the contract documents, including clarifying and updating the original sequences of operation to as-built/as-tested conditions.

N. Cooperate with the CxA for resolution of issues recorded in the "Issues Log"

O. Prepare and provide all documentation as necessary for the compilation of the Systems Manual.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. The HVAC Contractor shall provide all standard testing equipment required to perform startup, initial checkout, and testing requirements of Division 23.

B. The Controls Contractor shall provide all standard testing equipment required to test the Building Automation and Automatic Temperature Control System (BAS), including calibration of valve and damper actuators and all sensors. Trend logs for functional testing shall be generated through the BAS interface as requested by the CxA.

C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the following tolerances. Temperature sensors and digital thermometers shall have a certified calibration, performed within the past year, to an accuracy of 0.5°F and a resolution of ± 0.1 °F. Pressure sensors shall have an accuracy of ± 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

PART 3 - EXECUTION

3.1 RESPONSIBILITIES

A. HVAC, Controls and TAB Contractors. The commissioning responsibilities applicable to each of the HVAC, Controls and TAB Contractors of Division 23 are follows:

1. Attend the initial commissioning meeting conducted at the start of construction, the commissioning meeting held 30 days prior to startup of the primary equipment, and all commissioning team meetings.

2. Provide a copy of approved shop drawings and startup reports for all commissioned equipment to the CxA. Supplement the shop drawing data with the manufacturer's installation and start-up procedures. This material should be identical to the literature which will be included in the Operation and Maintenance Manuals.

3. The Operation and Maintenance Manuals shall be submitted to the CM prior to the start of training (three (3) weeks before startup and training and at least sixty (60) days before substantial completion).

4. Perform and document results of Pre-functional Inspections at the direction of the CxA. Ensure that the inspection checklists are completed before startup or as specified by the CxA.

5. During the startup and initial checkout process, execute all portions of the manufacturer's start-up checklists for all commissioned HVAC equipment.

6. Perform and clearly document all completed startup and system operational checkout procedures and provide a copy to the CxA.

7. Perform and document results of equipment functional testing at the direction of the CxA. Ensure that the testing is completed in the timeline specified by theCxA.

8. Address current A/E punch list items and Commissioning corrective action items on the "Issues Log" before functional testing. Air and water TAB shall be completed, with discrepancies and problems remedied, before functional testing of the respective air-or water-related systems.

9. Provide skilled technicians to execute starting of equipment and to perform tests in accordance with all Division 23 sections. Where specified, startup shall be performed by a factory authorized service representative. Ensure that they are available and present during the agreed-upon schedules for the sufficient duration to complete the necessary tests, adjustments and problem-solving.

10. Correct deficiencies (differences between specified and observed performance as interpreted by the CxA and A/E) and retest the equipment.

11. Provide training of Owner's operating staff as specified in Division 23 Sections. Use expert qualifiedpersonnel.

12. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of thewarranty.

13. Correct deficiencies and make necessary adjustments to O&M manuals for applicable issues identified in any seasonal testing.

B. HVAC Contractor. The responsibilities of the HVAC Contractor, during constructionand acceptance phases in addition to those listed in (A) are:

1. Provide startup for all HVAC equipment.

2. Prepare a preliminary schedule for Division 23 pipe and duct system testing, flushing and cleaning, equipment start-up and TAB start and completion for use by the PM and CxA. Update the schedule as appropriate.

3. Notify the PM and CxA when pipe and duct system testing, flushing, cleaning, startup of each piece of equipment, and TAB will occur. Be proactive in seeing that commissioning processes are executed and that the CxA has the scheduling information needed to efficiently facilitate the commission process.

4. Calibrations: The HVAC Contractor is responsible to calibrate all factory-installed sensors and actuators. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated by the HVAC Contractor.

5. Supervise all commissioning activities executed by subcontractors, including the Controls Contractor.

6. List and clearly identify on the as-built duct and piping drawings the locations of all flow meters, fire and smoke dampers, duct detectors, temperature sensors, relative humidity sensors, CO2 sensors, static and differential pressure sensors (air, water and building pressure).

C. Controls Contractor - The commissioning responsibilities of the Controls Contractor, during construction and acceptance phases in addition to those listed in (A) are:

1. Sequences of Operation Submittals. The Controls Contractor's submittals of control drawings shall include complete detailed sequences of operation for each piece of equipment, regardless of the completeness and clarity of the sequences in the specifications. The submitted sequences shall generally include the following, but can vary according to project needs:
   a. An overview narrative of the system (one or two paragraphs) generally describing its purpose, components and function.
   b. Logic diagrams detailing the flow of information for each control algorithm. These diagrams should include all inputs, outputs, and computations.
   c. All interactions and interlocks with other systems.
   d. Detailed delineation of control between any packaged controls and the building automation system, listing which points the only monitored at the BAS, and which points can be controlled by and adjusted at the BAS.
   e. Written sequences of control for packaged controlled equipment. (Equipment manufacturers' stock sequences may be included but will generally require additional narrative).
   f. Start-up sequences.
   g. Warm-up mode sequences.
   h. Normal operating mode sequences.
   i. Unoccupied mode sequences.
   j. Shutdown sequences.
   k. Capacity control sequences and equipment staging.
   l. Temperature and pressure control: setbacks, setups, resets, etc.
   m. Detailed sequences for all control strategies, e.g., economizer control, optimum start/stop, staging, optimization, demand limiting, etc.
   n. Effects of power or equipment failure with all standby component functions.
   o. Sequences for all alarms and emergency shut downs.
   p. Seasonal operational differences and recommendations.
   q. Initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
   r. Daily/weekly/monthly schedules, as appropriate, if known.
   s. To facilitate referencing in testing procedures, all sequences shall be written in small statements, each with a number for reference. Where possible, the numbering sequence shall correspond with Section 23 0460 Automatic Temperature Controls.

2. Control Drawings Submittal:
   a. The control drawings shall have a key to all abbreviations.
   b. The control drawings shall contain graphic schematic depictions of the system and each component.
   c. The schematics shall include the system and component layout of any equipment that the control system monitors, enables, or controls, even if the equipment is primarily controlled by packaged or integral controls.
   d. Provide a full points list with at least the following included for each point:
      1. Controlled system.
      2. Point abbreviation
      3. Point description
      4. Display unit.
      5. Control point or setpoint (Yes/No)
      6. Input point (Yes/No)
      7. Output point (Yes/No)
   e. The controls contractor shall keep the A/E, CxA, HVAC and TAB Contractor informed, in a timely manner, of all changes to this list during programming and setup.

3. Submit a written checkout plan indicating in a step-by-step manner, the procedures that will be followed to test, checkout and adjust the control system prior to functional testing. At minimum, the checkout plan shall include for each type of equipment controlled by the building automation system:
   a. System name.
   b. List of devices.
   c. Step-by-step procedures for testing each controller after installation, including:
      1. Process of verifying proper hardware and wiring installation.
      2. Process of downloading programs to local controllers and verifying that they are addressed correctly.
      3. Process for performing and documenting point-to-point checkout for each digital and analog input and output.
      4. Process of performing operational checks of each controlled component.
      5. Plan and process for calibrating valve and damper actuators and all sensors.
      6. A description of the expected field adjustments for transmitter, controllers and control actuators should control responses fall outside of expected values.
   d. A copy of the log and field checkout sheets that will document the process. This log must include a place for initial and final read values during calibration of each point and clearly indicate when a sensor, controller or command has "passed" and is operating within the contract parameters.
   e. A description of the instrumentation required for testing.
   f. Indicate the portion of the controls checkout plan that should be completed prior to TAB using the controls system for TAB work. Coordinate with the CxA and TAB Contractor for this determination.

4. Point-to-Point Checkout: Include in the checkout plan a point-to-point checkout. Each control point tied to a central control system shall be verified to be commanding, reporting and controlling according to its intended purpose. For each output, commands shall be initiated and verified to be functioning by visually observing and documenting the status of the controlled device in the field (e.g. valve or damper actuator response, pump or fan status). For each input, the system or conditions shall be altered to initiate the input response being tested and the response in the control system observed and recorded (e.g. high duct static pressure alarm).

5. Calibrations: The Controls Contractor is responsible to calibrate all field installed sensors and actuators using test and documentation methods approved by the CxA. The HVAC Contractor is responsible to calibrate all factory installed sensors and actuators.
   a. Sensors installed in the unit at the factory, with a calibration certification provided, need not be field calibrated by the HVAC Contractor.
   b. Valve leak-by tests shall be conducted by the Contractor when shown on a construction checklist.
   c. All procedures used shall be fully documented by the Controls Contractor on suitable forms, clearly referencing the procedures followed and written documentation of initial, intermediate and final results.

6. Beyond the control points necessary to execute all documented control sequences, provide monitoring, control and virtual points as indicated in the Specifications.

7. Provide an official notice to proceed to the CxA and project team upon completion of the Building Automation System (BAS) and Automatic Temperature Control System (ATC) installation, including checkout and calibration of each controlled device, to confirm that all system programming is complete as to all respects of the Contract Documents. This shall be submitted by the Controls Contractor prior to the start of functional testing by the CxA.

D. TAB Contractor: The scope of work for the TAB Contractor is provided in Section 23 0460.

3.2 SUBMITTALS

A. The Contractor shall send one copy of product data, shop drawings and similar submittals to the CxA at the same time they are submitted to the A/E. The CxA will review the submittals and provide any comments to the A/E for inclusion in their comments. The Architect will transmit to the CxA, for the CxA's use in preparing functional test procedures; one reviewed and approved copy of product data, shop drawings and similar submittals received from the HVAC, Controls and TAB Contractors, pertinent to equipment and systems to be commissioned.

3.3 STARTUP

A. The HVAC, Controls and TAB Contractors shall follow the start-up and initial checkout procedures listed in the Responsibilities list in this section. Equipment start-up is required to complete systems and sub-systems so they are fully functional, in compliance with the Contract Documents. The commissioning procedures and functional testing do not relieve or lessen this responsibility, or partially shift that responsibility to any extent onto the Commissioning Agent or Owner.

B. Testing is intended to begin upon completion of a system. Refer to Section 019100 for additional information related to scheduling.

3.4 TESTS

A. The HVAC and Controls Contractors shall provide the necessary support to the CxA to complete functional testing. The Controls Contractor shall fully test and verify all aspects of the BAS Contract Work on a point / system / integrated operational basis for all points, features and functions specified. The following requirements apply to all mechanical and control systems and features that are to be commissioned when referenced below. Tests shall:

1. Verify functionality and compliance with the basis of design for each individual sequence module in the sequence of operations. Verify proper operation of all control strategies, energy efficiency and self-diagnostics features by stepping through each sequence and documenting equipment and system performance. Tests shall include startup, normal operation, shutdown, scheduled 'on' and 'off', unoccupied and manual modes, safeties, alarms, over-rides, lockouts and power failure.

2. Verify operation of systems and components that may be impacted during low, normal and high load conditions and during combinations of environmental and interacting equipment conditions that could reasonably exist and potentially result in adverse system reaction.

3. Verify all alarm and high and low limit functions and messages generated on all points with alarm settings.

4. Verify integrated performance of all components and control system components, including all interlocks and interactions with other equipment and systems.

5. Verify shutdown and restart capabilities for both scheduled and unscheduled events (e.g. power failure recovery and normal scheduled start/stop).

6. Verify proper sequencing of heat transfer elements as required to prevent simultaneous heating and cooling, unless specifically required for dehumidification operation.

7. Verify system response and stability of control loops under different load conditions and determine if additional loop tuning is required for dehumidification operation.

8. When applicable, demonstrate a full cycle from 'off' to 'on' and 'no load' to 'full load' and then to 'no load' and 'off'.

9. Verify time of day schedules and setpoints.

10. Verify all energy saving control strategies.

11. Verify that all control system graphics are complete, that graphics are representative of the systems, and that all points and control elements are shown in the same location on the graphics as they are located in the field.

12. Verify operation control of all adjustable system control points, including proper access level as agreed to during the controls system demonstration.

B. In addition to specific details, and/or standards referenced for acceptance testing indicated in other Division 23 sections, the following common acceptance criteria shall apply to all mechanical equipment, assemblies, and features:

1. For the conditions, sequences and modes tested, the equipment, integral components and related equipment shall respond to varying loads and changing conditions and parameters appropriately as expected, according to the sequence of operation, as specified, according to acceptable operating practice and the manufacturer's performance specifications.

2. Systems shall accomplish their intended function and performance (e.g. provide supply air and water at designated temperature and flow rate, etc., and maintain space conditions in terms of air temperature, relative humidity, and CO2 concentration) at specified levels at varying conditions.

3. Control loops shall be stable under all operating conditions. Control loops shall exhibit a quarter decay ratio type response to a step change or other upset and return to stable operation in a time frame that is reasonable and realistic for the system that they are associated with.

4. Resetting a manual safety shall result in a stable, safe, and predictable return to normal operation by the system.

5. Safety circuits and permissive control circuits shall function in all possible combinations of selector switch positions (hand, auto, inverter, bypass etc.).

6. Additional acceptance criteria may be defined by the CxA when detailed tested procedures are developed.

7. At the CxA's discretion, if large numbers of deficiencies or repeated deficiencies are encountered, the CxA shall suspend functional testing until the Contractor corrects the deficiencies and troubleshoots all remaining systems at issue on their own. The Contractor shall be responsible for any resulting schedule delays that increase the overall time period to complete functional testing.

8. Retesting: The CxA will direct the retesting of the equipment once at no charge to the Owner for their time. The CxA's time and expenses incurred for a second retest, if required due to no fault of the CxA, will be reviewed by the Owner to determine the appropriate means of compensation to the CxA for extension of services. The functional testing shall include operating the system and components through each of the written sequences of operation, and other significant modes and sequences, including startup, shutdown, unoccupied mode, manual mode, staging, miscellaneous alarms, power failure, security alarm when impacted and interlocks with other systems or equipment. Sensors and actuators shall be calibrated during construction checkout by the installing contractors and spot-checked by the CxA during functional testing.

3.5 WRITTEN WORK PRODUCTS

A. Written work products of Contractors shall consist of the filled out start-up, initial checkout, and test documentation in accordance with all Division 23 sections.

END OF SECTION

SECTION 23 0490

GUARANTEE

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 GUARANTEE

A. The Contractor shall remove, replace and/or repair at his own expense and at the convenience of the Owner, any defects in workmanship, materials, ratings, capacities and/or characteristics occurring in the work within one (1) year or within such longer period as may be provided in the Drawings and/or Section of the Specifications, which guarantee period shall commence with the final acceptance of the entire Contract in accordance with the guarantee provisions stated in the General Conditions, and the Contractor shall pay for all damage to the system resulting from defects in the work and all expenses necessary to remove, replace, and/or repair any other work which may be damaged in removing, replacing and/or repairing the work.

END OF SECTION

SECTION 26 0100

GENERAL CONDITIONS

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 DESCRIPTION OF WORK

A. It is the intention of the Specification and Drawings to call for finish work, tested and ready for operation.

B. Any apparatus, appliance material or work not shown on the Drawings but mentioned in the Specifications, or vice versa, or any incidental accessories or ancillary devices necessary to make ready for operation even if not particularly specified, shall be furnished, delivered and installed under their respective Division without additional expense to the Owner.

C. Minor details not usually shown or specified, but necessary for proper installation and operation, shall be included in the work as though they were hereinafter specified or shown.

D. Work under each section shall include giving written notice to the Architect of any materials or apparatus believed inadequate or unsuitable, in violation of laws, ordinances, rules and regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, it is mutually agreed that work under each section has included the cost of all necessary items for the approved satisfactory functioning of the entire system without extra compensation.

E. Small scale drilling through walls and floors which may contain asbestos shall be performed by a person with a “restricted asbestos handler allied trades certificate” and shall have a copy of it in his possession at all times while working of the project.

1.2 DRAWINGS

A. Drawings are diagrammatic and indicate the general arrangement of the system and work included in the Contract. (Do not scale the drawings). Consult the Architectural Drawings and details for exact location of fixtures and equipment; where same are not definitely located, obtain this information from the general construction supervisor.

B. Work under each section shall closely follow Drawings in layout of work; check Drawings of other Divisions to verify spaces in which work will be installed. Maintain maximum headroom; do not begin work until unsatisfactory conditions are corrected.

C. Make reasonable modifications in the layout as needed to prevent conflict with work of other Sections of the Specifications or for proper execution of the work.

D. It shall be understood that the right is reserved by the Architect/Engineer to change the location of equipment and apparatus to a reasonable extent as building conditions may dictate, prior to their installation without extra cost to the Owner.

1.3 SURVEYS AND MEASUREMENTS

A. Base all measurements, both horizontal and vertical, from established benchmarks. All work shall agree with these established lines and levels. Verify all measurements at site and check the correctness of same as related to the work.

B. Before proceeding with the work resolve discrepancies between actual measurements and those indicated, which prevent following good practice or intent of the Drawings or Specifications.

1.4 CODES AND STANDARDS

A. The Codes and Standards listed below apply to all Electrical work codes or standards that are mentioned in these Specifications; the latest edition or revision shall be followed:

1. NEMA - Standards
2. ANSI CI - National Electrical Code (NFPA 70)
3. ANSI C50.13 - Rotating Electrical Machinery
4. NEMA MG2 - Construction and guide for selection, installation and use of electric motors.
5. NEMA MG1 - Motors and Generators

B. The following State and Local Codes shall apply: New York State Uniform Fire Prevention and Building Code, and Local Building Codes.

C. The following abbreviations are used within this Division of the Specifications:

1. IES - Illuminating Engineering Society.
2. NEC - National Electrical Code
3. ANSI - American National Standards Institute
4. ASTM - American Society for testing and materials
5. EPA - Environmental Protection Agency
6. IEEE - Institute of Electrical and Electronic Engineers
7. NEMA - National Electrical Manufacturers Association
8. NFPA - National Fire Protection Association.
9. OSHA - Occupational Safety and Health Administration
10. UL - Underwriter's Laboratories

1.5 PERMITS AND FEES

A. Give all necessary notices, obtain all permits and pay all Government and State sales taxes and fees where applicable, and other costs, including utility connections or extensions in connection with work of this Division. File all necessary plans, prepare all documents and obtain all necessary approvals of all Governmental and State departments having jurisdiction; obtain all necessary certificates of inspections for his work and deliver a copy to the Architect before request for acceptance and final payment for the work. Pay fees for utility construction/connections.

B. Include in the work, without extra cost to the Owner, any labor, materials, services, and apparatus, Drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on the Drawings and/or specified.

C. All materials furnished and all work installed shall comply with the rules and recommendations of the National Fire Protection Association, with the requirements of the local utility companies, with the recommendations of fire insurance rating organization having jurisdiction and with the requirements of all governmental departments having jurisdiction.

D. All materials and equipment for the electrical portion of the mechanical systems shall bear the approval label of or shall be listed by the Underwriter's Laboratories, Inc.

1.6 TEMPORARY LIGHT AND POWER

A. The Contractor shall furnish, install, maintain and, upon direction to do so, remove system of temporary lighting and power for the use of all construction trades.

B. The Electrical Contractor shall provide adequate electrical service for the needs of all Contracting Trades.

C. Wiring shall be provided for temporary use during building construction, including grounding and fused main cut-off switches. Temporary electric lines with branch switches shall be provided for lighting and for taps for electric tools, pumps and other temporary equipment; all connected to a main line looped through floor spaces and up stair wells or shafts. All power outlets shall be grounded to an equipment ground wire in an approved manner. Electric lines shall be extended to power tools, which cannot be located within reach of extension cords.

D. Light bulbs shall be provided in sufficient quantity to light the building for safety purposes. Extension cords shall be provided as may be essential to the proper execution of the work. Temporary lighting shall be provided for all stairs and other locations where needed for safety or the proper execution of the work.

E. The Electrical Contractor shall maintain temporary lighting and power systems in good working condition, including the relocation and reinstallation when required to avoid interference with the progress of construction.

F. Provide ground-fault personnel ampere protection for all single phase, 15 and 20 ampere receptacles. All receptacles and portable cord connectors shall have NEMA standard locking type configurations.

G. The Electrical Contractor shall turn lights on and off at the beginning and end of each working day of any trade unless otherwise directed. He shall arrange for all temporary light and power for all trades which do not have holidays (days off) similar to the electrical trade. The Electrical Contractor shall patch and repair all openings left damaged by the installation and removal of the temporary light and power.

1.7 MANUFACTURER'S IDENTIFICATION

A. Manufacturer's nameplate, name or trademark and address shall be attached permanently to all equipment and materials furnished under this Division. The nameplate of a contractor or distributor may not be used.

1.8 SHOP DRAWINGS

A. Submit for approval detailed shop drawings of all equipment and materials in accordance with working procedures.

B. Furnish all necessary templates and patterns for installation work and for the purpose of making adjoining work conform; furnish setting plans and shop details to other trades as necessary.

C. Submit shop drawings for the following:

1. Light fixtures.
2. Receptacles, switches, occupancy sensors.
3. Overcurrent protective devices.
4. Panelboards.
5. P.A. system components.
6. Fire alarm system.

1.9 MATERIALS AND WORKMANSHIP

A. All materials and apparatus necessary for the work, except as specifically indicated otherwise, shall be new, of first class quality and shall be furnished, delivered, erected, connected and finished in every detail and shall be so selected and arranged as to fit properly into the building spaces. Where no specific kind or quality of material is given, a first class standard article as accepted by the Architect shall be furnished.

B. Furnish the services of an experienced Superintendent who shall be constantly in charge of the installation of the work, together with all skilled workmen, helpers, and labor to unload, transfer, erect, connect up, adjust, start, operate and test each system.

C. Unless otherwise specifically indicated on the Drawings or Specifications, all equipment and materials shall be installed in accordance with the recommendations of the manufacturer. This includes the performance of such tests as the manufacturer recommends.

1.10 PROTECTION

A. Work under each Section shall include protecting the work and materials of all other Sections from damage from work or workmen and shall include making good all damage thus caused. Be responsible for work and equipment until finally inspected, tested, and accepted; protect work against theft, injury or damage; and carefully store material and equipment received on site, which is not immediately installed. Close open ends of work with temporary covers or plugs during construction to prevent entry of obstructing or other foreign material.

B. Work under each section includes receiving, unloading, uncrating, storing, protecting, setting in place and connecting up completely of any equipment supplied under each section. Work under each section shall also include exercising special care in handling and protecting equipment and fixtures, and shall include the cost of replacing any of the above equipment and fixtures which are missing or damaged by reason of mishandling of failure to protect on the part of the Contractor.

1.11 BASES AND SUPPORTS

A. Unless specifically noted otherwise, provide all necessary supports, pads, bases, and piers required for all equipment under this Division. Provide all temporary bases and supports as required.

B. All equipment, unless shown otherwise, shall be securely attached to the building structure. Attachments shall be of a strong and durable nature; any attachments that are, insufficient, shall be replaced as directed by the Architect.

1.12 SLEEVES, INSERTS AND ANCHOR BOLTS

A. All conduits passing through floors, walls or partitions shall be provided with sleeves having an internal diameter one inch larger than the outside diameter of the conduit, or insulation enclosing the conduit.

B. Furnish all sleeves, inserts, and anchor bolts necessary to be installed under other sections of the Specifications to accommodate work of this section.

C. Sleeves through outside walls shall be cast iron sleeves with intermediate integral flange. Sleeves shall be set with ends flush with each face of wall. The remaining space shall be packed with oakum to within 2 inches of each face of the wall. The remaining shall be packed and made watertight with a waterproof compound.

D. Sleeves through concrete floors or interior masonry walls shall be schedule 40 black steel pipe, set flush with finished walls or ceiling surfaces but extending 2 inches above finished floors.

E. Sleeves through interior partitions shall be 22 gauge galvanized sheet steel, set flush with finished surfaces or partitions.

F. Inserts shall be individual or strip type of pressed steel construction with accommodation for removable nuts and threaded rods up to 3/4” inch diameter, permitting lateral adjustment. Individual inserts shall have an opening at the top to allow reinforcing rods up to 1/2” diameter to be passed through the insert body. Strip inserts shall have attached rods having hooked ends to allow fastening to reinforcing rods. Inserts shall be as manufactured by Carpenter and Patterson, Inc. or Grinnell Co., Inc.

G. Penetrations through fire-rated walls, ceilings and floors in which cables, conduits pass, shall be sealed by a UL approved fire stop fitting classified for an hourly rating equal to the fire rating of the floor, wall or ceiling shall be Gedney Fire Seal Type CFSF of CAPS.

1.13 PAINTING

A. All finish painting in finished areas shall be performed by others.

B. All materials shipped to the job site under the Division, such as panels and plates, shall have a prime coat and standard manufacturer's finish unless otherwise specified.

C. Inaccessible conduits, hangers, supports and anchors and ducts shall be coated prior to installing.

D. All components of the fire alarm system raceway shall be painted red. This includes but is not limited to conduit, junction boxes, pull boxes.

1.14 CUTTING AND PATCHING

A. All cutting and patching required for the work of this Division shall be done by this Division.

B. Work under this Division shall include furnishing, locating and setting inserts and/or sleeves. Do all drilling and cutting necessary for the installation.

C. All holes cut through concrete slabs and structural steel shall be punched or drilled from the underside. No structural member shall be cut without the written acceptance of the Architect and all such cutting shall be done in a manner directed by him.

D. Refer to Division 1 for additional requirements.

1.15 SCAFFOLDING, RIGGING, HOISTING

A. Furnish all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished under this Division. Remove same from premises when no longer needed.

1.16 EXCAVATING AND BACKFILLING

A. All excavation and backfilling for the work of this Division shall be performed by Division 2.

1.17 WATERPROOFING

A. Where any work penetrates waterproofing, including waterproof concrete and floors in wet areas. Submit proposed method of installation for review by the Architect before beginning work. Furnish all necessary sleeves, caulking and flashing necessary to make opening absolutely watertight.

1.18 ACCESSIBILITY AND ACCESS PANELS

A. Be responsible for the sufficiency of the size of shafts and chases, the adequate thickness of partitions, and the adequate clearance in double partitions and hung ceilings for the proper installation of the work of this Division.

B. Locate all equipment, which must be serviced, operated or maintained in fully accessible positions. Minor deviations from Drawings may be allowed for better accessibility with approval of the Architect.

1.20 CLEANING

A. Thoroughly clean all equipment of all foreign substances inside and out before being placed in operation.

B. If any foreign matter should stop any part of a system after being placed in operation, the system shall be disconnected, cleaned and reconnected whenever necessary to locate and remove obstructions. Any work damaged in the course of removing obstructions shall be repaired or replaced when the system is reconnected at no additional cost to the Owner.

C. Upon completion of work remove from the premises all rubbish, debris, and excess materials. Any oil or grease stains on floor areas caused by work of this Division shall be removed and floor areas left clean.

1.21 RECORD DRAWINGS

A. Maintain at the job site a record set of Electrical Drawings on which any changes in location of equipment, panels, devices, and major conduits shall be recorded. Indicate dimensions of all items installed underground or in concrete.

1.22 OPERATING INSTRUCTIONS

A. Upon completion of all work and all tests, the Contractor shall furnish the necessary skilled labor and helpers for operating his system and equipment for a period specified under each applicable Section of this Division. During this period, he shall instruct the Owner or his representative fully in the operation, adjustment and maintenance of all equipment furnished. Give at least 7 days' notice to the Owner in advance of this period.

B. Furnish four complete bound sets for delivery to the Architect of typewritten or blueprinted instructions for operating and maintaining all systems and equipment included in this Division. All instruction shall be submitted in draft for review prior to final issue. Manufacturer's advertising literature or catalogs may not be used for operating and maintenance instruction.

C. In the above-mentioned instructions, include the maintenance schedule for the principal items of equipment furnished under this Division.

D. The manufacturer shall attest in writing that his equipment has been properly installed prior to start. The following is some of the equipment necessary for this inspection: fire alarm system. These letters will be bound into the operating and maintenance books.

1.23 ADJUSTING AND TESTING

A. After all equipment and accessories to be furnished are in place, they shall be put in final adjustment and subjected to such operating tests as will assure the Architect that they are in proper adjustment and in satisfactory permanent operating condition.

B. This particular work shall include the services of a factory engineer to inspect the installation and assist in the initial startup and adjustment to the equipment. The period of these services shall be for such time as necessary to secure proper installation and adjustments. After the equipment is placed in permanent operation, there shall be furnished the service of said engineer for the purpose of supervising the initial operation of the equipment and to instruct the personnel responsible for operation and maintenance of the equipment.

C. At the completion of the job when all panels, devices, etc. are at full working load the Contractor shall provide infrared scan thermographic inspection test of all connection points, terminals, etc. of wires #8 AWG and larger to detect "hot-spots" in the electrical current flow. Correct all hot-spots.

1.24 UNDERWRITER'S LABEL

A. All electrical equipment and materials shall be new and shall comply with the standards of and shall bear the label of the Underwriter's Laboratories.

1.25 ELECTRICAL SAFETY INSPECTION

A. Electrical Contractor shall arrange for an Electrical Safety Inspection to be performed by the Local Inspection Agency (i.e.: New York Electrical Inspection Services, Atlantic Inland, Middle Department Inspection Agency). A Certificate of Compliance "Underwriter's Certificate" shall be issued to the Owner. All costs and coordination required shall be included in this Contractors Base Bid.

1.26 REMOVALS

A. The scope of removals shown on the Drawings are diagrammatic only and indicate the intent of the work to be performed and not the complete scope of demolition and/or removal work. It shall be the responsibility of this Contractor to remove any electrical devices even if not specifically indicated to be removed on these Drawings in order to accommodate new work.

B. All power conductors, control wiring and conduit associated with mechanical equipment such as fans, pumps, etc. designated for removal on the HVAC Drawings shall be removed clear back to the source of power and disconnected. All motor starters, disconnect switches, control devices, etc. shall be removed. Refer to HVAC Drawings for extent of HVAC removals.

C. Any device removed shall include (but shall not be limited to) the removal of all associated wiring, conduit, boxes, and auxiliary devices back to the previous device on the circuit, or back to the panelboard or origin of the circuit or any other items that are not incorporated in new layout, until such removal is complete. If the removal of any device interrupts service of any other device that is to remain, the Contractor shall provide all materials and labor to ensure continuity of service to those devices to remain.

D. Junction boxes, pullboxes, wireways, conduits, or any other devices required to reconnect circuitry shall be installed concealed within the ceilings, partitions and/or walls, floors, no surface or exposed circuiting shall be permitted, unless specifically indicated.

E. The Electrical Contractor shall patch all openings in walls, ceilings or roof that are left open as a result of removals. Refer to cutting and patching section. Any electrical device removed including but not limited to disconnect switches, panelboards, etc. shall be cleaned, protected and turned over to the Owner or disposed of as directed by Owner.

END OF SECTION

SECTION 26 0125

SCOPE OF WORK

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 SCOPE OF WORK

A. The work under this section includes all labor, materials, equipment, tools, transportation and the performance of all work necessary and required for furnishing and installing all Electrical work shown on the Contract Documents, as specified herein and as otherwise required by job conditions or reasonably implied, including, but not necessarily limited to the following:

1. The addition of new fire alarm devices (i.e., automatic fan shutdown, for new HVAC equipment) and the replacement of the existing ones as shown on Drawings.

2. The contractor shall dispose of all debris, including but not limited to fixtures, equipment, lamps, ballast, wiring devices and the like in accordance with, as defined by governing law and regulations of the jurisdiction where the work is being performed.

3. Provisions for temporary fire prevention actions to be taken during the period of construction until the new fire alarm system is operational.

4. Modifications to existing electrical distribution system as indicated on the Drawings.

5. Distribution panelboard, circuit breaker panelboards, feeder, conduit, cables and branch circuit wiring with all connections complete.

6. Conduit, conduit fittings, junction and pull boxes and all appurtenances necessary for the raceway systems including necessary supports and fasteners.

7. Electrical conductors, connectors, fittings and connection lugs.

8. Branch circuit devices, outlet boxes, pull boxes, motor disconnect switches, etc.

9. Power wiring to HVAC and Plumbing equipment including disconnect switches as shown and/or required by NEC.

10. Lighting fixtures and lamps and occupancy sensor.

11. Public address speakers.

12. Core drilled holes for conduit passing through walls, ceilings and floors.

13. All necessary cutting, patching and core drilling incidental to the electrical work.

14. Temporary light and power.

15. Licenses, permits, inspection and approvals.

16. Grounding as required as per NEC.

17. Sleeves for conduit and watertight caulking between conduit and sleeve.

18. Testing.

19. Cutting, patching and drilling.

20. Excavation and backfill by others. Sand bedding by Electrical Contractor.

B. Coordination Drawings (if applicable): Attention is directed to Division 1 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the work and failure to honor these requirements may become the basis for denial of any and all claims for either or both “time” and “money”.

1.2 WORK NOT INCLUDED

A. The following related items will be done by others:

1. Furnishing motors and controllers.

2. Concrete work.

3. Excavation and backfill.

END OF SECTION

SECTION 26 0150

APPROVED MANUFACTURERS

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 APPROVED MANUFACTURERS

A. The following list of manufacturers constitutes an approved list:

1.	Panelboards	Siemens, Square D, GE
2.	Disconnect Switches	Siemens, Square D, GE
3.	Conduit (steel)	Walker, Youngstown, Steelduct, Triangle
4.	Conduit Fittings (steel)	Appleton, Crouse-Hind, O-Z, T & B, M & W
5.	Wire and Cable	General, South Wire, Triangle, Rome, Hatfield, Crescent, Cerro
6.	Splicing Connectors	3M, O-Z, Thomas & Betts
7.	Outlet Boxes	Appleton, National, Steel City, Raco
8.	Wiring Devices	Arrow-Hart, Hubbell, P & S
9.	Fuses	Bussman, Ferraz-Shawmut, Littlefuse
10.	Lamp	GE, Sylvannia, Philips
11.	Motion Sensors	Watt Stopper, Sensorswitch
13.	Fire Alarm System	Simplex or approved equal
14.	Public Address System	Audiotel or approved equal

B. All materials and appliances shall have listing of Underwriters Laboratories, Inc. and be so labeled, or shall conform to their requirements, in which case certified statements to that effect shall be furnished by the manufacturer with a copy of an examination report by a recognized independent testing laboratory acceptable to the Architect and his Engineer. Use new materials and appliances throughout.

C. Where several types or makes of materials are specified, the Contractor has the option of using any of these, but after a type or make has been selected and has received the approval of the Architect, it shall be used throughout.

D. The Contractor shall provide all structural supports for the proper attachment of equipment supplied by him and also for all equipment supplied to him under other sections of the Specifications for mounting and connections.

E. Secure all equipment to the building structure independently. Do not secure to work of other trades such as ceiling lath, piping racks, etc., unless specified or noted otherwise.

F. Wall mounted equipment shall be directly secured to wall by means of steel bolts. Maintain at least 1/4" air space between equipment and supporting wall. Pre-fabricated steel channels providing a high degree of mounting flexibility, such as those manufactured by Kindorf and Unistrut, shall be used for mounting arrays of equipment.

G. All fastening, supports, hangers, anchors, etc., shall be of a type made for the specific purpose. On masonry walls, metallic expansion shield and machine screws shall be used. Screws with wooden plugs or anchors will not be acceptable on any part of the work.

END OF SECTION

SECTION 26 0200

CONDUIT

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all material, labor, tools and services necessary to install rigid metal conduit, electrical metallic tubing and liquid tight flexible metal conduit, including all fittings to complete all work shown on the Drawings or specified herein.

1.2 RELATED WORK

A. Cutting and patching.

B. Trenching: Excavation and backfill for conduit and utility on site.

C. Sheet metal flashing and trim.

PART 2 - PRODUCTS

2.1 RIGID STEEL CONDUIT

A. Industry standard heavy wall conduit.

B. Minimum 3/4" trade size.

C. Threaded.

D. Hot dipped galvanized finish by means of plating after cutting of threads.

2.2 INTERMEDIATE METAL CONDUIT

A. Industry standard steel conduit.

B. Minimum 3/4" trade size.

C. Threaded.

D. Hot dipped galvanized finish by means of plating after cutting of threads.

2.3 ELECTRICAL METALLIC TUBING

A. Industry standard thin wall conduit of galvanized steel only.

B. Minimum 3/4" trade size.

C. Maximum 4" trade size.

2.4 FLEXIBLE METAL CONDUIT

A. Galvanized steel tape formed into an industry standard interlocking coil.

B. Minimum 3/4" trade size except for connection of lighting fixtures.

C. Grounding type.

D. Separate ground conductor.

E. Use for short connections to motor terminal box, other vibrating equipment using a minimum length of 18" with 50% slack and a maximum of 6'.

F. From outlet box to recessed lighting fixtures with a maximum length of 6'.

2.5 WIREWAYS

A. Lay-in type, UL listed as wireway or auxiliary gutter.

B. Wireway shall be of code gauge steel construction (UL standard for Wireway Auxiliary Gutters and Associated Fittings) with removable cover. Tamperproof screws shall be provided for sealing covers to prevent access by unauthorized personnel. Wireway shall be provided with knockouts.

C. Connector and covers shall be attached so that removal of connectors is not necessary to utilize the lay-in feature.

D. Finish: All sheet metal parts shall be provided with a rust inhibiting phosphating coating and baked enamel finish. All hardware shall be plated to prevent corrosion. All screws extending into the wireway shall be protected by spring nuts or otherwise guarded to prevent wire insulation damage.

2.6 CONDUIT SUPPORTS

A. Conduit clamps, straps and supports: Steel or malleable iron.

2.7 CONDUIT FITTINGS

A. Use compression fittings for all EMT in exposed areas. Utilize set screw fittings only above hung ceilings and concealed areas.

2.8 SURFACE METAL RACEWAY

A. Metal raceway shall be of a two-piece design with a base and snap-on cover.

B. Raceway and all components shall be listed by Underwriters Laboratories

C. Single Channel: Steel, zinc plated, off-white finish suitable for repainting. Two piece design with metal base and snap-on cover. Provide Wiremold V700, Hubbell Inc. 750 Series, or Panduit PMR5/PMR7.

D. Dual Channel: Steel, galvanized, off-white finish but suitable for repainting. Two-piece design with metal base and snap-on cover, minimum 0.04" thick base and cover. Base shall be divided by a removable barrier section. Provide duplex receptacles mounted in top cell and communication outlets in the bottom cell. Coordinate communications jack requirements with owner’s IT personnel. Provide Wiremold V4000, Wiremold DS4000 Series, Hubbell Inc. 4000 Series or Panduit PMR40.

PART 3 - EXECUTION

3.1 CONDUIT SIZING, ARRANGEMENT AND SUPPORT

A. Minimum size - 3/4". Provide grounding bushings on all conduits 1-1/4" and larger.

B. Arrange conduit to maintain headroom and present a neat appearance.

C. Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.

D. Draw up couplings and fittings full and tight. Protect threads cut in field from corrosion. Paint newly threaded joints of steel conduit with T & B "Kopershield" compound before installation. Running threads prohibited; use three-piece unions or split couplings instead. Use only compression fittings for all EMT in areas where it will be exposed in finished and unfinished areas. Provide set screw fittings only when installed above hung ceilings.

E. Maintain minimum 6-inch clearance between conduit and piping. Maintain 12-inch clearance between conduit and heat sources such as flues, steam pipes and heating appliances.

F. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers.

G. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.

H. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.

I. Exposed conduit on ceiling shall be parallel or perpendicular to wall and vice versa to ceiling when installed on wall. Secure conduit clamps and supports to masonry materials by toggle bolt, expansion bolt or steel insert. Spacing or conduit supports shall not exceed 7 feet.

3.2 CONDUIT INSTALLATION

A. Cut conduit square using a saw or pipe cutter, Deburr cut ends.

B. Bring conduit to the shoulder of fittings and couplings and fasten securely.

C. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes and for fastening conduit to sheet metal boxes in damp or wet locations.

D. Install no more than the equivalent of three 90-degree bends between boxes.

E. Use conduit bodies to make sharp changes in direction, as around beams.

F. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2-inch size.

G. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.

H. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.

I. Provide No. 12 AWG insulated conductor or suitable pull string in empty conduit, except sleeves and nipples.

J. Install expansion-deflection joints where conduit crosses building expansion or seismic joints.

K. Where conduit penetrates fire-rated walls and floors, provide pipe sleeves two sizes larger than conduit; Pack void around conduit with fire-stop fittings with UL listed fire rating equal to wall or floor ratings; Seal opening around conduit with UL listed foamed silicone elastomer compound.

L. Installation of conduit in slab shall comply with ACI 318.

M. Route conduit through roof openings for piping and duct work where possible; otherwise, route through roof with pitch pocket.

N. Maximum size conduit in slabs above grade: 1 inch. Do not route conduits to cross each other in slabs above grade. Conduits crossing each other may not be larger than 3/4 inch.

O. All conduit used for fire alarm system shall be painted red.

3.3 CONDUIT INSTALLATION OF SCHEDULE

A. Underground installations: PVC minimum Schedule 40 conduit, unless otherwise noted on Drawings.

B. Installations in or under concrete slab: PVC minimum Schedule 40 conduit, unless otherwise noted on Drawings.

C. Exposed outdoor locations: Rigid galvanized steel conduit.

D. Wet interior locations: Rigid galvanized steel conduit.

E. Concealed dry interior locations and above accessible ceiling for receptacle and lighting branch wiring: Electrical metallic tubing up to first junction box and flexible metallic tubing (MC cable only) thereafter.

F. Concealed dry interior locations other than receptacle and lighting branch wiring: Electrical metallic tubing.

G. Concealed dry interior locations and above accessible ceiling for fire alarm runs: Fire alarm armored cable type MC with red stripe as manufactured by AFC series 1800.

H. Concealed and exposed dry interior location for feeder runs: Electric metallic tubing.

I. Exposed dry interior in unfinished locations other than Boiler Rooms: Electric metallic tubing.

J. Final connections to motors: Flexible metallic tubing (MC cable). Minimum of 10” to maximum of 6’ for connections to motors.

K. Existing exposed dry interior locations (finished spaces), for branch wiring and fire alarm wiring, one-piece steel raceway (similar to Wiremold V-500, V-700).

L. Final connections to motors: Flexible metallic tubing (MC cable). Minimum of 18” to maximum of 6’ for connections to motors.

M. All conduit installed in boiler room up to 10’-0” AFF and lower shall be rigid galvanized steel conduit. All conduit above 10’-0” shall be electric metallic tubing.

N. Final connections to equipment and/or motors in boiler room, outdoors and potentially wet indoor areas: liquid tight, flexible; minimum of 18” to maximum 6’-0” connections.

END OF SECTION

SECTION 26 0300

WIRE AND CABLE

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all material, labor, tools and services necessary to wire and cable in raceway specified in other sections to complete all work shown on the Drawings or specified herein.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

A. Thermoplastic-insulated building wire: Type THHN.

B. Rubber insulated building wire: NEMA WC 3.

C. Feeders and branch circuits larger than number 6 AWG: Copper, stranded conductor, 600 volt insulation, type THHN.

D. Feeder and branch circuits 6 AWG and smaller: Copper conductor, 600 volt insulation, THWN/THHN, 6 and 8 AWG, stranded conductor; Smaller than 8 AWG, solid conductor.

E. Service feeders and branch circuits in conduit in contact with earth shall be type XHHW.

F. Control circuits: Copper, stranded conductor 600 volt insulation, THHN.

2.2 ARMORED CABLE

A. BX or pre-manufactured cables are not acceptable except for Type MC for branch wiring after the first junction box (for receptacle and lighting branch circuits) and final connections to motors in interior dry accessible locations, minimum length shall be 18” with a maximum length of 6’ for motors.

B. Type MC fire alarm cable with red stripe for concealed fire alarm wiring as manufactured by AFC series 1800.

C. Armored cable, Type MC size 14 through 6 AWG: Copper conductor, 600 volt thermoplastic insulation, rated 90 degrees C., with separate green ground conductor.

2.3 REMOTE CONTROL AND SIGNAL CABLE

A. Control cable for Class 2 or Class 3 remote control and signal circuits:
Copper conductor, 300 volt insulation, rated 60 degree C, individual conductors twisted together shielded and covered with a nonmetallic jacket; UL listed for use in air handling ducts, hollow spaces used as ducts and plenums. Verify wiring type with manufacturer.

2.4 COLOR CODING

A. All wiring shall be color-coded. Neutral wire shall be white throughout and each phase wire shall be identified any place in the system by its color code. All conductors in panel boxes and junction boxes shall be properly tagged with red non-flammable tags properly attached.

B. Wire shall be color coded as follows:

120/208 volt system		Fire Alarm
A Phase	Black	Red
B Phase	Red	
C Phase	Blue	

C. Equipment ground wires or ground jumpers shall be Green.

D. In addition to the basic color-coding described the following additional identification and tagging shall apply.

1. The switch legs for the local wall switches and in switch panel shall have distinctive stripes. In instances where color-coding is not practicable, such as short runs of heavy feeder cables, taping the ends of the cable with coded colors as indicated above or tagging will be permitted.

2. Cables shall be tagged in all pull boxes, wireways and wiring gutters of panels.

3. Where two (2) or more circuits run to or through a control device, outlet box or junction box, each circuit shall be tagged as a guide in making connections.

4. Tags shall identify wire or cable by number and/or piece of equipment served as shown on the Drawings.

PART 3 - EXECUTION

3.1 GENERAL WIRING METHODS

A. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring.

B. Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 75 feet and for 20 ampere.

C. Place an equal number of conductors for each phase of a circuit in same raceway or cable. No more than one of each phase shall be supported by a single neutral.

D. Splice only in junction or outlet boxes.

E. Neatly tag, identify, train and lace wiring inside boxes, equipment and panelboards.

F. Make conductor lengths for parallel circuits equal.

3.2 WIRING INSTALLATION IN RACEWAYS

A. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricate for pulling 4 AWG and larger wires.

B. Completely and thoroughly swab raceway system before installing conductors.

C. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.

3.3 CABLE INSTALLATION

A. Support cables above accessible ceilings; do not rest on ceiling tiles. Use spring metal clips or metal cable ties to support cables from structure (not ceiling suspension system). Include bridle rings or drive rings.

B. Use suitable cable fitting and connectors.

3.4 WIRING CONNECTIONS AND TERMINATIONS

A. Splice only in accessible junction boxes.

B. Use solderless pressure connections with insulating covers for copper wire splices and tape, 8 AWG and smaller. For 10 AWG and smaller, use insulated spring wire connectors with plastic caps.

C. Provide extended gutters and tap blocks or pull boxes with tap rail systems similar to Burndy MT Series or Burndy Electrorail system for wire splices 6 AWG and larger.

D. Tape uninsulated conductors with electrical tape to 150 percent of the insulation value of conductor.

E. Thoroughly clean wires before installing lugs and connectors.

F. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

G. Terminate spare conductors with electrical tape.

3.5 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of the Specifications.

B. Inspect wire and cable for physical damage and proper connection.

C. Torque test conductor connections and terminations to manufacturer's recommended values.

D. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

3.6 WIRE AND CABLE INSTALLATION SCHEDULE

A. All wiring and cable shall be installed in conduit unless otherwise noted. Refer to conduit section 26 0200 for conduit types at various location.

END OF SECTION

SECTION 26 0320

OVERCURRENT PROTECTIVE DEVICES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. Work of this section includes all labor, materials, equipment and services necessary to complete the electrical work as shown of the Drawings and specified herein, including, but not limited to, the following:

B. Fuses

1. Current limiting cartridge fuses.
2. Time delay cartridge fuses.

C. Circuit Breakers

1. Standard molded case circuit breakers "bolted in" type.
2. Solid state circuit breakers.
3. Current limiting circuit breakers.
4. Enclosed circuit breakers.

1.2 SUBMITTALS

A. Shop drawings showing dimensions, location of equipment and method of installation.

B. Product Data: Manufacturer’s printed data, catalog cuts.

1.3 DISCONNECT SWITCHES

A. Fusible switch assemblies: Quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover when switch is in ON position. Handle lockable in OFF position. Fuse clips shall be designed to accommodate Class R, J fuses.

B. Non-fusible switch assemblies: Quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover when switch is in ON position. Handle lockable in OFF position.

C. Enclosures: NEMA Type 1, 3R or 4 as required.

1.4 FUSES

A. Voltage ratings of fuses shall be suitable for the supply characteristics to which they are applied.

B. Fuse type and size shall be suitable for installation in related disconnect switch or circuit breaker.

C. Current limiting fuses shall be as follows:

1. Regardless of actual available fault current, they shall, at full recovery voltage, be capable of safely interrupting fault currents of 200,000 amperes RMS symmetrical or 280,000 amperes RMS asymmetrical, deliverable at the line side of the fuse.
2. They shall have average melting time-current characteristics to meet the Underwriters' Laboratories requirements for "Class RK-1" 0-600 amp fuses.

D. Regardless of actual available fault current, they shall be capable of limiting peak let through current to the following values based on 200,000 amperes RMS symmetrical or 280,000 amperes asymmetrical being available:

Rating In Amperes	Peak Let Through Current In Amps
15-30	6,000
35-50	8,000
70-100	12,000
125-200	20,000
225-601	38,000

E. Fuses shall be rejection type. Fuse clip shall be rejection type.

F. Fuse Type and Application Table:

Category of Application	Acceptable Fuse Types (Bussman Designations @ 600V)
Motor feeder	LPS below 600A
Power panel feeders	LPS below 600A
Safety switches	LPS

1.5 CIRCUIT BREAKERS

A. "Bolted-In" type, manually operated, quick-make, quick-break, mechanically trip-free operating mechanisms for simultaneous operation, of all poles, with contacts, arc interrupters and trip elements for each pole. "Plug-in" breakers are not permitted.

B. Tripping units shall be "thermal-magnetic" type having bimetallic elements for time delay overload protection, and magnetic elements for short circuit protection.

C. Manually operable by mean of toggle type operating handles having tripped positions midway between the "on-off" position. Handle to be clearly labeled as to breaker rating.

D. Minimum frame size for all circuit breakers, 1, 2, or 3 pole shall be 100 amperes.

E. Their interrupting rating shall not be less than 25,000 amperes RMS symmetrical at 208 volt for distribution panels and 10,000 amperes for power panels.

1.6 APPLICATIONS

A. Category of Application for Fuses:

1. Feeders on switchboards.
2. Branch fused switch unit in distribution panel.
3. Fused safety switch.

B. Category of Application for Circuit Breakers:

1. Panelboards.
2. Switchboards.
3. Individual enclosures.

1.7 SPARE FUSES

A. Upon Engineer's acceptance of the electrical distribution system, provide spare fuses as follows: 10% of each type and rating installed 600 amperes and smaller (minimum of 3). Provide spare fuse cabinet with directory to store all spare fuses. Locate as directed by Engineer and/or Owner.

1.8 APPROVED MANUFACTURERS

A. Fuses: Bussman, Ferraz-Shawmut.

B. Circuit Breakers: Siemens, General Electric, Square D.

1.9 INSTALLATION

A. All material installation shall be in accordance with manufacturer recommendations and the provisions of all applicable codes.

B. All fuses and circuit breakers shall be selectively coordinated.

C. Install disconnect switches where indicated on Drawings.

D. Install fuses in fusible disconnect switches.

E. Disconnects shall have NEMA 3R enclosure.

1.10 RECORD DRAWINGS

A. Shop drawings showing dimensions, location of equipment and method of installation.

B. Product Data: Manufacturer’s printed data, catalog cuts, performance curves.

END OF SECTION

SECTION 26 0350

BOXES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all material, labor, tools and services necessary to install wall and ceiling outlet boxes, floor boxes, pull and junction boxes to complete all work shown on the Drawings or specified herein.

1.2 RELATED WORK

A. Access doors.

B. Wiring devices: Service fittings and fire-rated poke-through fittings for floor boxes.

C. Cabinets and enclosures.

PART 2 - PRODUCTS

2.1 OUTLET BOXES

A. Sheet metal outlet boxes: ANSI/NEMA OS 1; Galvanized steel, with 1/2 inch male fixture studs where required.

B. Cast boxes: Cast ferroalloy, deep type, gasketed cover, threaded hubs.

C. Typical receptacle box shall be 4" square metal boxes, 30.8 cubic inch capacity with brackets as required. Provide 4" square raised device covers.

2.2 PULL AND JUNCTION BOXES

A. Sheetmetal boxes: ANSI/NEMA OS 1; Galvanized steel.

B. Sheetmetal boxes larger than 12 inches in any dimension: hinged enclosure in accordance with Section 26 0450.

C. Cast metal boxes for outdoor and wet location installations: NEMA 250; Type 4 and type 6, flat-flanged, surface-mounted junction box, UL listed as raintight. Galvanized cast iron box and cover with ground flange, neoprene gasket, and stainless steel cover screws.

D. Cast metal boxes for underground installation: NEMA 250; Type 4, inside flanged, recessed cover box for flush mounting, UL listed as raintight. Galvanized cast iron box and plain cover with neoprene gasket and stainless cover screws.

PART 3 - EXECUTION

3.1 COORDINATION OF BOX LOCATIONS

A. Provide electrical boxes as required in excess of that shown on Drawings and as required for splices, taps, wire pulling, equipment connections and code compliance.

B. Electrical box locations shown on Contract Drawings are approximate unless dimensioned. Verify location of floor boxes and outlets in offices and work areas prior to rough-in.

C. Locate and install boxes to allow access. Where installations are accessible, coordinate locations and sizes of required access doors with Division 1.

D. Locate and install to maintain headroom and to present neat appearance.

3.2 OUTLET BOX INSTALLATION

A. Do not install boxes back-to-back in walls. Provide minimum 6 inch separation, except provide minimum 24 inch separation in acoustic-rated walls.

B. Locate boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat openings for boxes.

C. Provide knockout closures for unused openings.

D. Support boxes independently of conduit except for cast iron boxes that are connected of rigid metal conduits, both supported within 12 inches of box.

E. Use multiple-gang boxes where more than one device is mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.

F. Install boxes in wall without damaging wall insulation.

G. Coordinate mounting heights and locations of outlets mounted above counters, benches and backspaces.

H. Position outlets to locate luminaries as shown on reflected ceiling plans.

I. In inaccessible ceiling areas, position outlets and junction boxes within 6 inches of recessed luminaire, to be accessible through luminaire ceiling opening.

J. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.

K. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.

L. Provide cast outlet boxes in exterior locations exposed to the weather and wet locations.

3.3 PULL AND JUNCTION BOX INSTALLATION

A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.

B. Support pull and junction boxes independent of conduit.

3.4 FLOOR BOX INSTALLATION

A. Set boxes level and flush with finish flooring material.

B. Use cast iron floor boxes for installation in slab on grade.

END OF SECTION

SECTION 26 0400

WIRING DEVICES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all materials, labor, tools and services necessary to install receptacles, service fittings device plates and box covers to complete all work shown on the Drawings or specified herein.

1.2 REFERENCES

A. FS W-C-596 - Electrical power connector, plug, receptacles and cable outlet.

B. FS W-S-896 - Switch, toggle.

C. NEMA WD 1 - General purpose wiring devices.

D. NEMA WD 5 - Specific-purpose wiring devices.

1.3 SUBMITTALS

A. Submit product data under Provisions of Contract and Division 1.

B. Provide product data showing configurations, finishes, dimensions and manufacturer's instructions.

PART 2 - PRODUCTS

2.1 RECEPTACLES

A. Convenience and straight-blade receptacles: 125 V, 2 pole, 3 wire, 20 ampere specification grade, ground fault interrupting or isolated ground type.

B. Internal ground clip of receptacles shall be in one piece with the receptacle mounts.

C. Receptacles with riveted ground clips will not be accepted.

D. Isolated ground type receptacle shall be orange in color.

2.2 WALL SWITCHES

A. Wall switches for lighting circuits and motor loads under 1/2 hp: AC general use snap switch with toggle handle, rated 20 amperes and 120-277 volts AC.

B. Handle: Ivory plastic.

C. Pilot light type: Lighted handle. Pilot strap in adjacent gang.

D. Locator type: Lighted handle.

2.3 COVER PLATES

A. Decorative cover plate: Stainless steel 302/304 smooth Hubbell "S" series.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install receptacles on roof along parapet wall.

B. Install specific use receptacles at heights shown on contract drawings.

C. Drill opening for poke - through fitting installation in accordance with manufacturer's instructions.

E. Install plates on switch, receptacle, and blank outlets in finished areas, using jumbo size plates for outlets installed in masonry walls.

E. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings and on surface mounted outlets.

F. Install devices and wall plates flush and level.

END OF SECTION

SECTION 26 0425

LIGHTING CONTROL SYSTEM

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 SUMMARY

A. This Section includes equipment for a lighting control system including relay/dimmer panels and controls.

1.2 SUBMITTALS

A. Product Data: For control systems, including dimensions and data on features and components. Include data on ratings and features of devices.

B. Shop Drawings: Details showing arrangements, characteristics, and circuit assignments of various modules. Include elevation views of front panels indicating devices and controls. Include illustrations and dimensioned drawings.
   1. Wiring diagrams: Detail wiring for power and control systems and differentiate between manufacturer and field-installed wiring.

C. Manufacturer Certificates: Signed by manufacturers certifying that they comply with requirements. Include evidence of manufacturing experience.

D. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

E. Maintenance Data: Provide operating manuals, instructional videotapes, and controls to be included in maintenance manuals specified in Division 1.

F. Record Data: Show connections and circuit and channel assignments.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has installed systems of similar scope and function as the units required for this project.

B. Manufacturer Qualifications: A firm experienced in manufacturing equipment similar to that indicated for this project that maintains a factory technical support service group. The firm shall be capable of providing the user with training, parts, and emergency maintenance and repairs support within 48 hours.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

D. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 LIGHTING CONTROL DIMMING SYSTEM

A. Description: Microprocessor-based system consisting of relays, control modules, and remote stations.
   1. UL and cUL LISTED (508 and 924).
   2. Comply with USITT DMX 512-A for data transmission (ANSI E1.11-2008 and ANSI E1.20-2010).

B. Cabinet

1. Mechanical

a. Cabinets contain 4 or 8 relay controlled circuits plus optional 0-10V dimmer control.
b. 18 GA steel, surface mounted, NEMA 1, IP20 rated panel with a removable screw cover. Textured, black powder coat finish.
c. Provide a removable interior shield that covers all line voltage components. When the cabinet's cover is removed, only the class II low voltage components will be accessible.
d. Optional, movable voltage barriers for separation of adjacent circuits with voltage differentials or providing emergency lighting.
e. Dimensions: E-Flex 4: 9.5"H x 12" W x 3" D and E-Flex 8: 16.25"H x 12" W x 3" D.

2. Electrical

a. Universal input voltages: 90V to 277V AC and 47 to 63Hz. UL/cUL 508 and 924 listed.
b. Contractor Terminals: Control power (18 to 10AWG), Load wiring (18 to 10AWG), 0-10V wiring (24 to 16AWG), Input wiring (28 to 12AWG), and E-FlexNet wiring (28 to 12AWG).

3. Environment

a. Ambient temperature operating range from 0°C to 40°C.
b. Indoor use only.

4. Relays

a. Single pole, mechanically held, latching style relays rated for 120V to 277V operation.
b. Each relay includes an LED status indicator and an integral manual operation switch.
c. Relays must maintain their control setting upon loss of power.
d. Relays must be UL rated for use with electronic ballasts (EB rated).
e. Minimum load type power ratings in the 120V to 277V operating range: Electronic ballast: 16A, Tungsten: 20A, Standard ballast: 20A or Resistive: 50A.

5. 0-10V Dimming Option

a. Compatible with current sink control operation: 50mA maximum combined ballast load.
b. Complies with IEC SELV/NEC Class 2 isolated 0-10V and IEC60929.

6. Control Inputs: Each panel shall simultaneously accept the following remote inputs: Occupancy sensors (four per panel), Daylight photocell sensors (four per panel), Dry contact closure (four per panel), CapT remote station inputs (four per panel), External timeclock/BMS contact closure (one per panel), Emergency contact closure (one per panel), and DMX/RDM

7. Configuration and control interfaces. Each E-Flex panel shall include:

a. User interface for configuration and control programing which includes a 4-digit, 7 segment LED display with menu, up, down, enter, input, select, and store button functions.
b. A type B USB port for programming the panel via the E-Flex Flextool Configurator PC program.
    1) Provides off-line editing to create, edit, and store system configuration data.
    2) Retrieve configuration data to be edited and reloaded or saved as a back-up program.
    3) Provide live preset control when connected to the E-Flex system.
    4) USB port shall provide ESD protection.

CapT Remote Stations: Provide CapT series control stations which shall meet the following:

1. Mechanical - The station shall include the following components:

   a. Durable ABS frame and polycarbonate faceplate with station graphics printed on the rear of the faceplate (exposed silk-screened graphics are not acceptable). No visible fasteners.
   b. Stations mount in a 3.5" deep single-gang masonry style backbox (by others).
   b. Capacitive touch buttons with wake on proximity sensing for low-power operation. Buttons shall contain no moving parts.
   c. Two LED indicators. Top indicator remains on and flickers when the proximity sensor is activated. The bottom LED indicator is activated whenever a button is pressed.
   d. Digital output over cat 5 cable or 3-#18-22 wires with a maximum wire length of 150 feet.

2. Operation

   a. Each E-Flex panel has four CapT station inputs with each input accepting one CapT station. Stations may be connected to multiple zones in multiple panels.
   b. Any zone may be assigned to multiple CapT stations.
   c. Stations control options include preset activation, raise/lower, on, and off operation.

3. Standard station configurations include:

   a. CapT-2: On and Off.
   b. CapT-5: On, Off, Raise, Lower, and Preset.
   c. CapT-7: Off, Raise, Lower, and 4 Presets (presets 1-4, 5-8, 6-12, or 13-16).

D. System Operation

1. Program nineteen presets (presets 1-16, emergency, DMX loss, and timeclock) plus ON and OFF.

2. Set load types: Switched, 0-10V, and receptacle (no daylight control)

3. Program fade times of up to 60 seconds for each preset.

4. Program low and high end level settings.

5. Clear memory to reset all configuration data to the factory default settings.

6. DMX signal loss response options: none, go to off, go to 100%, or go to preset 18.

7. Test features: relay test (manual relay operation), ramp test (0-10V and the associated relay operation), and relay override (by-passes all inputs to activate a relay).

8. Optional timeclock operation.

9. Memory
   a. Power loss data corruption protection with redundant backup.
   b. 20+ years non-volatile memory retention with ferroelectric ram.
   c. Unlimited write cycles.

10. Program occupancy sensor operation to occupancy or vacancy modes.

11. Assign a panel name and ID for each E-Flex panel in a system.

12. Programmable preset and zone names using the PC configuration program.

E. DMX/RDM

1. Configuration
   a. Set the start address via RDM, user interface, or PC application software.
   b. A DMX address shall be configurable to any zone. Selected zones may be excluded from DMX configuration.
   c. Set DMX signal loss response action.

2. Device Requirements
   a. 1.5kV optically isolated RDM (ANSI E1.20) input with fault tolerant input protection and PTC resettable fuse over-current protection.
   b. Un-buffered thru connection provided will not affect communication if relay panel loses power or fails.
   c. Slide switch to enable/disable end of line termination.

F. System Configurations

1. Standalone operation mode: E-Flex panels shall be capable of standalone operation and not require any external control device for operation.
   a. Panels are to be shipped with a factory preset default configuration mode for instant operation.
   b. System operation determined by remote inputs from occ sensors, daylight sensors, CapT remotes and/or time clock inputs to each E-Flex panel or group of panels.

2. Solitaire operation mode: Panel operation is controlled by Solitaire STM, DTM, and DTM-TS master controllers.
   a. Master controllers provide direct control via DMX of all relay and 0-10V dimming functions in the E-flex cabinet(s).
   b. DMX signal control passes thru to control additional e-Flex panels or DMX devices.
   c. Provides multiple area control of up to eight areas, including partition control operation.
   d. Solitaire masters provide control of zones directly connected to the master in addition to E-Flex controlled zones.
   e. Astronomical timeclock operation provided via Solitaire controller.

3. Provide: (2) E-Flex 8 dimming panels. Locate as shown on plans. E-Flex panel shall support both 0-10V dimming and DMX controlled relay switching.

2.2 LIGHTING CONTROLS

A. Control stations shall be DTM Series DMX based multiple preset controls.

1. Rugged ABS frame and a clear polycarbonate faceplate with station graphics printed on the rear of the faceplate for durability. Stations with exposed silk-screened graphics are not acceptable. The station mounts in a 4-gang (DTM-606) or 6-gang (DTM-612), 3.5” masonry style backbox (furnished by others) with no visible fasteners.

2. A graphic level backlit LCD displays the active preset name, fade time, recorded preset names, channel value and name, and menu functions.

3. Capacitive touch sensing user interface. Backlit control buttons and channel controllers shall have no moving parts. Stations with mechanical buttons or potentiometers are not considered equal.
   a. Control Buttons: Full, Off, Scroll, Select, Store, Menu, Master, Group, and Page.
   b. Channel Controllers: 6 or 12 channel configuration plus a Master controller. Station includes 19 additional pages of virtual control channels providing 120(DTM-606) or 240 (DTM-612) system control channels to control SPB power modules or other DMX based devices including dimmers and DMX fixtures.

4. Low voltage control wiring to auxiliary control stations.

5. Infrared receiver for wireless preset control using the optional SWC hand-held controller.

6. The stations have a digital output and require two shielded pairs (Belden #9729) plus 3-#14 wires.

7. Each DTM600 series master station requires a 12V DC power input.

8. USB port to provide a PC interface for off-line system configuration and data storage.

9. Available with an optional I/O module which includes two auxiliary terminations to receive control inputs from occupancy sensors, photocells, building management, or fire alarm systems.

B. Operation - The master station shall provide the following control functions:

1. Record 18 presets plus Full and Off with no external controls required to set or store presets.

   a. Presets are programmed using the channel controllers to set each channel's level. The Store button records the channel levels to a preset. Presets may be modified and copied to another preset.
   b. The Scroll buttons scroll the recorded preset names in the LCD display and the Select button activates the desired preset. Repressing Select accelerates an active fade.
   c. Full: Fades all channels to user programmable levels over a user selected fade time.
   d. Off: Fades all channels to blackout over a user selected fade time.

2. Master controller raises or lowers all assigned channels in an active preset. Each channel may be programmed to master or non-master control operation. The Master controller override is temporary and does not change the preset levels stored in memory. The Master Group function permits temporarily assigning selected channels within an active preset to be controlled by the master.

3. Channel controllers raise or lower each channel's control level from 0 to 100% by tracking the movement of the user's finger along the controller scale. Touching a controller's scale at any point will instantly change the light level to the selected setting and displays that channel's name and control level in the LCD display. The control level shall be indicated by an LED array next to each controller and on the LCD display when the channel level is being modified. Controllers are active in programming and playback modes and changes are temporary until stored. The Page button provides access to any of the 20 station pages for up to 120/240 control channels.

4. Control channel options:

   a. DMX control
   b. Non-dim control
   c. Fluorescent dimming

   d. Multi-color LED control: Fixtures with multi-color LEDS (RGB, etc.) are controlled with the DMX output using an individual channel per color or color mode control. Color mode assigns the RGB color mixing to a channel which is linked to either a virtual intensity controller or an intensity channel in the fixture. Fixtures with more than RGB colors will have the additional colors assigned to controllers adjacent to the color mode controller. The virtual intensity controller function controls the intensity level of the color mode channel and additional color controllers as a group. LED control includes DMX patching. The color mode color settings may be recorded within a preset or Full.

5. The Master station shall include a menu function to access station control and programming functions without requiring an external controller or computer. Control features to include:

   a. Program system control parameters including the SDE-LCD station control functions and partition configuration.
   b. Program channel dim/non-dim/fluorescent/LED control operation, high/low level trim settings for each channel, and DMX patching.
   c. Program preset and channel names using the station's name library or create custom names.
   d. Program a fade time from 0 seconds to 60 minutes for each preset with the active fade time indicated in the LCD display.

   e. Lock function to lock or unlock the station memory, access to the station operation, and remote entrance stations. Lock function is secured by an access code.
   f. A clean function to allow cleaning the station faceplate without impacting active light settings.
   g. Configure timeclock settings, auto-sequence settings, and assign control input functions.

6. All stored control data and settings shall be retained indefinitely if power is lost using non-volatile ferroelectric RAM. The station shall return to the previous control status once power is restored.

7. Accepts two direct control inputs plus additional inputs via the system data link. Inputs are assignable to control any of the following functions: room combine, fire alarm by-pass, activate a preset, lock/unlock stations, and activate timeclock lights-out warning operation (flashes lights prior to their going off when triggered by a timeclock setting).

8. Auto-sequence mode for timed playback of preset groups.

9. Astronomical timeclock function with up to 25 events and 25 holidays to activate presets, enable/disable occupancy sensor control operation, enable/disable photocell control operation, and activate the lights- out warning alert function.

10. Multiple room control to combine up to 8 areas for common control when the partitions are open. Partition configuration status may be set at the master, SDE-LCD, or the SDE-RC stations.

11. Exclude selected channels from being modified when changing to a selected preset.

12. Presets may activate the S-MIO module's programmable outputs to control external devices.

C. Auxiliary Stations - Provide SDE series entrance stations which shall meet the following requirements:

1. Mechanical: The station shall include the following components:

   a. Rugged ABS frame and a clear polycarbonate faceplate with station graphics printed on the rear of the faceplate for durability. Stations with exposed silk-screened graphics are not acceptable. Stations mount in a single-gang masonry style backbox (by others) with no visible fasteners.
   b. Capacitive touch sensing backlit buttons for preset recall. Buttons shall contain no moving parts and stations with mechanical buttons are not acceptable.
   c. Integral infrared receiver on the SDE606RL, SDE-LCD, and SDE-IR stations for wireless preset selection using the optional SWC handheld controller.
   d. The station requires a digital control link using two shielded pairs (Belden #9729) plus 3-#14 wires.

2. Operation - Entrance stations shall be available to provide the following control functions:

   a. Activate the master station's presets.
   b. Master control: Temporary override to raise or lower all channels in an active preset.
   c. Full: Fades user selected channels.
   d. Off: All channels fade to blackout.
   e. Room partition control: The SDE-LCD and SDE-RC stations provide partitioned room control to set the control operation of adjacent areas with movable partitions as combined or independent.

3. Standard station configurations include:

   a. SDE602: Full and Off.
   b. SDE603: Full, Preset 1, and Off.
   c. SDE606RL: Six presets (1 - 6, 7 - 12, or 13 - 18), Master raise/lower, Off, and IR infrared receiver.
   d. SDE-LCD: Presets 1 to 18, Master raise/lower, Off, and IR infrared receiver. Station includes a graphic level backlit LCD for displaying the preset names and control functions.
   e. SDE-IR: Infrared receiver station.
   f. SWC: Handheld infrared transmitter. Presets 1 to 12 and Off plus Master control.
   g. SDE-RC: Room partition control.
   h. SDE-SC: Up, Down, Stop shade control operation.

D. Power Modules: Provide SPB modules as scheduled and required (refer to plans for requirement).

1. General

   a. Modules to be UL and cUL listed for 120V or 277V operation.

   b. Includes an air-gap relay to open the circuit when the control signal is off.

   c. Faceplate and frame to be high impact polycarbonate with no visible mounting screws.

   d. Module mounting:

      1) Standard SPB modules mount in a 3.5"deep, 4 gang masonry style backbox provided by others

      2) SPB-ND non-dim modules mount in a 2 gang masonry style backbox by others.

      3) Emergency modules (-EM) are provided in a surface mounted 12"W x 15"H x 4"D panel.

   e. Each module requires a separate power feed.

2. Operation

   a. Controlled by the master station DMX control link with multiple modules controlled on one link.

   b. Modules are available to control incandescent, neon/cold-cathode, electronic low-voltage, dimmable fluorescent (0-10V and phase control versions), LEDs (forward phase, reverse phase, 0-10V, and DMX versions), and magnetic low-voltage lamps.

   c. Emergency modules (-EM) include an integral UL924 relay to by-pass the module output. The EM modules require a normal emergency power feed to assure constant power input to the module and a normal power monitor source. Upon loss of normal power the relay by-passes the normal dimmed operation and brings the module output to full until normal power is restored.

3. Power Module configurations: All modules controlled with a DMX control input except where noted.

   a. SPB-AC-120-I-DMX: Single 2000 watts (120V) dimmer to control forward phase lamps.
   b. SPB-AC-120-F-DMX: Single 2000 watts (120V) dimmer to control phase dimmable fluorescent ballasts (Mark X or 3-wire) lamps.
   c. SPB-2DC-120-DMX: Dual 1000 watts (120V) dimmers to control 0-10V dimmable fluorescent ballasts and LED drivers.
   d. SPB-RPC-120-DMX: Single 1800 watts (120V) dimmer to control reverse phase LED drivers.

E. Control Interfaces: Modules providing additional control features connected on the communication link.

1. S-MIO: Multi-function interface module accepts any combination of up to 8 dry contact or 0-10V inputs with up to 8 dry contact outputs. Module is configurable to accept photocell and occupancy sensor inputs, energy management inputs, and provide shade control operation. Inputs are assignable to control any of the following functions: room combine, fire alarm by-pass, activate a preset, lock/unlock stations, and activate timeclock lights-out warning operation.

F. Provide: (1) DTM606 DMX preset master, (3) SDE606RL entry control stations, (1) S-MIO dry contact interface module, and (1) DMX Merger Splitter. Located where shown on plans.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install equipment according to the manufacturer's written instructions. Set permanently mounted items plumb and level and square with ceilings and walls.

B. Mounting of Equipment: Conform to manufacturer's instructions and Division 16 Section "Supporting Devices." Mounting heights indicated are to bottom of unit for suspended items and to center of unit for wall-mounted ones.

3.2 CONTROL WIRING INSTALLATION

A. Install wiring between control devices as specified in Division 16 Section "Wires and Cables" for hard wired connections. Install wiring in raceway except cable and plug connections.

B. Wiring in Enclosures: Bundle, train, and support.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Arrange and pay for the service of a factory-authorized service representative to test, adjust, and program the lighting control system.

B. Schedule visual and mechanical inspections and electrical tests with at least 14-days advanced notification.

C. Electrical Tests: Perform according to manufacturer's instructions. Exercise caution testing devices containing solid-state components.

3.4 CLEANING AND ADJUSTING

A. Remove paint splatters and other spots, dirt, and debris. Repair scratches and mars of finish to match original finish. Clean fixtures, devices, and equipment internally and externally using methods and materials as recommended by manufacturers.

3.5 DEMONSTRATION

A. Demonstrate the system to prove compliance with requirements.

B. Direct Training: Arrange and pay for the services of a factory-authorized service representative to demonstrate lighting control system and train Owner's personnel.

1. Conduct a minimum of 1 day of training in operation and maintenance as specified under "Instructions to Owner's Employees" in Division 1 Section "Project Closeout."

2. Schedule training with at least a 14-day advance notification.

3.6 COMMISSIONING

A. Operational Tests: Energize lighting controls systems, program controls, and check controlled outlets for light levels.

B. Correct deficiencies and retest deficient items. Verify by the system tests that specified requirements are met.

END OF SECTION

SECTION 26 0426

DIGITAL LIGHTING CONTROL SYSTEM

PART 1 – GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 SUMMARY

A. Section Includes

1. Digital Lighting Controls
2. Relay Panels
3. Emergency Lighting Control (if applicable)

B. Related Sections

1. Section 26 0400 Wiring Devices: Receptacles
2. Section 26 0575 Interior Luminaires.
3. Electrical Sections, including wiring devices, apply to the work of this Section.

C. Control Intent – Control Intent includes, but is not limited to:

1. Defaults and initial calibration settings for such items as time delay, sensitivity, fade rates, etc.
2. Initial sensor and switching zones
3. Initial time switch settings
4. Task lighting and receptacle controls
5. Emergency Lighting control (if applicable)

1.2 REFERENCES

A. American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE)

B. Underwriter Laboratories of Canada (ULC)

C. International Electrotechnical Commission (IEC)

D. International Organization for Standardization (ISO)

E. National Electrical Manufacturers Association (NEMA)

F. WD1 (R2005) - General Color Requirements for Wiring Devices.

G. Underwriters Laboratories, Inc. (UL)

1. 20 – Plug Load Controls
2. 508– Industrial Controls
3. 916 – Energy Management Equipment.
4. 924 – Emergency Lighting

1.3 SYSTEM DESCRIPTION & OPERATION

A. The Lighting Control and Automation system as defined under this section covers the following equipment:

1. Digital Occupancy Sensors – Self-configuring, digitally addressable and calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications.
2. Digital Switches – Self-configuring, digitally addressable pushbutton on/off, dimming, and scene switches with two-way active infrared (IR) communications.

1.4 LIGHTING CONTROL APPLICATIONS

A. Unless relevant provisions of the applicable local Energy Codes are more stringent, provide a minimum application of lighting controls as follows:

1. Space Control Requirements – Provide occupancy/vacancy sensors with Manual- or Partial-ON functionality in all spaces except toilet rooms, storerooms, library stacks, or other applications where hands-free operation is desirable and Automatic-ON occupancy sensors are more appropriate. Provide Manual-ON occupancy/vacancy sensors for any enclosed office, conference room, meeting room, open plan system and training room. For spaces with multiple occupants, or where line-of-sight may be obscured, provide ceiling- or corner-mounted sensors and Manual-ON switches.
2. Bi-Level Lighting – Provide multi-level controls in all spaces except toilet rooms, storerooms, library stacks, or applications where variable dimming is used.
3. Task Lighting / Plug Loads – Provide automatic shut off of non-essential plug loads and task lighting in all spaces except toilet rooms and storerooms. Provide Automatic-ON of plug loads whenever spaces are occupied. For spaces with multiple occupants a single shut off consistent with the overhead lighting may be used for the area.
4. Daylit Areas – Provide daylight-responsive automatic control in all spaces (conditioned or unconditioned) where daylight contribution is available as defined by relevant local building energy code:
    a. All luminaires within code-defined daylight zones shall be controlled separately from luminaires outside of daylit zones.
    b. Daytime setpoints for total ambient illumination (combined daylight and electric light) levels that initiate dimming shall be programmed in compliance with relevant local building energy codes.
    c. Multiple-leveled switched daylight harvesting controls may be utilized for areas marked on drawings.
    d. Provide smooth and continuous daylight dimming for areas marked on drawings. Daylighting control system may be designed to turn off electric lighting when daylight is at or above required lighting levels, only if system functions to turn lamps back on at dimmed level, rather than turning full-on prior to dimming.
5. Conference, meeting, training, auditoriums, and multipurpose rooms shall have controls that allow for independent control of each local control zone. Rooms larger than 300 square feet shall instead have at least four (4) pre-set lighting scenes unless otherwise specified. Occupancy / vacancy sensors shall be provided to extinguish all lighting in the space. Spaces with up to four moveable walls shall include controls that can be reconfigured when the room is partitioned.

1.5 SUBMITTALS

A. Submittals Package: Submit the shop drawings, and the product data specified below at the same time as a package.

B. Shop Drawings

1. Composite wiring and/or schematic diagram of each control circuit as proposed to be installed.
2. Show exact location of all digital devices, including at minimum sensors, room controllers, and switches for each area on reflected ceiling plans. (Contractor must provide AutoCAD format reflected ceiling plans.)
3. Provide room/area details including products and sequence of operation for each room or area. Illustrate typical acceptable room/area connection topologies.
4. Network riser diagram including floor and building level details. Include network cable specification and end-of-line termination details, if required. Illustrate points of connection to integrated systems. Coordinate integration with mechanical and/or other trades.

C. Product Data: Catalog sheets, specifications and installation instructions.

D. Include data for each device which:

1. Indicates where sensor is proposed to be installed.
2. Prove that the sensor is suitable for the proposed application.

1.6 QUALITY ASSURANCE

A. Manufacturer: Minimum [10] years experience in manufacture of lighting controls.

1.7 PROJECT CONDITIONS

A. Do not install equipment until following conditions can be maintained in spaces to receive equipment:

1. Ambient temperature: 0° to 40° C (32° to 104° F).
2. Relative humidity: Maximum 90 percent, non-condensing.

1.8 WARRANTY

A. Provide a five year limited manufacturer’s warranty on all room control devices and panels.

1.9 MAINTENANCE

A. Spare Parts

1. Provide spares of each product to be used for maintenance as listed below: Refer to design documents. Coordinate with owner for quantity prior to purchase order.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer

1. WattStopper
   a. System: Digital Lighting Management (DLM)

2. Basis of design product: WattStopper Digital Lighting Management (DLM) or subject to compliance and prior approval with specified requirements of this section, one of the following:
   a. Refer to design documents.

B. Substitutions: [If Permitted]

1. All proposed substitutions (clearly delineated as such) must be submitted in writing for approval by the design professional a minimum of 10 working days prior to the bid date and must be made available to all bidders. Proposed substitutes must be accompanied by a review of the specification noting compliance on a line-by-line basis.

2. By using pre-approved substitutions, the contractor accepts responsibility and associated costs for all required modifications to circuitry, devices, and wiring. The contractor shall provide complete engineered shop drawings (including power and control wiring) with deviations from the original design highlighted for review and approval prior to rough-in.

2.2 DIGITAL LIGHTING CONTROLS

A. Furnish the Company's system which accommodates the square-footage coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors, switches, daylighting sensors and accessories which suit the lighting and electrical system parameters.

2.3 DIGITAL WALL SWITCH OCCUPANCY SENSORS

A. Wallbox mounted passive infrared PIR or dual technology (passive infrared and ultrasonic) digital occupancy sensor with 1 or 2 switch buttons.

B. Digital Occupancy Sensors shall provide scrolling LCD display for digital calibration and electronic documentation. Features include the following:

1. Digital calibration and pushbutton configuration for the following variables:

   a. Sensitivity – 0-100% in 10% increments
   b. Time delay – 1-30 minutes in 1 minute increments
   c. Test mode – Five second time delay
   d. Detection technology – PIR, Dual Technology activation and/or re-activation.
   e. Walk-through mode
   f. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.

2. Programmable control functionality including:

   a. Each sensor may be programmed to control specific loads within a local network.
   b. Sensor shall be capable of activating one of 16 user-definable lighting scenes.
   c. Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically during the configurable period of time (default 10 seconds) after turning off.
   d. On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:
      i Ultrasonic and Passive Infrared
      ii Ultrasonic or Passive Infrared
      iii Ultrasonic only
      iv Passive Infrared only

3. Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.

4. Two RJ-45 ports for connection to DLM local network.

5. Two-way infrared (IR) transceiver to allow remote programming through handheld configuration tool and control by remote personal controls.

6. Device Status LEDs including:
   a. PIR detection
   b. Ultrasonic detection
   c. Configuration mode
   d. Load binding

7. Assignment of occupancy sensor to a specific load within the room without wiring or special tools.

8. Assignment of local buttons to specific loads within the room without wiring or special tools.

9. Manual override of controlled loads.

10. All digital parameter data programmed into an individual wall switch sensor shall be retained in non-volatile FLASH memory within the wall switch sensor itself. Memory shall have an expected life of no less than 10 years.

C. Units shall not have any dip switches or potentiometers for field settings.

D. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.

E. Two-button wall switch occupancy sensors, when connected to a single relay dimming room controller, shall operate in the following sequence as a factory default:
1. Left button
   a. Press and release - Turn load on
   b. Press and hold - Raise dimming load
2. Right button
   a. Press and release - Turn load off
   b. Press and hold - Lower dimming load

F. Low voltage momentary pushbuttons shall include the following features:

1. Load/Scene Status LED on each switch button with the following characteristics:

   a. Bi-level LED
   b. Dim locator level indicates power to switch
   c. Bright status level indicates that load or scene is active

2. The following button attributes may be changed or selected using a wireless configuration tool:

   a. Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).
   b. Individual button function may be configured to Toggle, On only or Off only.
   c. Individual scenes may be locked to prevent unauthorized change.
   d. Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.
   e. Ramp rate may be adjusted for each dimmer switch.
   f. Switch buttons may be bound to any load on a room controller and are not load type dependent; each button may be bound to multiple loads.

G. WattStopper part numbers: LMPW, LMDW. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening.

2.4 DIGITAL WALL OR CEILING MOUNTED OCCUPANCY SENSOR

A. Wall or ceiling mounted (to suit installation) passive infrared (PIR), ultrasonic or dual technology digital (passive infrared and ultrasonic) occupancy sensor.

B. Digital Occupancy Sensors shall provide graphic LCD display for digital calibration and electronic documentation. Features include the following:

1. Digital calibration and pushbutton configuration for the following variables:
   a. Sensitivity – 0-100% in 10% increments
   b. Time delay – 1-30 minutes in 1 minute increments
   c. Test mode – Five second time delay
   d. Detection technology – PIR, Ultrasonic or Dual Technology activation and/or re-activation.
   e. Walk-through mode
   f. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.

2. Programmable control functionality including:
   a. Each sensor may be programmed to control specific loads within a local network.
   b. Sensor shall be capable of activating one of 16 user-definable lighting scenes.
   c. Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically within a configurable period of time (default 10 seconds) after turning off.
   d. On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:
      i Ultrasonic and Passive Infrared
      ii Ultrasonic or Passive Infrared
      iii Ultrasonic only
      iv Passive Infrared only

3. Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.

4. One or two RJ-45 port(s) for connection to DLM local network.

5. Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool and control by remote personal controls.

6. Device Status LEDs, which may be disabled for selected applications, including:
   a. PIR detection
   b. Ultrasonic detection
   c. Configuration mode
   d. Load binding

7. Assignment of occupancy sensor to a specific load within the room without wiring or special tools.

8. Manual override of controlled loads.

9. All digital parameter data programmed into an individual occupancy sensor shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years.

C. Units shall not have any dip switches or potentiometers for field settings.

D. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.

E. WattStopper product numbers: LMPX, LMDX, LMPC, LMUC, LMDC

2.5 DIGITAL WALL SWITCHES

A. Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5 and 8 button configuration. Wall switches shall include the following features:

1. Two-way infrared (IR) transceiver for use with personal and configuration remote controls.

2. Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.

3. Configuration LED on each switch that blinks to indicate data transmission.

4. Load/Scene Status LED on each switch button with the following characteristics:
   a. Bi-level LED
   b. Dim locator level indicates power to switch
   c. Bright status level indicates that load or scene is active

5. Dimming switches shall include seven bi-level LEDs to indicate load levels using 14 steps.

6. Programmable control functionality including:
   a. Button priority may be configured to any BACnet priority level, from 1-16, corresponding to networked operation allowing local actions to utilize life safety priority.
   b. Scene patterns may be saved to any button other than dimming rockers. Once set, buttons may be digitally locked to prevent overwriting of the preset levels.

7. All digital parameter data programmed into an individual wall switch shall be retained in non-volatile FLASH memory within the wall switch itself. Memory shall have an expected life of no less than 10 years.

B. Two RJ-45 ports for connection to DLM local network.

C. Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration shall be required to achieve multi-way switching.

D. The following switch attributes may be changed or selected using a wireless configuration tool:

1. Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).
2. Individual button function may be configured to Toggle, On only or Off only.
3. Individual scenes may be locked to prevent unauthorized change.
4. Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.
5. Ramp rate may be adjusted for each dimmer switch.

6. Switch buttons may be bound to any load on a room controller and are not load type dependant; each button may be bound to multiple loads.

E. WattStopper product numbers: LMSW-101, LMSW-102, LMSW-103, LMSW-104, LMSW-105, LMSW-108, LMDM-101. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening.

2.6 DIGITAL ROOM CONTROLLERS

A. Digital controllers for lighting and plug loads automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room and plug load controllers shall be provided to match the room lighting and plug load control requirements. The controllers will be simple to install, and will not have dip switches or potentiometers, or require special configuration for standard Plug n' Go applications. The control units will include the following features:

1. Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room.

2. Simple replacement – Using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf.

3. Multiple room controllers connected together in a local network must automatically prioritize each room controller, without requiring any configuration or setup, so that loads are sequentially assigned using room controller device ID's from highest to lowest.

4. Device Status LEDs to indicate:
   a. Data transmission
   b. Device has power
   c. Status for each load
   d. Configuration status

5. Quick installation features including:
   a. Standard junction box mounting
   b. Quick low voltage connections using standard RJ-45 patch cable

6. Based on individual configuration, each load shall be capable of the following behavior on power up following the loss of normal power:
   a. Turn on to 100%
   b. Remain off
   c. Turn on to last level

7. Each load shall be configurable to operate in the following sequences based on occupancy:
   a. Auto-on/Auto-off (Follow on and off)
   b. Manual-on/Auto-off (Follow off only)

8. The polarity of each load output shall be reversible, via digital configuration, so that on is off and off is on.

9. UL 2043 plenum rated

10. Manual override and LED indication for each load

11. Dual voltage (120/277 VAC, 60 Hz), or 347 VAC, 60 Hz (selected models only). 120/277 volt models rated for 20A total load, derating to 16A required for some dimmed loads (forward phase dimming); 347 volt models rated for 15A total load; plug load controllers carry application-specific UL 20 rating for receptacle control.

12. Zero cross circuitry for each load

13. All digital parameter data programmed into an individual room controller or plug load controller shall be retained in non-volatile FLASH memory within the controller itself. Memory shall have an expected life of no less than 10 years.

B. On/Off Room Controllers shall include:

1. One or two relay configuration
2. Efficient 150 mA switching power supply
3. Three RJ-45 DLM local network ports with integral strain relief and dust cover
4. WattStopper product numbers: LMRC-101, LMRC-102

C. On/Off/Dimming enhanced Room Controllers shall include:

1. Real time current monitoring

2. Multiple relay configurations
   a. One, two or three relays (LMRC-21x series)
   b. One or two relays (LMRC-22x series)

3. Efficient 250 mA switching power supply

4. Four RJ-45 DLM local network ports with integral strain relief and dust cover

5. One dimming output per relay
   a. 0-10V Dimming - Where indicated, one 0-10 volt analog output per relay for control of compatible ballasts and LED drivers. The 0-10 volt output shall automatically open upon loss of power to the Room Controller to assure full light output from the controlled lighting. (LMRC-21x series)
   b. Line Voltage, Forward Phase Dimming - Where indicated, one forward phase control line voltage dimming output per relay for control of compatible two-wire or three-wire ballasts, LED drivers, MLV, forward phase compatible ELV, neon/cold cathode and incandescent loads. (LMRC-22x series)
   c. Each dimming output channel shall have an independently configurable minimum and maximum calibration trim level to set the dimming range to match the true dynamic range of the connected ballast or driver.
   d. The LED level indicators on bound dimming switches shall utilize this new maximum and minimum trim.
   e. Each dimming output channel shall have an independently configurable minimum and maximum trim level to set the dynamic range of the output within the new 0-100% dimming range defined by the minimum and maximum calibration trim.
   f. Calibration and trim levels must be set per output channel.
   g. Devices that set calibration or trim levels per controller are not acceptable.
   h. All configuration shall be digital. Devices that set calibration or trim levels per output channel via trim pots or dip-switches are not acceptable.

6. Each load shall have an independently configurable preset on level for Normal Hours and After Hours events to allow different dimmed levels to be established at the start of both Normal Hours and After Hours events.

7. Fade rates for dimming loads shall be specific to bound switch buttons, and the load shall maintain a default value for any bound buttons that do not specify a unique value.

8. The following dimming attributes may be changed or selected using a wireless configuration tool:
   a. Establish preset level for each load from 0-100%
   b. Set high and low trim for each load
   c. Set lamp burn in time for each load up to 100 hours

9. Override button for each load provides the following functions:
   a. Press and release for on/off control
   b. Press and hold for dimming control

10. WattStopper product numbers: LMRC-211, LRMC-212, LRMC-213, LMRC-221, LMRC-222

2.7 DLM LOCAL NETWORK (Room Network)

A. The DLM local network is a free topology lighting control physical connection and communication protocol designed to control a small area of a building.

B. Features of the DLM local network include:

1. Plug n' Go® automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached.
2. Simple replacement of any device in the network with a standard off the shelf unit without requiring commissioning, configuration or setup.
3. Push n' Learn® configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices in the local network.
4. Two-way infrared communications for control by handheld remotes, and configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver.

C. Digital room devices connect to the local network using pre-terminated Cat 5e cables with RJ-45 connectors, which provide both data and power to room devices. Systems that utilize RJ-45 patch cords but do not provide serial communication data from individual end devices are not acceptable.

D. If manufacturer's pre-terminated Cat 5e cables are not used for the installation, the contractor is responsible for testing each cable following installation and supplying manufacturer with test results.

E. WattStopper Product Number: LMRJ-Series

2.8 CONFIGURATION TOOLS

A. A wireless configuration tool facilitates optional customization of DLM local networks using two-way infrared communications, while PC software connects to each local network via a USB interface.

B. Features and functionality of the wireless configuration tool shall include but not be limited to:

1. Two-way infrared (IR) communication with DLM IR-enabled devices within a range of approximately 30 feet.

2. High visibility organic LED (OLED) display, pushbutton user interface and menu-driven operation.

3. Must be able to read and modify parameters for room controllers, occupancy sensors, wall switches, daylighting sensors, network bridges and relay panels, and identify room devices by type and serial number.

4. Save up to eight occupancy sensor setting profiles and apply profiles to selected sensors.

5. Temporarily adjust light level of any load(s) on the local network, and incorporate those levels in scene setting. Set room mode for testing of Normal Hours (NH) and After Hours (AH) parameter settings.

6. Adjust or fine-tune daylighting settings established during auto-configuration, and input light level data to complete configuration of open loop daylighting controls.

7. Set room mode for testing of Normal Hours (NH) and After Hours (AH) parameter settings.

8. Verify status of building level network devices.

C. WattStopper Product Numbers: LMCT-100, LMCI-100/LMCS-100

2.9 PROGRAMMING, CONFIGURATION AND DOCUMENTATION SOFTWARE

A. PC-native application for optional programming of detailed technician-level parameter information for all DLM products, including all parameters not accessible via BACnet and the handled IR configuration tool. Software must be capable of accessing room-level parameter information locally within the room when connected via the optional LMCI-100 USB programming adapter, or globally for many segment networks simultaneously utilizing standard BACnet/IP communication.

1. Additional parameters exposed through this method include but are not limited to:
   a. Occupancy sensor detection LED disable for performance and other aesthetic spaces where blinking LEDs present a distraction.
   b. Six occupancy sensor action behaviors for each controlled load, separately configurable for normal hours and after hours modes. Modes include: No Action, Follow Off Only, Follow On Only, Follow On and Off, Follow On Only with Override Time Delay, Follow Off Only with Blink Warn Grace Time, Follow On and Off with Blink Warn Grace Time.
   c. Separate fade time adjustments per load for both normal and after hours from 0 - 4 hours.
   d. Configurable occupancy sensor re-trigger grace period from 0 - 4 minutes separate for both normal hours and after hours.
   e. Separate normal hours and after hours per-load button mode with modes including: Do nothing, on only, off only, on and off.
   f. Load control polarity reversal so that on events turn loads off and vice versa.
   g. Per-load DR (demand response) shed level in units of percent.
   h. Load output pulse mode in increments of 1second.
   i. Fade trip point for each load for normal hours and after hours that establishes the dimmer command level at which a switched load closes its relay to allow for staggered On of switched loads in response to a dimmer.
2. Generation of reports at the whole file, partial file, or room level. Reports include but are not limited to:
   a. Device list report: All devices in a project listed by type.
   b. Load binding report: All load controller bindings showing interaction with sensors, switches, and daylighting.
   c. BACnet points report: Per room Device ID report of the valid BACnet points for a given site's BOM.
   d. Room summary report: Device manifest for each room, aggregated by common BOM, showing basic sequence of operations.
   e. Device parameter report: Per-room lists of all configured parameters accessible via hand held IR programmer for use with O&M documentation.
   f. Scene report: All project scene pattern values not left at defaults (i.e. 1 = all loads 100%, 2 = all loads 75%, 3 = all loads 50%, 4 = all loads 25%, 5-16 = same as scene 1).

g. Occupancy sensor report: Basic settings including time delay and sensitivity(ies) for all occupancy sensors.

3. Network-wide programming of parameter data in a spreadsheet-like programming environment including but not limited to the following operations:
   a. Set, copy/paste an entire project site of sensor time delays.
   b. Set, copy/paste an entire project site of sensor sensitivity settings.
   c. Search based on room name and text labels.
   d. Filter by product type (i.e. LMRC-212) to allow parameter set by product.
   e. Filter by parameter value to search for product with specific configurations.

4. Network-wide firmware upgrading remotely via the BACnet/IP network.
   a. Mass firmware update of entire rooms.
   b. Mass firmware update of specifically selected rooms or areas.
   c. Mass firmware upgrade of specific products.

B. WattStopper Product Number: LMCS-100, LMCI-100

2.10 LMCP LIGHTING CONTROL PANELS

A. User Interface: Each lighting control panel system shall be supplied with at least (1) handheld configuration tool (LMCT-100). As a remote programming interface the configuration tool shall allow setup, configuration, and diagnostics of the panel without the need for software or connection of a computer. The user interface shall have the following panel-specific functions as a minimum.
   1. Set network parameters including panel device ID, MS/TP MAC address, baud rate and max master range.
   2. Relay Group creation of up to 99 groups. Group creation shall result in programming of all seven key relay parameters for member relays. The seven parameters are as follows: After-hours Override Time Delay, Normal Hours Override Time Delay, Action on Transition to Normal Hours, Action on Transition to After Hours, Sensor Action During Normal Hours, Sensor Action During After Hours, Blink-Warn Time for After Hours.
   3. Program up to 254 separate scheduled events. Events shall occur on seven day intervals with each day selectable as active or inactive, and shall be configurable as to whether the event is active on holidays. Holidays are also defined through the User Interface.
   4. Program up to 32 separate Dark/Light events. Events shall have a selectable source as either calculated Astro with delay, or a digital IO module with an integral 0-5V or 0-10V analog photocell. Dark/Light events shall occur on seven day intervals with each day selectable as active or inactive, and shall be configurable as to whether the event is active on holidays.
   5. Button binding of digital switches to groups shall be accessible via the handheld IR remote and accomplished from the digital switch station.
   6. Programming of panel location information shall be accomplished by the handheld IR remote and include at a minimum LAT, LON, DST zone, and an approximate city/state location.
   7. An additional handheld IR remote may optionally be specified to be permanently mounted to the panel interior via a retractable anti-theft lanyard to allow for convenient programming of the panel while assuring that the handheld programmer is always present at that panel. An unlimited number of handheld IR remotes may also be purchased for facilities staff as determined by the end user's representative.
   8. WattStopper Product Number: LMCT-100

2.11 EMERGENCY LIGHTING CONTROL DEVICES

A. Emergency Lighting Control Unit – A UL 924 listed device that monitors a switched circuit providing normal lighting to an area. The unit provides normal ON/OFF control of emergency lighting along with the normal lighting. Upon normal power failure the emergency lighting circuit will close, forcing the emergency lighting ON until normal power is restored. Features include:
   1. 120/277 volts, 50/60 Hz, 20 amp ballast rating
   2. Push to test button
   3. Auxiliary contact for remote test or fire alarm system interface

B. WattStopper Product Numbers: ELCU-100, ELCU-200.

PART 3 – EXECUTION

3.1 OPTIONAL PRE-INSTALLATION MEETING

A. A factory authorized manufacturer's representative shall provide the electrical contractor a functional overview of the lighting control system prior to installation. The contractor shall schedule the pre-installation site visit after receipt of approved submittals to review the following:
   1. Confirm the location and mounting of all digital devices, with special attention to placement of occupancy and daylighting sensors.
   2. Review the specifications for low voltage control wiring and termination.
   3. Discuss the functionality and configuration of all products, including sequences of operation, per design requirements.
   4. Discuss requirements for integration with other trades.

3.2 CONTRACTOR INSTALLATION AND SERVICES

A. Contractor to install all devices and wiring in a professional manner. All line voltage connections to be tagged to indicate circuit and switched legs.

B. Contractor to install all room/area devices using manufacturer's factory-tested Cat 5e cable with pre-terminated RJ-45 connectors. If pre-terminated cable is not used for room/area wiring, the contractor is responsible for testing each field-terminated cable following installation, and shall supply the lighting controls manufacturers with test results. Contractor to install any room to room network devices using manufacturer-supplied LM-MSTP network wire. Network wire substitution is not permitted and may result in loss of product warranty per DLM SEGMENT NETWORK section of specification. Low voltage wiring topology must comply with manufacturer's specifications. Contractor shall route network wiring as shown in submittal drawings as closely as possible, and shall document final wiring location, routing and topology on as built drawings.

C. Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated. Before start up, contractor shall test all devices to ensure proper communication.

D. Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings. Adjust time delay so that controlled area remains lighted while occupied.

E. Provide written or computer-generated documentation on the configuration of the system including room by room description including:
   1. Sensor parameters, time delays, sensitivities, and daylighting setpoints.
   2. Sequence of operation, (e.g. manual ON, Auto OFF. etc.)
   3. Load Parameters (e.g. blink warning, etc.)

F. Post start-up tuning – After 30 days from occupancy contractor shall adjust sensor time delays and sensitivities to meet the Owner's requirements. Provide a detailed report to the Architect / Owner of post start-up activity.

3.3 FACTORY SERVICES

A. Upon completion of the installation, the manufacturer's factory authorized representative shall start up and verify a complete fully functional system.

B. The Electrical Contractor shall provide both the manufacturer and the electrical engineer with three weeks written notice of the system start up and adjustment date.

C. Upon completion of the system start up, the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system.

3.4 COMMISSIONING SUPPORT SERVICES

A. On this project, a commissioning agent will be hired to verify the installation and programming of all building systems, which includes the lighting control system. Manufacturer should include an extra day of technician's time to review the functionality and settings of the lighting control hardware with the commissioning agent, including reviewing submittal drawings and ensuring that instructions on how to configure each device are readily available. Manufacturer is NOT responsible for helping the commissioning agent inspect the individual devices. It will be the commissioning agent's responsibility to create and complete any forms required for the commissioning process, although the manufacturer or contractor may offer spreadsheets and/or printouts to assist the agent with this task.

B. The commissioning agent shall work with the Electrical Contractor during installation of the lighting control hardware to become familiar with the specific products. The agent may also accompany the manufacturer's technicians during their start-up work to better understand the process of testing, calibration and configuration of the products. However, the contractor and manufacturer shall ensure that interfacing with the agent does not prevent them from completing the requirements outlined in the contract documents.

3.5 ACCEPTANCE TESTING SUPPORT SERVICES

A. On all California projects, a certified lighting controls acceptance test technician (CLCATT) must verify the installation of the lighting control system. Manufacturer should include an extra day of factory technician's time to assist the CLCATT review the functionality and settings of the lighting control hardware per the requirements in the California State forms. It will be the CLCATT's responsibility to create and complete any forms required for the commissioning process, although the manufacturer or contractor may offer spreadsheets and/or printouts to assist the CLCATT with this task.

END OF SECTION

SECTION 26 0450

CABINETS AND ENCLOSURES

PART 1 - GENERAL

Applicable Provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all materials, labor, tools and services necessary to install hinged cover enclosures to complete all work shown on the Drawings or specified herein.

1.2 REFERENCES

A. NEMA 250 - Enclosures for electrical equipment (1000 volts maximum).

B. Submittals - Submit product data under Provisions of Contract and Division 1.

PART 2 - PRODUCTS

2.1 HINGED COVER ENCLOSURES

A. Construction: NEMA 250; Type 1 and 3R steel.

B. Finished: Manufacturer's standard enamel finish.

C. Covers: Continuous hinge, held closed by operable by key.

D. Provide barriers between normal and emergency wiring. Barriers shall be of non-current carrying material of adequate thickness for mechanical strength but in no case less than 1/4". Each barrier shall have an angle iron framing support all around.

2.2 FABRICATION

A. Shop assemble enclosures in accordance with ANSI/NEMA ISC 6.

B. Provide knockouts on enclosures.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install enclosures plumb, anchor securely to wall and structural supports at each corner, minimum.

B. Provide necessary feet for free-standing equipment enclosures.

C. Install trim plumb.

END OF SECTION

SECTION 26 0500

SUPPORTING DEVICES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all material, labor, tools and services necessary to install rigid metal conduit, electrical metallic tubing and flexible metal conduit, including all fittings to complete all work shown on the Drawings or specified herein.

1.2 RELATED WORK

A. Conduit and equipment supports.

B. Fastening hardware.

1.3 REFERENCES

A. Conduit supports.

1.4 QUALITY ASSURANCE

A. Support system shall be adequate for weight of equipment and conduit, including wiring, which they carry.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Support channel: Galvanized or painted steel.

B. Hardware: Corrosion resistant.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.

B. Do not use powder-actuated anchors.

C. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.

D. In wet locations install free-standing electrical equipment on concrete pads.

E. Install surface mounted cabinets and panelboards with minimum of four anchors. Provide steel channel supports to stand cabinet one inch off wall.

F. Bridge studs top and bottom with channels to support flush mounted cabinets and panelboards in stud walls.

END OF SECTION

SECTION 26 0550

GENERAL LABELING AND IDENTIFICATION

PART 1 - GENERAL

Applicable Provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all material, labor, tools and services necessary to install nameplates, tape labels, wire markers, conduit color coding to complete all work shown on the Drawings or specified herein.

1.2 RELATED WORK

A. Painting.

1.3 SUBMITTALS

A. Submit shop drawings under provisions of Division 1.

B. Include schedule for nameplates and tape labels.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Nameplates: Engraved three-layer laminated plastic, white letters on a black background.

B. Tape labels: Embossed adhesive tape with 3/16 inch black letters on a white background.

C. Wire and cable markers: Cloth markers, split sleeve or tubing type.

PART 3 - EXECUTION

3.1 INSTALLATION

A. De-grease and clean surfaces to receive nameplates and tape labels.

B. Install nameplates and tape labels parallel to equipment lines.

C. Secure nameplates to equipment fronts using screws, rivets, or adhesive. Secure nameplate to inside face of recessed panelboard doors in finished locations.

D. Embossed tape will not be permitted for any application. Use embossed tape only for identification of individual wall switches and receptacles and control device stations.

3.2 WIRE IDENTIFICATION

A. Provide wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes and at load connection. Identify each branch circuit or feeder number for power and lighting circuits and each control wire number as indicated on equipment manufacturer's shop drawings for control wiring.

3.3 NAMEPLATE ENGRAVING SCHEDULE

A. Provide nameplates to identify all electrical distribution, control equipment and loads served including year of installation. Letter height: 1/2 inch for individual switches, loads served, distributions and control equipment identification. For example:

MP-1 INSTALLED 2021

B. Panelboards: 3/4 inch, identify equipment designation. 1/2 inch, identify voltage rating and source of power.

C. Individual circuit breakers, switches and motor starters in panelboards, switchboards and motor control centers: 1/4 inch, identify circuit and load served, including location.

D. Individual circuit breakers, enclosed switches and motor starters: 1/2 inch, identify load served.

3.4 FIRE ALARM

A. All fire alarm raceway components shall be painted red and identified.

END OF SECTION

SECTION 26 0575

INTERIOR LUMINAIRES

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. Interior luminaires and accessories.

B. Emergency lighting units.

C. Exit signs.

D. LED Driver.

E. LED dimming and controls.

F. LED emergency power supply.

G. Lamps.

H. Luminaire accessories.

1.2 REFERENCES

A. ANSI/IES RP-16-10 – Nomenclature and Definitions for Illuminating Engineering.

B. ANSI C78.37 7 – Specifications for the Chromaticity of Solid-State Lighting (SSL) Products.

C. IES LM-79-08 – Electric and Photometric Measurements of Solid-State Lighting Products.

D. IES LM-80-08 – Measuring Lumen Maintenance of LED Light Sources.

E. IES 7M-21-11 – Projecting Long Term Lumen Maintenance of LED Light Sources.

F. IES LM-82-11 – IES Approved Method for the Characterization of LED Light Engines and LED Lamps for Electrical and Photometric Properties as a Function of Temperature.

G. UL 8750 – LED Equipment for Use in Lighting Products.

H. NEMA WD 6 - Wiring Devices – Dimensional Requirements.

I. NFPA 70 - National Electrical Code.

J. NFPA 101- Life Safety Code.

1.3 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five (5) years documented experience.

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70 and to requirements of NFPA 101.

B. Products: Listed and classified by Underwriters Laboratories, Inc. (UL), American National Standards Institute (ANSI) and Illuminating Engineering Society (IES).

1.5 SUBSITITUTIONS

A. All proposed substitutions must be submitted with each light fixture specification cutsheet, accompanied with footcandle calculation for all spaces, provided for Architect and Engineer's review, prior to approval.

B. If the substitution is accepted, the contractor accepts responsibility and associated costs for all required modifications to circuitry, devices, and wiring.

PART 2 - PRODUCTS

2.1 LUMINAIRES

A. Furnish Products as scheduled.

2.2 EXIT SIGNS

A. Manufacturers: As scheduled.

B. Description: Exit sign fixture suitable for use as emergency lighting unit.

C. Housing: Extruded aluminum or steel as per schedule.

D. Face: Aluminum stencil face with red letters, unless otherwise noted.

E. Directional Arrows: Universal type for field adjustment, direction per drawing.

F. Mounting: Universal, for field selection or per drawing.

G. Lamps: L.E.D.

H. Input Voltage: As scheduled.

2.3 LED DRIVERS

A. Manufacturers: As scheduled.

B. Voltage: As scheduled.

2.4 LAMPS

A. Lamp Types: As specified for luminaire. LED source.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendent length required to suspend luminaire at indicated height.

B. Support luminaires 2 x 4 foot (600 x 1200 mm) and larger in size independent of ceiling framing.

C. All lay-in luminaries shall be supported with chains to building structure.

D. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.

E. Exposed Grid Ceilings: Support surface mounted luminaires on grid ceiling directly from building structure. Provide auxiliary members spanning ceiling grid members to support surface mounted luminaires. Fasten surface mounted luminaires to ceiling grid members using bolts, screws, rivets, or suitable clips.

F. Install wall mounted luminaires, emergency lighting units and exit signs at 80” above finished floor, unless otherwise noted.

G. Install accessories furnished with each luminaire.

H. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

I. Bond products and metal accessories to branch circuit equipment grounding conductor.

J. Install specified lamps in each emergency lighting unit, exit sign, and luminaire.

3.2 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.3 ADJUSTING

A. Aim and adjust luminaires as indicated.

B. Position exit sign directional arrows as indicated.

3.4 CLEANING

A. Clean electrical parts to remove conductive and deleterious materials.

B. Remove dirt and debris from enclosures.

C. Clean photometric control surfaces as recommended by manufacturer.

D. Clean finished and touch up damage.

3.5 PROTECTION OF FINISHED WORK

A. Relamp luminaires that have failed lamps as substantial completion.

END OF SECTION

SECTION 26 0600

DISCONNECT SWITCHES

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all materials, labor, tools and services necessary to install disconnect switches, fuses and enclosures to complete all work shown on the Drawings or specified herein.

1.2 SUBMITTALS

A. Submit product data under Provisions of Contract and Division 1.

B. Include outline Drawings with dimensions, equipment ratings for voltage, capacity, horsepower and short circuit.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - DISCONNECT SWITCHES

A. Siemens.

B. Square 'D'.

C. General Electric.

D. Or approved equal.

2.2 DISCONNECT SWITCHES

A. Fusible switch assemblies: Quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch is in ON position. Handle lockable in OFF position. Fuse clips: Designed to accommodate class R, J fuses.

B. Non-fusible switch assemblies: Quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

C. Enclosures: NEMA Type 1; 3R; 4 as indicated on Drawings.

2.3 ACCEPTABLE MANUFACTURERS - FUSES

A. Bussman.

B. Ferraz-Shawmut.

C. Or approved equal.

2.4 FUSES

A. Fuses 600 amperes and less: ANSI/UL 198E, class RK1; RK5; Dual element, current limiting, time delay, 250 volt.

B. Interrupting rating: 200,000 rms amperes.

C. An additional fuse of each size required to be supplied.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install disconnect switches where indicated on Drawings.

B. Install fuses in fusible disconnect switches.

C. Disconnects installed outdoors shall have NEMA 3R enclosures.

D. Disconnects installed indoors in dry locations shall have NEMA 1 enclosure.

END OF SECTION

SECTION 26 0650

GROUNDING

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all materials, labor, tools and services necessary to install the power system grounding to complete all work shown on the Drawings or specified herein.

1.2 RELATED WORK

A. Panelboards.

B. Raceways.

C. Connection Equipment.

D. Electric Equipment.

E. Tests and Acceptance.

1.3 SUBMITTALS

A. Manufacturers' data, catalog cuts of ground rods, connectors, bushings, etc., along with recommended installation procedures.

PART 2 - PRODUCTS

2.1 WIRING

A. All wiring used for grounding shall be insulated copper, unless otherwise noted. Size shall be in accordance with code for the application, minimum #12.

B. Where used in conjunction with computer equipment, grounding conductors shall be equal in size to the phase conductors.

C. Avoid splices in ground conductors.

2.2 RACEWAY

A. Grounding continuity shall be maintained for all metallic raceways.

B. Provide bonding jumpers across metal parts separated by non-conducting materials.

C. Where a grounding conductor is installed as a supplement to metallic raceway serving as the equipment grounding conductor, bonding conductor to the raceway at each end.

D. All raceway accessories, such as locknuts, bushings, expansion fittings, etc. shall be installed to provide maximum metal-to-metal bonding.

2.3 CLAMPS

A. Provide approved ground clamps for connecting grounding conductors to pipe, conduits, wireways, building steel, grounding rods, etc.

B. Where bond will be in an inaccessible location or as an alternate to ground clamps, provide exothermic weld, similar to Cadweld.

2.4 ACCESSORIES

A. Provide all necessary accessories of appropriate size and material for connection or termination of grounding conductors including:

1. Straps.
2. Clamps.
3. Lugs.
4. Bars and buses.
5. Isolators (where applicable).
6. Locknuts and bushings.

2.5 ACCEPTABLE MANUFACTURERS

A. Copperweld.

B. Cadweld (for exothermic welds).

C. O.Z. Gedney.

D. Burndy.

PART 3 - EXECUTION

3.1 STRUCTURAL STEEL BUILDINGS

A. Select a column common to aligned electric closets as the bonding column for grounding of transformer neutrals, isolated grounds and separate equipment grounding conductors.

B. All grounding conductors in each closet shall be bonded in close proximity to one another.

C. Where a grounding conductor to be bonded is not in proximity to the common column, bond to the nearest column or structural beam.

D. Provide bonding jumper strap across all structural expansion joints where the grounding integrity of the structural system is reduced

3.2 RACEWAYS

A. Grounding continuity is to be maintained for all metallic raceways. Provide necessary clamps, bushings, straps and locknuts to assure continuity.

B. For non-metallic or flexible raceways, provide a separate equipment-grounding conductor bonded to both ends.

C. Where indicated, an additional equipment-grounding conductor shall be provided in metallic raceway.

D. Where indicated, an isolated ground conductor shall be provided in addition to the equipment-grounding conductor. Bond at each end to the isolated ground terminal identified.

3.3 EQUIPMENT

A. All equipment shall be grounded.

B. Where isolated grounding is indicated, it shall be for the isolation of internal equipment components only. All metallic enclosures of such equipment shall be connected to the equipment ground system.

3.4 PANELBOARDS

A. All panelboards and distribution panels shall be provided with a ground bar bonded to the enclosure. Provide an isolated ground bar connected to the incoming feeder ground where indicated.

3.5 TESTING

A. Upon completion of the installation, confirm the grounding continuity of all raceways, conductors and equipment. Maximum allowable resistance is 25 ohms.

3.6 RECORD DRAWINGS

A. Submit record As-Built Drawings indicating the location of all points where grounding conductors are bonded to steel, rods, plates, etc.

B. Indicate the location of all grounding buses not installed within distribution equipment.

END OF SECTION

SECTION 26 0700

PANELBOARDS

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all materials, labor, tools and services necessary to install the panelboards and to complete all work shown on the Drawings or specified herein.

1.2 RELATED WORK

A. Grounding

B. Overcurrent Protection

1.3 SUBMITTALS

A. Submit shop drawings for equipment and component devices under provisions of Division 1.

B. Include outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

C. Furnish two (2) sets of keys to Owner.

1.4 REFERENCES

A. FS W-C-375 - Circuit breakers, molded case, branch circuit and service.

B. FS W-P-115 - Power distribution panel.

C. NEMA AB 1 - Molded case circuit breakers.

D. NEMA KS 1 - Enclosed switches.

E. NEMA PB 1 - Panelboards.

F. NEMA PB 1.1 - Instruction for safe installation, operation and maintenance of panelboard rated 600 volts or less.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - PANELBOARD AND LOAD CENTERS

A. Siemens.

B. Square "D".

C. General Electric.

D. Or approved equal.

2.2 BRANCH CIRCUIT PANELBOARDS

A. Lighting and appliance branch circuit panelboards: NEMA PB 1; circuit breaker type.

B. Enclosure: NEMA PB 1; Type 1.

C. Cabinet size: Approximately 6 inches deep; 20 inches wide for 240 volt and less panelboards. Verity field conditions and alter dimensions to suit at no additional cost.

D. Provide surface cabinet front door-in-door with concealed trim clamps, concealed hinge and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

E. Provide panelboards with copper bus, rating as scheduled on Drawings. Provide copper ground bus in all panelboards and isolated ground bus in those as indicated on Drawings.

F. Minimum integrated short circuit rating: 10,000 amperes rms symmetrical for 240 volt rated for 125 amps or less, 22,000 amperes rms symmetrical for 240 volt rated greater than 125 amps to 225 amps and 30,000 amperes for emergency power panelboards (verify in field). If panelboard is noted as a main distribution panelboard, than panel shall be rated as a distribution panelboard. Contractor shall provide short circuit study to ensure adequacy.

G. Molded case circuit breakers: Bolt-on type thermal magnetic trip handle for all poles. Provide circuit breakers UL listed as type SWD for lighting circuits. Breaker handle to indicate ampere rating.

2.3 DISTRIBUTION PANELBOARDS

A. Description: NEMA PB 1, circuit breaker type. The bus of all panels rated a minimum 400 amps shall be distribution type.

B. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard.

C. Minimum integrated short circuit rating: 65,000 amperes rms symmetrical for 240 volt panelboards; 65,000 amperes rms symmetrical for 480 volt panelboards, unless otherwise noted on Drawings.

D. Model Case Circuit Breakers: NEMA AB 1, circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers UL listed as Type HACR as specified on Drawings.

E. Enclosure: NEMA PB 1, Type 1.

F. Cabinet Front: Surface type, fastened with screws. Double hinged doors with flush lock, metal directory frame, finished in manufacturer’s standard gray enamel. One hinged door to access breakers, the other to access wiring compartment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards flush or surface mounted as indicated on Drawings.

B. Mounting height maximum 6 ft. (2 m) to top circuit breaker.

C. Provide filler plates for unused spaces in panelboards.

D. Provide type written circuit directory for each branch circuit panelboard. Indicate loads served and panel name by matching that shown on panel schedules on Drawings. Revise directory to reflect circuiting changes required to balance phase loads. Provide a second copy and turn over to Owner.

E. Provide 3/4" thick plywood backboard for mounting of panels. Paint backboard with fire retardant paint.

F. Provide nameplates as indicated in Section 26 0550.

3.2 FIELD QUALITY CONTROL

A. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 20 percent, rearrange circuits in the panelboard to balance the phase loads within 20 percent. Take care to maintain proper phasing for multi-wire branch circuits.

B. Visual and mechanical inspection: Inspect for physical damage, proper alignment, anchorage and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches and fuses.

3.3 TESTS

A. Submit certification that each panelboard has withstood, without breakdown, a factory dielectric (Hi-Pot) test consisting of a one minute application of a 60 cycle AC test voltage applied between phase legs and from each phase leg to enclosure.

B. The applied test voltage shall have an RMS value of at least twice the line to line system voltage to which the panelboard is to be applied, plus one thousand volts (minimum 1500V).

3.4 RECORD DRAWINGS

A. Submit as-built Drawings indicating the location of all panelboards.

END OF SECTION

SECTION 26 0800

FIRE ALARM SYSTEM

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 FIRE ALARM SYSTEM

A. The existing fire alarm system is an addressable system. The fire alarm control panel is located in the boiler room.

B. Add and modify as required to the existing system, as specified/shown on the drawings and as per field requirements. All devices shall be suitable for operation and compatible with existing system. Provide relays modules, cards, power supplies, etc. as required.

C. Provide sufficient quantity of relays for fan shutdown as specified/shown on Drawings.

D. Connect, test and leave the system in first class operating condition.

E. The system shall maintain all applicable Local, State and National Codes including the National Electrical Code, NPFA-72, NFPA-101, ADA 1971 and NEC. The system shall be listed by Underwriter's Laboratories, Inc.

F. The Electrical Contractor shall provide a manufacturers certified technician to supervise installation, adjustments, final connection and system testing.

G. Fire alarm wiring and cable shall be per manufacturer's requirements.

H. Fire alarm system test shall be in accordance with NFPA-72 and local fire department requirements.

END OF SECTION

SECTION 26 0825

PUBLIC ADDRESS SYSTEM

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this Section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. The Contractor shall furnish all equipment, accessories and material required for the installation of communication devices in strict compliance with these Specifications and applicable Contract Drawings. Any material and/or equipment necessary for the proper operation of the system, which is not specified or described herein, shall be deemed part of this specification.

PART 2 - PRODUCTS

2.1 SPEAKERS

A. Flush Speaker Baffles (ceiling): Ceiling Speakers shall be Audiotel S86T725PG8W white semi-gloss enamel steel grille with 8" speaker, 25/70 volt 7 watt transformer and 6 oz. magnet mounted on a # RE-84 steel protective cover and an TB-8 tile bridge support.

END OF SECTION

SECTION 26 0890

ELECTRICAL SYSTEMS COMMISSIONING

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 SUMMARY

A. Section includes commissioning process requirements for electrical systems, assemblies, and equipment.

B. Related Sections:

1. Section 01 9113 - General Commissioning Requirements.

1.2 DEFINITIONS

A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

B. CxA: Commissioning Authority.

C. Integrated Systems: When referenced this encompasses all control, equipment and systems utilized in support of the facility.

D. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.3 CONTRACTOR'S RESPONSIBILITIES

A. Perform commissioning tests at the direction of the CxA and as defined in the contract documents.

B. Attend construction phase commissioning meetings.

C. Attend test coordination meetings.

D. Participate in the electrical system maintenance orientation and inspection for assemblies and equipment as directed by the CxA.

E. Provide information requested by the CxA, including manufacturer cut sheets and shop drawings for final commissioning documentation.

F. Provide measuring instruments and logging devices to record test data and provide data acquisition equipment to record data for the complete range of testing for the required test period.

G. Provide detailed startup procedures.

H. Provide startup testing for all normal and emergency power equipment and shall coordinate and execute the electrical tasks for the commissioning checklists for all commissioned equipment.

I. Provide copies of all submittals as required including all changes thereto.

J. Facilitate the coordination of the commissioning and incorporate commissioning activities (the Commissioning Plan) into the Overall Project Schedule (OPS).

K. Ensure that all subcontractors and vendors execute their commissioning responsibilities according to the contract documents.

L. Provide training in the operation and maintenance of installed equipment for owner personnel.

M. Review and accept construction checklists provided by the commissioning authority.

N. Complete startup reports and construction checklists as work is completed and provide to the Commissioning Authority on a weekly basis.

O. Review and accept commissioning process test procedures provided by the Commissioning Authority.

P. Complete commissioning process test procedures (functional testing as detailed in functional testing checklists).

Q. Prepare O&M manuals, according to the contract documents, including clarifying and updating the original sequences of operation to as-built/as-tested conditions.

R. Cooperate with the CxA for resolution of issues recorded in the "Issues Log".

1.4 CxA'S RESPONSIBILITIES

A. Provide Project-specific construction checklists and commissioning process test procedures for actual electrical systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.

B. Direct commissioning testing.

C. Verify testing and operational sequencing per design documents.

D. Provide a final written report outlining the commissioning process and including commissioning field documentation.

1.5 COMMISSIONING DOCUMENTATION

A. The contractor shall provide the following information to the CxA for inclusion in the commissioning plan:

1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for electrical systems, assemblies, equipment, and components to be verified and tested.
4. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
5. System startup reports.
6. Certificate of readiness certifying that electrical systems, subsystems, equipment, and associated controls are ready for testing.
7. Test and inspection reports and certificates.
8. Corrective action documents.
9. Verification of contractually required static and dynamic testing reports.

1.6 SUBMITTALS

A. Certificates of readiness.

B. Certificates of completion of installation, prestart, and startup activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TESTING PREPARATION

A. Certify that electrical systems, subsystems, and equipment have been installed, calibrated, and started, and that they are operating in the manner required by the Contract Documents.

B. Certify that electrical instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

C. Certify that testing and adjustments have been completed and that testing and adjustment reports have been submitted, discrepancies corrected, and corrective work approved.

D. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

E. Inspect and verify the position of each device and interlock identified on checklists.

F. Check safety cutouts, alarms, and interlocks with life-safety systems during each mode of operation.

G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as required and as directed by the CxA.

3.2 TESTING VERIFICATION

A. Prior to performance of testing, provide copies of reports, sample forms, checklists, and certificates to the CxA.

B. Notify the CxA at least (ten) 10 days in advance of testing execution and provide access for the CxA to witness testing procedures.

C. Provide technicians, instrumentation, and tools to verify testing of electrical systems at the direction of the CxA.

1. The CxA will notify the electrical contractor ten (10) days in advance of the date of field verification. Notice will not include data points to be verified.

2. The electrical contractor shall use the same instruments (by model and serial number) that were used when original data were collected.

3. Failure of an item includes operational sequence as determined in the contract documents including safeties, capacity, and operational integrity.

4. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3.3 GENERAL TESTING REQUIREMENTS

A. Provide technicians, instrumentation, and tools to perform commissioning tests at the direction of the CxA.

B. Scope of electrical system testing can include, but is not limited to, entire electrical power distribution installation from central distribution to branch circuit to individual equipment served. Testing shall include measuring capacities and effectiveness of operational and control functions.

C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of interface to the building automation system.

D. The CxA with coordination of a certified testing agency, shall prepare detailed testing plans, procedures, and checklists for electrical systems, subsystems, and equipment.

E. Tests will be performed using design conditions whenever possible.

F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.

G. The CxA may direct that set points be altered when simulating conditions is not practical.

H. If tests cannot be completed because of a deficiency outside the scope of the electrical system, document the deficiency and report it to the Construction Management Representative. After deficiencies are resolved, reschedule tests.

I. Retesting: The CxA will direct the retesting of the equipment once at no “charge” to the Owner for their time. The CxA’s time and expenses incurred for a second retest, if required due to no fault of the CxA, will be reviewed by the Owner to determine the appropriate means of compensation to the CxA for extension of services. The functional testing shall include operating the system and components through each of the written sequences of operation, and other significant modes and sequences, including startup, shutdown, unoccupied mode, manual mode, staging, miscellaneous alarms, power failure, security alarm when impacted and interlocks with other systems or equipment. Sensors and actuators shall be calibrated during construction check listing by the installing contractors and spot-checked by the CxA during functional testing.

3.4 ELECTRICAL SYSTEMS, SUBSYSTEMS AND EQUIPMENT TESTING PROCEDURES

A. Electrical Installation and Verification: Testing requirements are specified in Division 26 Sections. Provide submittals, test data, inspection records to the CxA.

1. Insulation resistance testing, mechanical integrity tests and inspections, ground testing, continuity, transformer-specific tests, emergency power system and manufacturer startup according to contract, agency and authority having jurisdiction requirements as indicated in Division 26. Electrical contractor shall prepare supporting documentation for compliance for copy to the CxA.

B. The following equipment/systems will be commissioned in this project:

1. Lighting Controls.

END OF SECTION

SECTION 26 0900

GUARANTEE

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 GUARANTEE

A. The Contractor shall remove, replace and/or repair at his own expense and at the convenience of the Owner, any defects in workmanship, materials, ratings, capacities and/or characteristics occurring in the work within one (1) year or within such longer period as may be provided in the Drawings and/or Section of the Specifications, which guarantee period shall commence with the final acceptance of the entire Contract in accordance with the guarantee provisions stated in the General Conditions, and the Contractor shall pay for all damage to the system resulting from defects in the work and all expenses necessary to remove, replace, and/or repair any other work which may be damaged in removing, replacing and/or repairing the work.

END OF SECTION

SECTION 31 2316
EXCAVATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Excavating and backfilling for footings, foundations, site structures, concrete sidewalks, ramps, stairs, and paving.

B. Dewatering.

C. Temporary excavation support and protection systems.

D. Preparing subgrades for all excavate areas.

E. Drainage course.

F. Select fill.

G. Final grading

1.3 RELATED REQUIREMENTS

A. Section 01 5713 - Temporary Erosion and Sediment Control: Slope protection and erosion control.

B. Section 01 7000 - Execution: Project conditions; protection of bench marks, scoping, survey control points, temporary bracing and shoring, and dewatering.

C. Section 03 3000 - Cast-in-Place Concrete.

D. Section 03 4100 - Precast Structural Concrete.

E. Section 03 4113 - Precast Concrete Hollow Core Planks.

F. Section 32 1216 - Asphalt Paving.

G. Section 32 1313 - Waterproof Concrete Paving.

H. Section 32 3113 - Chain Link Fences and Gates.

I. Section 32 9220 - Restoration of Turf Areas.

J. Section 32 3230 - Site Furnishings.

K. Refer to Appendix for Geo-Tech Report and Borings.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Refer to individual sections for additional requirements.

C. Project Record Documents: Record drawings at project closeout according to Section 01 7800 - Closeout Submittals. Show locations of installed support materials left in place, including referenced locations and depths, on drawings.

D. Field Quality Control Submittals: Document visual inspection of load-bearing excavated surfaces.

E. Product Data: For the following:

1. Sieve Analysis, Proctor Compaction Test and Certification of Specification Compliance for e of each fill materials and mix design proposed for flowable fill at least 15 days before start of backfilling. Flowable fill submittal shall include ASTM C 1260 test results.
2. Each type of plastic warning tape.

3. Geotextile fabric.
4. Contractor shall submit copies of proposed materials with locations, methods and operations of backfilling and compaction.

F. Samples: For the following:
1. 12-by-12-inch Sample of subdrainage and separation geotextile.
2. A 25-pound sample of each type of off-site fill material that is to be used at the site in an air-tight container for the testing laboratory, a minimum of one week prior to delivery to the site. Submit samples to the YPS Office of Facilities Management. Use of these proposed materials by the Contractor prior to testing and approval or rejection shall be at the Contractor's own risk.

G. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
1. Refer to individual sections for additional requirements.
2. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
3. Laboratory compaction curves according to ASTM D 2487 for each on-site or borrow soil material proposed for fill and backfill.
4. Optimum moisture-maximum density curve for each soil material.
5. Submit the name of each supplier and specific type and source of each material. Any change in source throughout the job requires approval of the YPS Office of Facilities Management.
6. Submit soil test reports for organic content of loam from off-site sources. Loam shall closely match the approved samples and not be delivered to the site prior to receiving approval of the soil test report.

H. Pre excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

1.5 QUALITY ASSURANCE

A. Comply with: New York State Department of Transportation (NYSDOT) "Standard Specifications for Construction and Materials". Notify YPS Office of Facilities Management of conflicts with these specifications.

B. Routine testing of existing soils and compacted material for compliance with these specifications will be performed as part of Contractor responsibility.
1. Compacted material not meeting density requirements shall be removed or re compacted and retested at Contractor's expense.
2. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.
   a. Pre installation Conference: Conduct conference at Project site to comply with requirements of Division 1.
3. Section 01 3000 - Administrative Requirements for Project Meetings.
   a. Before commencing earthwork, meet with YPS Office of Facilities Management, Contractor, and Testing Agency and other concerned entities. Review earthwork procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least 3 working days prior to convening conference. Record discussions and agreements and furnish a copy to each participant.
4. Codes and Standards: Perform earthwork complying with requirements of State New York Uniform Fire and Building Code and authorities having jurisdiction.
5. Testing and Inspection Service: Contractor will employ and pay for a qualified independent geotechnical testing and inspection laboratory to perform soil testing and inspection service during earthwork operations to include but not be limited to the following:

a. Verification of suitability of each footing subgrade material, in accordance with specified requirements.
   a) Field reports; in-place soil density tests.
   b) One optimum moisture-maximum density curve for each type of soil encountered.
   c) Inspections and certifications shall be performed by a licensed engineer registered in the State of New York.

1.6 DEFINITIONS

A. Excavation shall mean the excavation, removal, stockpiling, and/or satisfactory disposal of all materials encountered within the limits indicated or specified other than rock or ledge. Excavated materials shall include, but not be limited to removal of material encountered above subgrade elevations indicated, earth materials such as peat, organic or inorganic silts, clay, sand, gravel, pavements, cobble and boulders less than 1.0 cubic yard in volume, soft or disintegrated rock which, in the opinion of the YPS Office of Facilities Management, can be removed without blasting or drilling; pavement, brick and concrete masonry, and all obstructions not specifically included in another Section and subsequent disposal of materials removed

B. Unauthorized Excavation: Removal of materials beyond indicated subgrade elevations or dimensions without specific direction of YPS Office of Facilities Management. Unauthorized excavation and remedial work directed byYPS Office of Facilities Management shall be at Contractor's expense.
   1. In locations other than those above, backfill and compact unauthorized excavations as specified for authorized excavations of same classification unless otherwise directed by YPS Office of Facilities Management.

C. Excavation classified as "unclassified" and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered, pavements and other obstructions visible on ground surface, underground structures, utilities and other items indicated to be demolished and removed, together with earth and other materials, including rock.

D. Backfill: Soil material or controlled low-strength material used to fill an excavation.

E. Drainage Fill: Layer supporting concrete pavement, stairs, and footings used to minimize capillary flow of pore water.

F. Select Fill: Soil material to raise existing grades supporting concrete pavement and stairs.

G. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

H. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

I. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt road and pavement walk.

J. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below select fill, drainage fill, and topsoil materials.

K. Controlled Low Strength Material:

1.7 PROJECT CONDITIONS

A. Refer to Section 01 7000 for scoping requirements.

B. Verify existing grades and notify YPS Office of Facilities Management of differing conditions.

C. Verify that survey bench mark and intended elevations for the Work are as indicated.

D. Project Site Information: A geotechnical report has not been prepared for this Project.

E. The contractor, subject to approval of the YPS Office of Facilities Management may make additional test borings and conduct other exploratory operations as necessary.

F. Existing Utilities: Locate existing underground utilities in work area before starting earthwork operations.

1.8 OWNER'S REPSPONSIBILITY

A. The YPS Office of Facilities Management has provided an existing conditions survey of the property which is incorporated into the Contract Drawings.

1.9 CONTRACTOR'S REPSPONSIBILITY

A. The Contractor shall provide adequate personnel and equipment to complete the Work as specified herein and within the agreed upon Project Construction Schedule. The Contractor shall employ qualified English-speaking supervisor who shall provide adequate and efficient coordination of the Work. The supervisor shall be present on the site on a continuous full-time basis and shall have the authority to act on behalf of the Contractor.

B. The Contractor shall provide adequate survey control to locate parking areas, driveways, and existing structures etc. within the horizontal dimensions shown on the Contract Drawings. He shall also provide adequate vertical control to establish site grades as shown on the Contract Drawings, within the tolerances as specified hereinafter.

C. Prior to the beginning of any site grading, the Contractor shall make sufficient checks on the topographic conditions to satisfy him/herself that the existing elevations are as shown by the topographic survey and on the Contract Drawings. Should any discrepancies be found they shall be reported to the YPS Office of Facilities Management and Fuller and D'Angelo, P.C. in writing prior to commencement of any work.

D. The Contractor shall review all Drawings, Specifications and all other information included in Contract Documents and shall determine the quantities of the work to be completed and be responsible for the assumptions made in determining the cost of the Work.

E. The Contractor shall coordinate and complete his work in such a manner as to interfere as little as possible with all other contractors and/or subcontractors working on the site.

1.10 PROTECTION

A. The Contractor shall contact Dig Safe a minimum of 48 hours prior to performing any excavation and shall maintain current Dig Safe authorization numbers during all excavation activities. Protect structures, utilities, monitoring wells, property monuments, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations. The Contractor shall be responsible for actual cost of repair or replacement of any items damaged as a result of construction activities, including any professional services required for inspection of repairs and replacement.

B. Trees and Shrubbery:
   1. Existing trees and shrubbery to remain shall be protected from injury during construction.
   2. Except as otherwise directed, cutting and trimming of existing trees will not be permitted.
   3. All existing trees to remain and which may be damaged by construction operations shall be boxed and placed and protected and all such protection shall be maintained until completion of the work.

C. Existing Utilities:
   1. Excavation and backfill operations shall be done in such a manner as to prevent cave-ins of excavations or the undermining, damage, or disturbing of existing utilities and structures or of new work.
   2. Backfill shall be placed and compacted so as to prevent future settlement or damage to existing utilities, structures, new work, and in accordance with the requirements of the particular utility company.
   3. Any excavation improperly backfilled or where settlement occurs shall be reopened to the depth required, then refilled with new materials and compacted, and the surface restored to the required grade and condition, at no additional cost to the Owner.

D. Paved surfaces:
   1. Do not operate equipment that will cause damage on paved surfaces that are to remain. Any damage to existing roads or other paved surfaces caused by construction equipment shall be repaired at no additional cost to Owner.

E. Property:
1. Any damage due to excavation, backfilling or settlement of the backfill or injury to persons or damage to property occurring as a result of such damage, shall be the responsibility of the Contractor. All costs to repair such damage, in a manner satisfactory to the YPS Office of Facilities Management, shall be borne by the Contractor, at no additional cost to the Owner.

1.11 PRODUCT HANDLING

A. Store materials to preserve their quality and fitness for work.

1.12 WORKMANSHIP

Contractor shall be responsible for correction of work not conforming to specified requirements. Correct deficient work as directed by YPS Office of Facilities Management.

A. Remove work found to be defective. Replace with new acceptable work.

PART 2 PRODUCTS -

2.1 UNCLASSIFIED EXCAVATION

A. Excavation for this project shall be "unclassified".
1. Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

B. Pipes and conduits shall be provided with 6 inches of Pipe Zone Bedding material to eliminate differential settlement.

2.2 SOIL MATERIALS

A. Excavations General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: ASTM D 2487 soil classification groups GW, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, and PT or a combination of these group symbols.
1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
2. Materials containing excessive amounts of water, plastic clay, vegetation, organic matter, debris, pavement, stones or boulders over 3 inches in greatest dimension, frozen material, and material which, in the opinion of the YPS Office of Facilities Management will not provide a suitable foundation or subgrade.

D. General Fill Material: Soil materials free of clay, rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
1. **Not to be used against foundation walls**.

E. Select Fill: Sound and durable, well-graded sand and gravel, free of deleterious materials such as pyritic shale, organics, or contaminants of a chemical, mineral, or biological nature and conforming to New York State Department of Transportation, paragraph 304-2.02, Type 2 and the following limits of gradation:

100%	passing a 2" sieve.
30-90%	passing a #10 sieve.
10-70%	passing a #40 sieve.
0-5%	passing a #200 sieve

1. Location: Use for sub-base fill under pavements, over undistrube soil, and .

F. Drainage Fill: ASTM C-33 Blend 57, a blend of NYSDOT No. 1 and No. 2 crushed stone that complies with material specification requirements of Article 703-02 for crushed stone and the following limits of gradation:

% Passing By Weight	Sieve Size
100%	1" sieve.
40-50%	3/4"
25-60%	passing a 1/2" sieve.
10-30%	passing a 3/8" sieve
0-10%	passing a # 4 sieve.
0-5%	passing a # 8 sieve

1. Location: Under slabs on grade, sidewalks, concrete stairs, footings, and piers.concrete pavement and stairs.

G. Bedding and Pipe Encasement Course:

1. Select mixture of graded thoroughly washed crushed stone free from organic, frozen or other deleterious materials, conforming to the requirements of NYS DOT Section 703-02 and meeting the following gradation requirements (except material from trenching operations may be used if meeting the following:

   100% passing a 1" sieve.
   90-100% passing a 1/2" sieve.
   0-15% passing a 1/4" sieve.

   a. Location: water, sanitary, sprinkler, and conduit.

H. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a very stiff state.

I. Recycled material shall not be permitted.

J. Slag of any kind shall no be permitted.

2.3 ACCESSORIES

A. Bedding and Fill to Correct Over-Excavation:

1. Select Fill.

2.4 GEOTEXTILES

A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 157 lbf ; ASTM D 4632.
3. Sewn Seam Strength: 142 lbf ; ASTM D 4632.
4. Tear Strength: 56 lbf ; ASTM D 4533.
5. Puncture Strength: 56 lbf ; ASTM D 4833.
6. Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
7. Permittivity: 0.5 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.
9. Product: Filter Fabric: “Geotex 351” by Propex Geosynthetics; “Mirafi 140N” by Mirafi, Inc.; or accepted equivalent.
10. Location: Where shown on drawings.

2.5 CONTROLLED LOW-STRENGTH MATERIAL

A. Controlled Low-Strength Material: Low-density, self-compacting, flowable concrete material as follows:

1. Portland Cement: ASTM C 150, Type I , II , or III.
2. Fly Ash: ASTM C 618, Class C or F.
3. Normal-Weight Aggregate: ASTM C 33, 3/4-inch nominal maximum aggregate size.

4. Foaming Agent: ASTM C 869.
5. Water: ASTM C 94/C 94M.
6. Air-Entraining Admixture: ASTM C 260.
7. Produce low-density, controlled low-strength material with the following physical properties:
   a. As-Cast Unit Weight: 36 to 42 lb/cu. ft. at point of placement, when tested according to ASTM C 138/C 138M.
   b. Compressive Strength: 80 psi , when tested according to ASTM C 495.
   c. Location: Over all utilities passing under vehcular traffic

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that survey bench mark and intended elevations for the work are as indicated.

B. Survey existing adjacent structures and improvements and establish exact elevations at fixed points to act as benchmarks.
   1. Resurvey benchmarks during installation of excavation support and protection systems and notify YPS Office of Facilities Management if any changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect from damage.

C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

D. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Fuller and D'Angelo, P.C. .

E. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

F. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TEMPORARY EXCAVATION SUPPORT AND PROTECTION

A. Excavation Safety: Comply with OSHA's Excavation Standard, 29 CFR 1926, Subpart P.

3.4 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrade, and from flooding Project site, and surrounding area.

B. Protect subgrade from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
   2. Install continuous dewatering system, as required to keep subgrade dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

C. The Contractor shall provide, maintain and operate pumps of adequate capacity required to maintain excavations, pits, trenches and depressions within the Contract Limit Lines as well as the Buildings free of water accumulated at any time and as necessary to permit the proper installation of the work required under all contracts. Disposal of pumped water shall be done with due respect to the rights of adjoining buildings. All costs in connection with the removal of water as above provided for shall be borne by the Contractor.

3.5 EXPLOSIVES

A. Explosives: Do not use explosives.

3.6 EXCAVATING GENERAL

A. Underpin adjacent structures that could be damaged by excavating work.

B. Excavate to accommodate construction operations, footings, walls, and piers.
   1. Excavate to the specified elevations.
   2. Excavate to the length and width required to safely install, adjust, and remove any forms, bracing, or supports necessary for the installation of the work.
   3. Hand trim excavations. Remove loose matter.
   4. Slope banks of excavations deeper than 4 feet (1.2 meters) to angle of repose or less until shored.

C. Notify YPS Office of Facilities Management of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

D. Do not interfere with 45 degree bearing splay of foundations.

E. Provide temporary means and methods, as required, to remove all water from excavations until directed by . Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.7 FILLING AND BACKFILLING

A. Do not fill or backfill until all debris, water, unsatisfactory soil materials, obstructions, and deleterious materials have been removed from excavation.

3.8 REPAIR

A. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 2323.

3.9 STABILITY OF EXCAVATIONS

A. Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace, where sloping is not possible because of space restrictions or stability of material excavated, to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

3.10 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
   1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
   2. When rock is encountered, remove additional 12” of material and provide compacted drainage fill to eliminate differential settlement.
   3. Footing adjacent to existing building shall bear at same elevation or deeper.

3.11 EXCAVATION FOR WALKS AND PAVEMENTS

A. See Section 32 1313 - Waterproof Concrete Paving for excavation and backfilling requirements. Construct to indicated cross sections, elevations, and grades.

B. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades

3.12 EXCAVATION FOR ASPHALT PAVING AND WALKS

A. See Section 32 1216 - Asphalt Paving for excavation and backfilling requirements. Construct to indicated cross sections, elevations, and grades.

3.13 SUBGRADE INSPECTION

A. Notify YPS Office of Facilities Management when excavations have reached required subgrade.

B. If Testing Laboratory determines that unsatisfactory soil is present, notify the YPS Office of Facilities Management prior to proceeding. At the direction of the YPS Office of Facilities Management, continue excavation and replace with compacted backfill or select fill material as directed.

1. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by YPS Office of Facilities Management, without additional compensation.

3.14 UNAUTHORIZED EXCAVATION

A. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by ,YPS Office of Facilities Management without additional compensation.

3.15 STORAGE OF SOIL MATERIALS

A. Stockpile borrows material and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
   2. Provide tarp or erosion control fabric on stockpile material and a silt fence around stockpiled material.
   3. Material stockpiled outside the contract area shall be in locations approved by the Owner. If areas are not available store material off site at contractor's expense.

3.16 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:
   1. Construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
   2. Surveying locations of underground utilities for record documents.
   3. Inspecting and testing underground utilities.
   4. Removing concrete formwork.
   5. Removing trash and debris.
   6. Removing temporary shoring, bracing, and sheeting.
   7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.17 FILL

A. Place and compact fill material in layers to required elevations as follows:
   1. Under grass and planted areas, use satisfactory soil material.
   2. Under walks and pavements, use satisfactory soil material and drainage fill.
   3. Under building footings and foundations, use select fill and drainage fill.

B. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.18 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
   1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
   2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.19 COMPACTION OF BACKFILLS AND FILLS

A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
   1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill material at 98 percent.
   2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 95 percent.
   3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 90 percent.

3.20 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

3.21 SELECT FILL COURSES

A. Place select fill course free of mud, frost, snow, or ice.

B. Place select fill course as follows:
   1. When thickness of compacted course is 6 inches or less, place materials in a single layer.
   2. When thickness of compacted course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches (150 mm) thick or less than 3 inches thick when compacted.
   3. Compact select fill course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 98 percent of maximum dry unit weight according to ASTM D 1557

3.22 DRAINAGE FILL

A. Under slabs-on-grade, pavements, walks, ramps, and stairs place drainage course on prepared subgrade and as follows:
   1. When compacted thickness of drainage course is 6 inches or less, place materials in a single layer.
   2. When compacted thickness of drainage course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches (150 mm) thick or less than 3 inches thick when compacted.
   3. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.23 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Provide for visual inspection of load-bearing excavated surfaces by Fuller and D'Angelo, P.C. before placement of foundations.

C. Testing Agency: The Contractor will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

D. Allow testing agency to inspect and test the following:
   1. Confirmation of existing structure, foundation depths and undisturbed soil levels.
   2. Compaction of in place soil.
   3. Supply and compaction of select fill.
   4. Subgrade and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

E. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by YPS Office of Facilities Management
2. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
3. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100 feet or less of wall length, but no fewer than two tests.
4. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150 feet or less of trench length, but no fewer than two tests.

F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.24 CLEANING

A. Remove excavated material that is unsuitable for re-use from site.

B. Remove excess excavated material from site.

3.25 PROTECTION

A. Divert surface flow from rains or water discharges from the excavation.

B. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

C. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition.

D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

E. Keep excavations free of standing water and completely free of water during concrete placement.

F. Scarify or remove and replace soil material to depth as directed by YPS Office of Facilities Management; reshape and recompact.

G. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

H. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.26 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove all surplus soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

B. Refer to Section 01 7419 - Construction Waste Management and Disposal for additional requirements.

END OF SECTION

SECTION 32 1216
ASPHALT PAVING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Aggregate base course.

B. Walkway Paving: Single course bituminous concrete paving.

C. Surface sealer.

1.3 RELATED REQUIREMENTS

A. Section 31 2316 - Excavation.

1.4 REFERENCE STANDARDS

A. New York State Department of Transportation

B. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot Mix Asphalt
1. Pavements," unless more stringent requirements are indicated.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

B. Job-Mix Designs: For each job mix proposed for the Work.

C. Qualification Data: For manufacturer.

D. Material Test Reports: For each paving material.

E. Material Certificates: For each paving material, signed by manufacturers.

1.6 QUALITY ASSURANCE

A. Manufacturer shall be a paving-mix manufacturer registered with and approved by the New York DOT.

B. Perform Work in accordance with State of New York Highways standard.

C. Mixing Plant: Complying with State of New York Public Work's standard.

D. Obtain materials from same source throughout.

1.7 FIELD CONDITIONS

A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.

B. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

C. Place bitumen mixture when temperature is not more than 15 F degrees below bitumen supplier's bill of lading and not more than maximum specified temperature.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Comply with New York State and NY DOT code for paving work on public property.

2.2 MATERIALS

A. General: Asphalt concrete and all related items shall meet the requirements of NYSDOT Section 400

B. Aggregate for Base Course shall be Type 4 and conform to the requirements of Section 304 of the NY State DOT Specifications.
   1. Gradation shall conform to the following:
      a. Sieve Size Designation Percent Passing by Weight
      b. 3 inch 100%
      c. 2 inch 90-100%
      d. 1/4 inch 30-65%
      e. No. 40 5-40%
      f. No. 200 0-1%

C. Binder Course: Type 3, NYSDOT Sections 401, 403

D. Water: Potable.

E. Surface Course: Type 6, NYSDOT Sections 401, 403

F. Primer: In accordance with State of New York Highways standards.

G. Tack Coat: In accordance with State of New York Highways standards 702-90.

H. Seal Coat: AI MS-19, slurry type.

2.3 ASPHALT PAVING MIXES AND MIX DESIGN

A. Refer to NYDOT Specification.

B. Submit proposed mix design of each class of mix for review prior to beginning of work.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

C. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.

D. Review condition of subgrade and preparatory work.

E. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

3.2 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.
   1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct lay down and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

D. Average Density: 96 percent of reference laboratory density according to AASHTO T 245, but not less than 94 percent nor greater than 100 percent.

E. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

F. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

G. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

H. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

I. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

J. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.3 BASE COURSE

A. Proof roll subbase surface with a ten (10) ton static steel wheel roller to check for unstable or otherwise unsuitable areas, as determined by the Architect. Replace and recompact all unsatisfactory areas, as approved by the Architect, prior to commencement of paving operations.

B. Construction of crushed stone base shall be in accordance with the applicable requirements of Section 304 of the New York State Specifications and as required herein.

3.4 PREPARATION - PRIMER

A. Apply primer in accordance with State of New York Highways standards.

B. Use clean sand to blot excess primer.

3.5 PREPARATION - TACK COAT

A. Apply tack coat in accordance with State of New York Highways standards.

3.6 PLACING ASPHALT PAVEMENT - SINGLE COURSE

A. Asphalt concrete shall not be applied on a wet surface or when the air temperature is below 45 degrees F. unless otherwise directed, or when weather conditions would prevent proper construction

B. Install Work in accordance with State of New York Highways standards 400 unless otherwise specified..

C. Place asphalt within 24 hours of applying primer or tack coat.

D. Place to thickness identified in schedule at end of Section.

E. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

F. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

3.7 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150 mm).
3. Offset transverse joints, in successive courses, a minimum of 24 inches (600 mm).
4. Construct transverse joints as described in AI MS-22, "Construction of Hot Mix Asphalt Pavements."
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density

3.8 SEAL COAT

A. Apply seal coat to surface course in accordance with State of New York Highways standards.

B. Prepare surface as per manufactures recommendations.

C. Location: All new asphalt paving shall provided with sealer coat.

3.9 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Compacted Thickness: Within 1/4 inch of specified or indicated thickness.

C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements

3.10 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for quality control.

B. Provide field inspection and testing. Take samples and perform tests in accordance with AI MS-2.

3.11 DISPOSAL

A. Except for material indicated to be recycled, if any, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

B. Do not allow excavated materials to accumulate on-site

3.12 PROTECTION

A. Immediately after placement, protect pavement from mechanical injury for three (3) days or until surface temperature is less than 140 degrees F.

3.13 SCHEDULE

A. Walkway Paving: Single course of: 6" base course and 2" surface course: 8" inch compacted thickness, and seal coat.

END OF SECTION

SECTION 32 1714
TRAFFIC SIGNS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 DESCRIPTION OF WORK

A. Furnish and install sign face-sheet aluminum signs of type specified, metal sign posts, at locations indicated on the plans or as ordered and in conformance with the plans and these specifications.

1.3 REFERENCE STANDARDS

A. New York State Department of Transportation.

B. The Manual on Uniform Traffic Control Devices (MUTCD).

1.4 SUBMITTALS

A. Product data.

B. Shop Drawings: Elevations, details, and connections.

1.5 MOCK-UP

A. Provide mock-up for evaluation of installation workmanship.

B. Locate mock-up where directed by Fuller and D'Angelo, P.C.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products above ground until ready for installation.

B. Prevent excessive soil and mud from coming in contact with sign and posts.

C. Protect material from damage. Do not use damaged material. Remove damaged material from the site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metal signs shall be minimum 16 gauge galvanized steel posts with breakaway safety splice.

B. Reflective sheeting shall conform to the requirements of the State of NY DOT.

C. Silk screening of enclosed lens and encapsulated lens reflective sheeting shall conform to the requirements specified by the reflective sheeting manufacturer.

D. Metal sign posts shall be 1-5/8" x 1-3/4" x 3-1/2".

E. Hardware to re-mount existing signal for re-use.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

A. Placement and dimensions of copy, border and mounting holes to conform to details as shown on drawings. Accomplish the silk screening of all copy, border and background on encapsulated lens reflective sheeting before the application of the reflective sheeting to the finished aluminum sign blank. Use heat activated adhesive type encapsulated lens reflective sheeting and apply in a manner specified by the reflective sheeting manufacture

B. Apply reflective sheeting in such a manner that the finished sign will be wrinkle and bubble free. No splices of the reflective sheeting will be permitted on any sign face under 30 square feet in area with one dimension of 4' or less and no more than one splice will be permitted on any one sign without the approval of the Engineer.

C. Directly apply cutout enclosed lens and encapsulated lens reflective sheeting copy and border in conformance with the requirements specified by the reflective sheeting manufacturer. Apply cutout copy and border directly to clean, dust free reflective sheeting background panels. Cut borders neatly and butt-join at corners and panel joints. Use enclosed lens reflective sheeting of uniform brightness color for direct applied cutout copy and border.

D. After complete fabrication of the sign as indicated on the plans and in conformance with the requirements contained in the specifications, mount the sign on the type of support designated on the plans after satisfactorily installing the support at its proper location. Install the reinforcing plate as shown on the plans.

E. Install posts as indicated on drawing.

END OF SECTION

SECTION 32 1723.13
PAINTED PAVEMENT MARKINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Parking lot markings, including parking bays and handicapped symbols.

B. Roadway lane markings and crosswalk markings.

C. "No Parking" curb painting.

1.3 RELATED REQUIREMENTS

A. Section 32 1216 - Asphalt Paving.

1.4 REFERENCE STANDARDS

A. FS TT-B-1325 - Beads (Glass Spheres); Retro-Reflective; 2007d (Validated 2017).

B. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver paint in containers of at least 5 gallons accompanied by batch certificate.

B. Deliver glass beads in containers suitable for handling and strong enough to prevent loss during shipment accompanied by batch certificate.

C. Store products in manufacturer's unopened packaging until ready for installation.

D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS COLOR(S) AS INDICATED

2.1 MATERIALS

A. Line and Zone Marking Paint: Waterborne acrylic alkyd traffic marking paint; color(s) as indicated.

1. Roadway Markings: yellow.
2. Handicapped Symbols: Blue.
3. Product: Pro-Park made by Sherwin Williams.
4. Substitutions: Section 01 2500 Substitution Procedures.

B. Reflective Glass Beads: FS TT-B-1325, Type I (low index of refraction), Gradation A (coarse, drop-on); with silicone or other suitable waterproofing coating to ensure free flow.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Fuller and D'Angelo, P.C. of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Allow new pavement surfaces to cure for a period of not less than 14 days before application of marking materials.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Clean surfaces thoroughly prior to installation.

1. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.
2. Completely remove rubber deposits, existing paint markings, and other coatings adhering to the pavement, by scraping, wire brushing, sandblasting, mechanical abrasion, or approved chemicals.

D. Where oil or grease are present, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application; after cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint.

E. Establish survey control points to determine locations and dimensions of markings; provide templates to control paint application by type and color at necessary intervals.

3.3 INSTALLATION

A. Begin pavement marking as soon as practicable after surface has been cleaned and dried.

B. Do not apply paint if temperature of surface to be painted or the atmosphere is less than 50 degrees F or more than 95 degrees F.

C. Apply in accordance with manufacturer's instructions using an experienced technician that is thoroughly familiar with equipment, materials, and marking layouts.

D. Comply with FHWA MUTCD manual (http://mutcd.fhwa.dot.gov) for details not shown.

E. Apply markings in locations determined by measurement from survey control points; preserve control points until after markings have been accepted.

F. Apply uniformly painted markings of color(s), lengths, and widths as indicated on drawings true, sharp edges and ends.

1. Apply paint in one coat only.
2. Wet Film Thickness: 0.015 inch, minimum.
3. Length Tolerance: Plus or minus 3 inches.
4. Width Tolerance: Plus or minus 1/8 inch.

G. Parking Lots: Apply parking space lines, entrance and exit arrows, painted curbs, and other markings indicated on drawings.

1. Mark the International Handicapped Symbol at indicated parking spaces.
2. Hand application by pneumatic spray is acceptable.

H. Symbols: Use a suitable template that will provide a pavement marking with true, sharp edges and ends, of the design and size indicated.

3.4 DRYING, PROTECTION, AND REPLACEMENT

A. Protect newly painted markings so that paint is not picked up by tires, smeared, or tracked.

B. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly painted markings.

C. Allow paint to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.

D. Remove and replace markings that are applied at less than minimum material rates; deviate from true alignment; exceed length and width tolerances; or show light spots, smears, or other deficiencies or irregularities.

E. Remove markings in manner to avoid damage to the surface to which the marking was applied, using carefully controlled sand blasting, approved grinding equipment, or other approved method.

F. Replace removed markings at no additional cost to Yonkers Public Schools.

END OF SECTION

SECTION 32 1731
STEEL GUARDRAIL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Steel guardrail and steel posts.

B. Excavating for post bases.

1.3 RELATED REQUIREMENTS

1.4 REFERENCE STANDARDS

A. AASHTO M 180 - Standard Specification for Corrugated Sheet Steel Beams for Highway Guardrail; 2018.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on rail, posts, accessories, hardware and structural capabilities of rail section.

1.6 REGULATORY REQUIREMENTS

A. Conform to NYYS DOT Standards code for rail height or location restrictions.

PART 2 PRODUCTS

2.1 MATERIALS

A. As indicated on drawings.

2.2 ACCESSORIES

A. Hardware: Steel, bolts, nuts and washers to suit rail profile.

2.3 FINISHES

A. Components: Galvanized in accordance with ASTM A123/A123M.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install rails and posts and accessories in accordance with manufacturer's instructions.and shown on drawings.

B. Attach rails securely to posts with anchoring hardware.

END OF SECTION

SECTION 32 3113
CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Posts, rails, and frames.

B. Wire fabric.

C. Cantilever Gate System.

D. Accessories.

1.3 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete anchorage for posts.

B. Section 08 7101 - Door Hardware: Gate locking device.

C. Section 31 2316 - Excavation.

1.4 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

C. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric; 2011a (Reapproved 2017).

D. ASTM A428/A428M - Standard Test Method for Weight (Mass) of Coating on Aluminum-Coated Iron or Steel Articles; 2010 (Reapproved 2014).

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.

F. ASTM F567 - Standard Practice for Installation of Chain-Link Fence; 2014a.

G. ASTM F668 - Standard Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain-Link Fence Fabric; 2017.

H. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures; 2016.

I. CLFMI WLG 2445 - Wind Load Guide for the Selection of Line Post and Line Post Spacing; 2018.

J. FS RR-F-191/1D - Fencing, Wire and Post Metal (Chain-Link Fence Fabric); 1990.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.

C. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components. See CLFMI CLF-SFR0111 for planning and design recommendations.

D. Samples: Submit two samples of fence fabric, 12 inch by 12 inch in size illustrating construction and colored finish.

E. Manufacturer's Installation Instructions: Indicate installation requirements

F. Field Inspection Records: Provide installation inspection records that include post settings, framework, fabric, barbed wire, fittings and accessories, gates, and workmanship.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five (5) years of documented experience.

B. Fence Installer: Company with demonstrated successful experience installing similar projects and products, with not less than five years of documented experience.

1.7 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Line Posts: 3.0 inch diameter.

B. Corner and Terminal Posts: 3.0 inch diameter.

C. Top and Brace Rail: 1.66 inch diameter, plain end, sleeve coupled.

D. Bottom Rail: 1.66 inch diameter, plain end, sleeve coupled.

E. Fabric: 1-1/2 inch diamond mesh interwoven wire, 6 gage, 0.1920 inch thick, Class 2, top selvage knuckle end closed, bottom selvage knuckle end closed.
   1. PVC-coated to meet the requirements of ASTM F668.

2.2 MATERIALS

A. Posts, Rails, and Frames:
   1. Formed from hot-dipped galvanized steel sheet, ASTM A653/A653M, HSLAS, Grade 50, with G90 (Z275) zinc coating.
   2. Line Posts: Type I round in accordance with FS RR-F-191/1D
   3. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round in accordance with FS RR-F-191/1D.

2.3 COMPONENTS

A. Line Posts: 3.0 inch diameter.

B. Wire Fabric: ASTM F668 polymer-coated galvanized steel chain link fabric.

C. Corner and Terminal Posts: 3.0 inch diameter.

D. Concrete: Type specified in Section 03 3000.

E. Fabric: 1-1/2 inch diamond mesh interwoven wire, 6 gage, 0.1920 inch thick, top selvage knuckle end closed, bottom selvage twisted tight.

2.4 MANUAL GATES AND RELATED HARDWARE

A. Hardware for Single Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; _____.

B. Hinges: Finished to match fence components.
   1. Brackets: Round.
   2. Mounting: Center.
   3. Closing: Manual.

C. Latches: Finished to match fence components.
   1. Brackets: Round.

D. Gates shall be furnished and installed where indicated on the plans or directed by the YPS Office of Facilities Management. All necessary fittings and gate holders to lock gates in both open and closed positions shall be furnished. The locking device shall be as shown on the plans or shall be an approved

equal locking device. Gates shall be constructed of the same materials and finishes as the fence. All gates shall be braced with truss rods and turnbuckles. All gates shall be so arranged that they can be locked when closed and locked back to the fence when open.

E. Owner will furnish padlocks.

2.5 CHAIN LINK CANTILEVER GATE

A. Gate schedule shall include the following:
   1. Size: As shown on drawings.
   2. Materials:
      a. Gate framing (uprights & diagonal bracing) shall be manufactured from ASTM B221 aluminum (designation 6063-T-6) with yield strength of 25,000 PSI, a tensile strength of 30,000 PSI and a standard mill finish. The TransPort™ enclosed tracks shall be manufactured from ASTM B221 aluminum (designation 6063-T-6) with yield strength of 25,000 PSI, a tensile strength of 30,000 PSI and a standard mill finish.
      b. Gate in-fill shall be chain link fabric meeting the wire mesh material and size specified for corresponding chain link fence.
      c. Material for gate uprights and diagonal bracing shall be 2" square x ¼" wall aluminum. The cross-sectional shape of the enclosed-track shall confirm to the manufacturers Fast-Trak™ design with as a single extrusion consisting of a 2" x 5" channeled support with integrated 2" x 2" enclosed-track raceway.
      d. Steel material for fence posts shall be galvanized prior to forming in accordance with the requirements of ASTM A653/A653M, with minimum yield strength of 45,000 psi (310 MPa). The steel shall be hot-dip galvanized to meet the requirements of ASTM A653/A653M with a minimum zinc coating weight of 0.90 oz/ft2 (276 g/m2), Coating Designation G-90. Material for gate support posts shall be 4" square x 11 Ga. tubing.
      e. Suspension Rollers for top and bottom tracks shall be used at each support post to track connection. Each truck assembly shall be capable of being adjusted vertically via threaded rod for fine-tune adjustment. Truck assembly shall be constructed in a way so that the primary housing for the truck rollers shall pivot via ball-bearing connection to threaded rod.

B. Manufacture:
   1. Ameristar TransPort Link gate system Ameristar Perimeter Security USA Inc., in Tulsa, Oklahoma.
   2. Substitutions: See Section 01 2500 Substitution Procedures.

2.6 ACCESSORIES

A. Caps: Molded rigid vinyl; sized to post diameter, set screw retainer.

B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; Galvanized steel.

2.7 FINISHES

A. Components and Fabric: 5 ga. Bonded Vinyl coated, over coating of 1.8 oz/sq ft galvanizing, on 6 ga. core.

B. Hardware: Hot-dip galvanized to weight required by ASTM A153/A153M.

C. Accessories: Same finish as framing.

D. Color(s): Black.

2.8 CANTILEVER GATE FABRICATION

A. Gate frame uprights and diagonal bracing shall be pre-fabricated and pre-punched to accept frame fasteners. Enclosed track shall be pre-punched to accept gate uprights. Posts shall be precut to specified lengths.

B. Top and bottom enclosed track extrusions shall be mechanically fastened to vertical gate uprights and intermediate supports, as required by assembly instructions. Diagonal bracing shall be mechanically

fastened to vertical gate uprights and intermediate supports, as required by assembly instructions. Chain link fabric shall be attached to gate uprights with tension-bands.

C. The manufactured gate components shall be subjected to the Ameristar thermal stratification coating process (high-temperature, in-line, multi-stage, and multi-layer) including, as a minimum, a six-stage pretreatment/wash and an electrostatic spray application of a polyester finish. The topcoat shall be a "no-mar" TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). The color shall be (specify Black, Bronze, White, or Desert Sand). The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic as per manufacturer's published standards.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that areas are clear of obstructions or debris.

3.2 PREPARATION

A. Removal: Obstructions or debris.

3.3 INSTALLATION

A. Install framework, fabric, accessories in accordance with ASTM F567.

B. Set intermediate posts plumb. Slope top of concrete for water runoff.

C. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.

D. Provide top rail through line post tops and splice with 6 inch long rail sleeves.

E. Do not stretch fabric until concrete foundation has cured 28 days.

F. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.

G. Position bottom of fabric 2 inches above concrete.

H. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.

I. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

J. Install bottom tension wire stretched taut between terminal posts.

K. Do not attach the hinged side of gate to building wall; provide gate posts.

L. Install gate with fabric to match fence. Install hardware.

M. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.

N. Perform three random field inspections confirming proper installation.

3.4 GATE INSTALLATION

A. Cantilever support posts shall be set in concrete footers having a minimum depth of 48" (Note: In some cases, local restrictions of freezing weather conditions may require a greater depth). The "Earthwork" and "Concrete" sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering analysis to be sufficient in strength for the intended application.

B. Gate to be installed per manufacturers gate installation instructions. Gate shall be installed in compliance with ASTM F2200 standards.

C. Gate posts shall be spaced according to the manufacturers' drawings, dependent on clear opening. The manufacturers' gate drawings shall identify the necessary gate hardware required for the application. Gate hardware shall be provided by the manufacture of the gate and shall be installed per manufacturer's recommendations

D. Gate installation maintenance: When cutting/drilling posts adhere to the following steps to seal the exposed steel surfaces:

1. Remove all metal shavings from cut area.
2. Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole; let dry.
3. Apply 2 coats of custom finish paint matching fence color.
4. Failure to seal exposed surfaces per steps 1-3 above will negate warranty. Ameristar spray cans or paint pens shall be used to prime and finish exposed surfaces; it is recommended that paint pens be used to prevent overspray. Use of non-Ameristar parts or components will negate the manufactures' warranty

3.5 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch.

B. Maximum Offset From True Position: 1 inch.

C. Do not infringe on adjacent property lines.

3.6 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Layout: Verify that fence installation markings are accurate to design, paying attention to gate locations, underground utilities, and property lines.

C. Post Settings: Randomly inspect three locations against design for:
   1. Hole diameter.
   2. Hole depth.
   3. Hole spacing.

D. Fence Height: Randomly measure fence height at three locations or at areas that appear out of compliance with design.

E. Workmanship: Verify neat installation free of defects. See CLFMI CLF-FIG0111 for field inspection guidance.

3.7 CLEANING

A. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material.

B. Clean fence with mild household detergent and clean water rinse well.

C. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

3.8 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. Training: Train Yonkers Public Schools's personnel on operation and maintenance of system.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

END OF SECTION

SECTION 32 3300
SITE FURNISHINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SECTION INCLUDES

A. Benches.

B. Bollards.

1.3 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete.

1.4 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's specifications and descriptive literature, installation instructions, and maintenance information.

C. Shop Drawings: Indicate plans for each unit or group of units, elevations with model number, overall dimensions, construction, and anchorage details.

D. Samples: Submit two sets of manufacturer's available colors for metal furnishings.

1.6 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide manufacturer’s warranty against defects in materials or workmanship for ductile iron castings for a period of 10 years from Date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Precast Furnishings:
   1. Wausau Made, a division of Wausau Tile Inc: www.tecturadesigns.com.
   2. Substitutions: Refer to 01 2500 - Substitution Procedures

2.2 PRECAST CONCRETE FURNISHINGS

A. Precast Concrete Furnishings, General:
   1. Precast Concrete Components: Mixture of cement, aggregates, water, and mineral colors; molded to shape, and reinforced with steel bars.
      a. Finish:
         a) Horizontal Surfaces: Smooth for seats.
      b. Color: As selected by Fuller and D'Angelo, P.C. from manufacturer's standard range.
      c. Clear Sealers: Anti-graffiti.
   2. Hardware: Stainless steel.

B. Benches: Frame and seat section without back.

1. Material: Reinforced Concrete
2. Frame: Precast concrete.
3. Seat: Precast concrete.
4. Length: 37 inches.
5. Height: 18 inches.
6. Width: 17 inches.
7. Mounting: Surface, using concealed anchor rods, four 3/8" diameter inserts.
8. Products:
    a. WausauTile Inc. Model TF5207, PO Box 1520, Wausau, WI 54402- (800 388-8728).

2.3 BOLLARDS

A. Steel Pipe Bollards: Concrete filled steel pipe with plain shaft.
1. Shape: Round.
2. Diameter: six inches.
3. Materials:
    a. Steel Pipe: ASTM A53/A53M, standard weight.
    b. Factory Finish: Hot-dipped galvanized.
4. Mounting: In-ground.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify proper installation of mounting surfaces, preinstalled anchor bolts, and other mounting devices; and ready to receive site furnishing items.

B. Do not begin installation until unacceptable conditions are corrected.

3.2 INSTALLATION

A. Install site furnishings in accordance with approved shop drawings, and manufacturer's installation instructions.

B. Provide level mounting surfaces for site furnishing items.

END OF SECTION

SECTION 32 9220
RESTORATION OF TURF AREAS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including School Facilities Management Contract Manual and Specifications and Division 1 Specification Sections, apply to this Section.

B. In the event of discrepancies between the specifications and School Facilities Management Contract Manual and Specifications the School Facilities Management Contract Manual and Specifications shall prevail.

1.2 SUMMARY

A. The contractor shall supply all materials, equipment, labor, incidentals and maintenance required in order to provide an acceptable stand of turf by top soiling and seeding of all disturbed areas including stripping topsoil, grading, placing topsoil, fertilizing and seeding, in accordance with the drawings and as specified.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil
   1. Stockpiled topsoil from site preparation, earthwork and trenching operations may be used.
   2. Topsoil shall not be used in a muddy or frozen condition.

B. Fertilizer: Commercial fertilizer (14-28-15) shall have the following composition by weight: Nitrogen 14%; Phosphorous 28%; Potash 14%; as manufactured by Jonathan Green “New Seeding Lawn Fertilizer”.

C. The seed used shall be fresh, re-cleaned seed of the latest crop containing a blend of those listed below and shall be harvested from one field to ensure a uniform color and texture. Percentages of each grass type are to be within the given range for that type:
   1. Devine Perennial Ryegrass
   2. America Kentucky Bluegrass
   3. Apollo Kentucky Bluegrass
   4. Limousine Kentucky Bluegrass
   5. Midnight Kentucky Bluegrass

D. Mulch: Mulch shall be approved salt hay or weed free straw and stabilized with a binder.

PART 3 - CONSTRUCTION

3.1 GRADING AND SUBGRADE PREPARATION

A. Perform grading operations to bring subgrade to levels required and to contour indicated on the drawings.

B. Completed subgrade shall be approved by YPS Office of Facilities Management before topsoil and seeding.

C. The approved subgrade shall be scarified to a depth of 2 inches to permit mixing with rootzone material.

D. Provide minimum 6” topsoil in all areas.

3.2 SEEDBED PREPARATION

A. Seasonal and weather limitations - All operations including seedbed preparation shall be performed only when the soil is in proper condition to permit satisfactory work. Continuation of work at other than specified times or conditions shall proceed only with consent of the YPS Office of Facilities Management.

B. Leveling - Any undulations or irregularities in the surface resulting from fertilization, tillage or any other causes shall be leveled prior to seeding. Flooded, washed out, or otherwise damaged areas shall be reconstructed and all grades reestablished in conformance with the drawings and specifications.

C. Cleanup - Prior to seeding, the surface shall be cleared of all trash, debris and stone larger than 1-1/2 diameter and of all roots, brush, wire, grade stakes and other objects that could be a hindrance to maintenance operations and use.

D. Fertilizing - After final seedbed preparation, apply fertilizer at the manufacturer's recommended rate indicated on the bag. Fertilizer shall be distributed evenly over all areas to be seeded by machine, or as otherwise approved by the YPS Office of Facilities Management, and shall be worked lightly into the top 1 inch of the rootzone mixture.

3.3 SEEDING

A. The contractor shall furnish and place all materials required for seeding in all top soiled areas.

B. All areas to be seeded shall be thoroughly disked or otherwise loosened to a depth of 4 inches and shall be raked to true lines free from all unsightly variations, bumps, ridges, or depressions. All sticks, stones, roots or other objectionable material which might interfere with the formation of a finely pulverized seed bed shall be removed from the soil. Ground limestone and commercial fertilizer shall be applied as specified above.

C. The soil shall then be raked to a smooth, even draining surface and compacted with an approved roller as directed by the Architect. Any depressions which occur shall be regraded and rerolled until a satisfactory grade is obtained.

D. The rate of seeding shall be 10 lbs. per 1000 sq. ft. of area. Grass seed shall be sown by approved machine in such manner that a uniform stand will result and as indicated on the drawings for the upper field.

E. Grass seed shall be sown preferably in the fall between August 25 and October 1, in the spring between March 15 and May 1, or at such other times as are approved by the YPS Office of Facilities Management. All seeding is to be done in dry or moderately dry soil and at times when the wind does not exceed a velocity of 5 miles per hour.

3.4 MULCHING

A. All seeded areas shall be mulched not later than three (3) days following seeding. Ground surfaces shall be completely covered at a rate of at least two (2) tons per acre.

B. Mulch shall be anchored using jute or other approved netting properly fastened in place.

C. Subsequent watering - Seed shall be watered as required to maintain adequate moisture in the soil. In the absence of rainfall, seed shall be watered at frequencies dictated by need.

3.5 HYDROSEEDING

A. The contractor shall have the option of hydroseeding the lawn areas at no increased cost to the YPS Office of Facilities Management and subject to the written approval of the YPS Office of Facilities Management. If the contractor selects this option, he shall submit to the YPS Office of Facilities Management for approval a complete specification of the hydroseeding operation he intends to follow. Hydroseeding with a cellulose fiber mulch is acceptable.

3.6 MAINTENANCE, REPLACEMENT, GUARANTEE AND FINAL INSPECTION

A. Maintenance operations shall begin immediately after seeding and shall be continued as required until provisional acceptance. Grass shall be kept in a healthy, growing condition by mowing, watering, weeding, cultivating, disposal of waste vegetation, fertilizing, spraying or spreading of approved materials to prevent or treat infestations of insects or disease and all other operations required to maintain a strong, vigorous and healthy stand of grass.

B. Seeded areas that are dead, or in the opinion of the YPS Office of Facilities Management, in an unhealthy, unsightly or badly impaired condition, shall be replaced by the contractor as soon as reasonably possible after the unsatisfactory condition has become evident. No replacement shall be made when weather or soil is unfavorable for seeding. Such replacements shall be made in the same manner as specified for the original seeding.

3.7 ACCEPTANCE

A. Inspection of the work of seeding to determine provisional acceptance will be made by the YPS Office of Facilities Management upon written notice requesting such inspection submitted by the contractor at least seven (7) days prior to the anticipated date of inspection. Request may be made subsequent to the second mowing of the turf.

B. After inspection the Contractor will be notified in writing by the YPS Office of Facilities Management of provisional acceptance of all work, or if there are any deficiencies of the requirements for completion of the work.

C. All seeded areas shall be guaranteed for one (l) growing season commencing with the date of provisional acceptance.

D. Upon provisional acceptance, the YPS Office of Facilities Management will assume general responsibility for maintenance of the lawn areas. The contractor shall, however, make periodic visits to the site during the guarantee period to advise the YPS Office of Facilities Management of proper maintenance procedures.

E. At the expiration of the guarantee period, upon written request of the Contractor, inspection for final acceptance will be made by the YPS Office of Facilities Management. All remedial work to seeding work by the contractor shall be completed prior to the request for final acceptance.

END OF SECTION