

SECTION 01 1000
SUMMARY OF CONTRACTS

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: Yonkers YPS Riverside High School
- B. Owner's Name: Yonkers Public Schools.
- C. Engineer's Name: Eisenbach & Ruhnke Engineering, P.C.
- D. The Project consists of the following Prime Contracts:
 - 1. CONTRACT 1 - GENERAL CONSTRUCTION
 - a. Replace some exterior and interior doors and hardware.
 - b. Renovate all bathrooms and provide 2 new bathrooms.
 - c. Wall, ceiling, and window upgrades.
 - d. Provide door signs.
 - e. Miscellaneous other work.
 - 2. CONTRACT 2 - HVAC
 - a. Renovations to HVAC unit in penthouse including related work on roof.
 - b. Renovations to bathrooms and provide ventilation to new Bathrooms.
 - c. There is an Alternate H1 to provide UV-C lights in 9 HVAC units.
 - 3. CONTRACT 3 - ELECTRICAL
 - a. Renovations to bathrooms and new bathrooms
 - b. Exterior lighting.
 - c. Provide place of refuge intercom system.
 - d. Provide security system.
 - e. Miscellaneous other work.
 - 4. CONTRACT 4 - PLUMBING
 - a. Renovate all existing and the new Bathrooms.
 - 5. CONTRACT 5 - SITE CONSTRUCTION
 - a. Provide site improvements.
 - b. There are three Alternatives S1, S2 and S3 for areas of work to be done.

1.02 DESCRIPTION OF ALTERATIONS WORK

- A. Scope defined above and indicated on Drawings.
- B. The project includes renovations to the building.
- C. The schedule is to be coordinated with the YPS and is per the Phasing Plan on the Drawings.

1.03 OWNER OCCUPANCY

- A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

- C. Schedule the Work to accommodate Owner occupancy.

1.04 CONTRACTOR USE OF SITE AND PREMISES

- A. Arrange use of site and premises to allow:
1. Owner occupancy.
 2. Work by Others.
- B. Provide access to and from site as required by law and by Owner:
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.
- C. Utility Outages and Shutdown:
1. Limit disruption of utility services to hours the building is unoccupied.
 2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
 3. Prevent accidental disruption of utility services to other facilities.

1.05 WORK SEQUENCE

- A. See Phasing Plan provided on the Drawings. Coordinate with Engineer, Construction Manager and District Representative.

1.06 EQUIVALENCY CLAUSE

- A. Where, in these specifications, certain kinds, types, brands, or manufacturers of material are named, they shall be regarded as the standard of quality. Where two or more are named the Contractor may select one of those items, subject to meeting the requirements of the specified product.. If the contractor desires to use any kind, type, brand, or manufacture of material other than those named in the specification, he shall indicate in writing, and prior to award of the contract, what kind, type, brand, or manufacture is included in the base bid for the specified items. Submit information describing in specific detail, wherein it differs from the quality and performance required by the base specifications, and such other information as may be required by the Owner. Contractor shall refer to Section 01 6000.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 1090
RFI FORM

CONTRACTOR'S REQUEST FOR INFORMATION NO. _____ **E&R RFI NO:** _____

NAME OF PROJECT:
Riverside High School – Interior Renovations, Doors, Security and Site Work

NAME OF OWNER: Yonkers Public School District

DATE: _____

A/E PROJECT NO: Y19RIV01

ARCHITECT/ENGINEER: Eisenbach & Ruhnke Engineering, P.C.
291 Genesee Street
Utica, New York 13501
315.735.1916 Fax: 315.735.6365

FROM (CO. NAME): _____

EMAIL/FAX NO. _____

CONTACT NAME: _____

SUBJECT: _____

DISCIPLINE/TRADE: _____

DWG./SPEC. REFERENCE: _____

QUESTION:

ANSWER:

ARCHITECT'S/ENGINEERS SIGNATURE: _____

DATE: _____

Note: review and any responses to this request for information by the architect/engineer is strictly for design intent only and does not constitute acknowledgement or acceptance of any cost or schedule implications unless specifically presented by the contractor. By submission of this request for information, the contractor assumes all responsibility in the absence of an approved change order or work directive.

END OF SECTION

**SECTION 01 2100
ALLOWANCES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Contingency allowance.
- B. Payment and modification procedures relating to allowances.

1.02 RELATED REQUIREMENTS

- A. Section 01 2000 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 CONTINGENCY ALLOWANCE

- A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.
- B. Funds will be drawn from the Contingency Allowance only by Change Order.
- C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.04 ALLOWANCES SCHEDULE

- A. CONTRACT 1 - GENERAL CONSTRUCTION
 - 1. ALLOWANCE
 - a. Include an allowance for use according to the Owner' instructions
Thirty Five Thousand (\$35,000) DOLLARS
- B. CONTRACT 2 - HVAC
 - 1. ALLOWANCE
 - a. Include an allowance for use according to the Owner' instructions
Ten Thousand (\$10,000) DOLLARS
- C. CONTRACT 3 - ELECTRICAL
 - 1. ALLOWANCE
 - a. Include an allowance for use according to the Owner' instructions
Twenty Thousand (\$20,000) DOLLARS
- D. CONTRACT 4 - PLUMBING
 - 1. ALLOWANCE
 - a. Include an allowance for use according to the Owner' instructions
Thirty Five Thousand (\$35,000) DOLLARS
- E. CONTRACT 5 - SITE CONSTRUCTION
 - 1. ALLOWANCE
 - a. Include an allowance for use according to the Owner' instructions
Twenty Thousand (\$20,000) DOLLARS

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2200
UNIT PRICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. List of unit prices, for use in preparing Bids.
- B. Measurement and payment criteria applicable to Work performed under a unit price payment method.

1.02 COSTS INCLUDED

- A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.03 UNIT QUANTITIES SPECIFIED

- A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.04 MEASUREMENT OF QUANTITIES

- A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.
- B. Assist by providing necessary equipment, workers, and survey personnel as required.
- C. Measurement Devices:
 - 1. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle.

1.05 PAYMENT

- A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Engineer, multiplied by the unit price.

1.06 SCHEDULE OF UNIT PRICES

1. CONTRACT 1 – GENERAL CONSTRUCTION

A. UNIT PRICE GC-1

- a. Window balance replacement. The contractor will include in the base bid the replacement of window balances for 50 windows. The cost will be adjusted up or down based upon the quantity required.
- b. Unit of Measure: Per Window

B. UNIT PRICE GC-2

- a. Window glazing replacement. The contractor will include in the base bid the replacement of window glazing for 50 windows. The cost will be adjusted up or down based upon the quantity required.
- b. Unit of Measure: Per window.

C. UNIT PRICE GC-3

- a. Wall Repair. The contractor will include in the base bid the repair of 100 square feet of wall area in addition to the wall repair quantities indicated on drawings A-800 and A-801. The cost will be adjusted up or down based upon the quantity required.
- b. Unit of Measure: Per sq.ft.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2300

ALTERNATES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section identifies each Alternate by letter and number, and describes the basic changes to be incorporated into the Work, only when that Alternate is made part of the Work by specific provision in the Owner-Contractor Agreement.
- B. Reference sections of Specifications stipulate pertinent requirements for products and methods to achieve the Work stipulated under each Alternate.
- C. Coordinate pertinent related work and modify surrounding work as required to properly integrate the Work under each selected Alternate, and to provide the complete construction required by Contract Documents.

1.02 ALTERNATES

A. SITE CONTRACTOR

1. ALTERNATE S1

- i. This alternate is for the replacement of the Concrete Plaza surface area indicated on Drawing C-100.
- ii. This is a lump sum add alternate.

2. ALTERNATE S2

- i. This alternate is for the replacement of the sidewalk area indicated on Drawing C-100.
- ii. This is a lump sum add alternate.

3. ALTERNATE S3

- i. This alternate is for the replacement sidewalk area indicated on Drawing C-100
- ii. This is a lump sum add alternate.

B. HVAC CONTRACTOR

1. ALTERNATE H1

- i. This alternate is to provide UV-C lights in the nine (9) HVAC units indicated on the schedule of UV-C lights on Drawings M-106 and M-107.
- ii. This is a lump sum add alternate.

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SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electronic document submittal service.
- B. Preconstruction meeting.
- C. Progress meetings.
- D. Construction progress schedule.
- E. Submittals for review, information, and project closeout.
- F. Number of copies of submittals.
- G. Submittal procedures.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary of Contracts
- B. Section 01 7000 - Execution and Closeout Requirements: Additional coordination requirements.
- C. Section 01 7800 - Closeout Submittals: Project record documents.

1.03 PROJECT COORDINATION

- A. Project Coordinator: Eisenbach & Ruhnke Engineering, P.C..
- B. During construction, coordinate use of site and facilities through the Project Coordinator.
- C. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- D. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.
- E. Coordinate field engineering and layout work under instructions of the Project Coordinator.
- F. Make the following types of submittals to Engineer through the Project Coordinator:
 - 1. Requests for interpretation.
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Manufacturer's instructions and field reports.
 - 6. Applications for payment and change order requests.
 - 7. Progress schedules.
 - 8. Coordination drawings.
 - 9. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
 - 1. Besides submittals for review, information, and closeout, this procedure applies to requests for information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, and any other document any participant wishes to make part of the project record.
 - 2. Contractor and Engineer are required to use this service.

3. It is Contractor's responsibility to submit documents in PDF format.
 4. Subcontractors, suppliers, and Engineer's consultants are to be permitted to use the service at no extra charge.
 5. Users of the service need an email address, Internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
 6. Paper document transmittals will not be reviewed; emailed PDF documents will not be reviewed.
 7. All other specified submittal and document transmission procedures apply, except that electronic document requirements to not apply to samples or color selection charts.
- B. Submittal Service: The selected service is:
1. Submittal Exchange (tel: 1-800-714-0024): www.submittalexchange.com
- C. Project Closeout: Engineer will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Yonkers Public School District.

3.02 PRECONSTRUCTION MEETING

- A. Eisenbach & Ruhnke Engineering, P.C. will schedule a meeting after Notice of Award.
- B. Attendance Required:
1. Yonkers Public School District.
 2. Engineer.
 3. Contractor.
- C. Agenda:
1. Execution of Yonkers Public School District- Contractor 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. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 6. Scheduling.
 7. Owner's requirements and occupancy prior to completion.
 8. Location of Personnel and waste decontamination unit.
 9. Location of dumpsters.
- D. Eisenbach & Ruhnke Engineering, P.C. will record minutes and distribute copies within 5 days after meeting to participants. Contractor shall distribute all entities of the Contractor affected by decisions made.

3.03 SITE MOBILIZATION MEETING

- A. Engineer will schedule a meeting at the Project site prior to Contractor occupancy.
- B. Attendance Required:
1. Contractor.
 2. Yonkers Public School District.
 3. Engineer.
 4. Contractor's Superintendent.
 5. Major Subcontractors.
- C. Agenda:
1. Use of premises by Yonkers Public School District and Contractor.
 2. Yonkers Public School District's requirements and occupancy prior to completion.
 3. Construction facilities and controls provided by Yonkers Public School District.
 4. Temporary utilities provided by Yonkers Public School District.
 5. Survey and building layout.
 6. Security and housekeeping procedures.

7. Schedules.
 8. Application for payment procedures.
 9. Procedures for testing.
 10. Procedures for maintaining record documents.
 11. Requirements for start-up of equipment.
 12. Inspection and acceptance of equipment put into service during construction period.
- D. Eisenbach & Ruhnke Engineering, P.C. will record minutes and distribute copies within 5 days after meeting to participants. Contractor shall distribute all entities of the Contractor affected by decisions made.

3.04 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.
- B. Engineer will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Yonkers Public School District, Engineer, as appropriate to agenda topics for each meeting.
- D. Agenda:
 1. Review minutes of previous meetings.
 2. Review of Work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems that impede, or will impede, planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Review of off-site fabrication and delivery schedules.
 7. Maintenance of progress schedule.
 8. Corrective measures to regain projected schedules.
 9. Planned progress during succeeding work period.
 10. Coordination of projected progress.
 11. Maintenance of quality and work standards.
 12. Effect of proposed changes on progress schedule and coordination.
 13. Other business relating to Work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, Yonkers Public School District, participants, and those affected by decisions made.

3.05 CONSTRUCTION PROGRESS SCHEDULE

- A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.

3.06 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 1. Product data.
 2. Shop drawings.
 3. Samples for selection.
 4. Samples for verification.
- B. Submit to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

- C. The Engineer/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 Engineer/Architect's review shall be conducted with reasonable promptness while allowing sufficient time in the Engineer/Architect's judgment to permit adequate review. Review of a specific item shall not indicate that the Engineer/Architect has reviewed the entire assembly of which the item is a component. The Engineer/Architect shall not be responsible for any deviations from the Construction Documents not brought to the attention of the Engineer/Architect, in writing, by the Contractor. The Engineer/Architect shall not be required to review partial submissions or those for which submissions of correlated items have not been received.
- D. Initial Review: Allow 20 working days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Engineer/Architect will advise Contractor when a submittal being processed must be delayed for coordination.
- E. Allow 15 working days for processing each re-submittal.
- F. Engineer/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.
- G. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.
- H. Engineer/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.
- I. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
- 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. Samples will be reviewed only for aesthetic, color, or finish selection.
- L. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - CLOSEOUT SUBMITTALS.

3.07 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 - 1. Design data.
 - 2. Certificates.
 - 3. Test reports.
 - 4. Inspection reports.
 - 5. Manufacturer's instructions.
 - 6. Manufacturer's field reports.
 - 7. Other types indicated.
- B. Submit for Engineer's knowledge as contract administrator or for Yonkers Public School District. No action will be taken.

3.08 SUBMITTALS FOR PROJECT CLOSEOUT

- A. When the following are specified in individual sections, submit them at project closeout:

1. Project record documents.
 2. Operation and maintenance data.
 3. Warranties.
 4. Bonds.
 5. Other types as indicated.
- B. Submit for Yonkers Public School District's benefit during and after project completion.

3.09 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.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Engineer.
1. After review, produce duplicates.
 2. Approved sample will be retained at the project site.
 3. Retained samples will not be returned to Contractor unless specifically so stated.

3.10 SUBMITTAL PROCEDURES

- A. Transmit each submittal with approved form.
- B. Shop drawings are the product and the property of the Contractor. The Owner, Owner's Representative, or Architect 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.
- C. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
- D. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
- E. 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.
- F. Schedule submittals to expedite the Project, and coordinate submission of related items.
- G. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
- H. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
- I. Provide space for Contractor and Engineer review stamps.
- J. When revised for resubmission, identify all changes made since previous submission.
- K. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- L. Submittals not requested will not be recognized or processed.

3.11 ENGINEER'S/ARCHITECTS ACTION

- A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. General: Except for submittals for the record and similar purposes, where action and return on submittals is required or requested, the Architect/Engineer will review each submittal, mark with appropriate "Action".

- C. Action Submittals: Engineer/Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Engineer/Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
- D. Final Unrestricted Release: Where the submittals are marked as follows, 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.
 - 1. Marking: "No Exceptions Taken"
- E. 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 Engineer's/Architect's notations or corrections on the submittal and with the requirements of the contract documents; acceptance of the work will depend on that compliance.
 - 1. Markings: "Make Correction Noted"
- F. Returned for re-submittal: When the 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 Engineer's/Architect'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.
 - 1. Marking: "Revise and Resubmit"
- G. Marking: "Rejected"
- H. Other Action: Where the submittal is returned, marked with the Engineer's/Architect's explanation, for special processing or other Contractor activity, or is primarily for information or record purposes, the submittal will not be marked.

END OF SECTION

SECTION 01 3216
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preliminary schedule.
- B. Construction progress schedule, bar chart type.

1.02 RELATED SECTIONS

- A. Section 01 1000 - Summary of Contracts: Work sequence.

1.03 REFERENCES

- A. AGC (CPSM) - Construction Planning and Scheduling Manual; Associated General Contractors of America; 2004.

1.04 SUBMITTALS

- A. Within 10 days after date of Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 5 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.
- F. Submit under transmittal letter form specified in Section 01 3000.
- G. The Contractor is hereby notified that payment requisitions will not be processed by the Engineering and Owner's representative nor paid by the Owner until all schedules are reviewed and approved by the Contractor and the Engineer and Owner's Representative.

1.05 QUALITY ASSURANCE

- A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with one year's minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.
- B. Contractor's Administrative Personnel: 3 years minimum experience in using and monitoring CPM schedules on comparable projects.

1.06 SCHEDULE FORMAT

- A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.
- B. Submit schedule in electronic PDF format.
- C. Diagram Sheet Size: Maximum 22 x 17 inches or width required.
- D. Scale and Spacing: To allow for notations and revisions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

- A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

- B. Identify each item by specification section number.
- C. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- D. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS

- A. Include a separate bar for each major portion of Work or operation.
- B. Identify the first work day of each week.

3.04 REVIEW AND EVALUATION OF SCHEDULE

- A. Participate in joint review and evaluation of schedule with Engineer at each submittal.
- B. Evaluate project status to determine work behind schedule and work ahead of schedule.
- C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.05 UPDATING SCHEDULE

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
- C. Annotate diagrams to graphically depict current status of Work.
- D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- E. Indicate changes required to maintain Date of Substantial Completion.
- F. Submit reports required to support recommended changes.

3.06 DISTRIBUTION OF SCHEDULE

- A. Distribute copies of updated schedules to Contractor's project site file, to Subcontractors, suppliers, Engineer, Yonkers Public School District, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

END OF SECTION

SECTION 01 3300
SED SPECIAL REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 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.

1.03 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.

1.04 GENERAL SAFETY AND SECURITY DURING CONSTRUCTION

- A. All construction materials shall be stored in a safe and secure manner.
 - 1. Fences around construction supplies or debris shall be maintained.
 - 2. Gates shall always be locked unless a worker is in attendance, to prevent unauthorized entry.
 - 3. 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.
 - 4. Workers shall be required to wear photo-identification badges at all times for identification and security purposes while working at occupied sites.

1.05 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.
 - a. 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.
 - b. 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.

1.06 FIRE PREVENTION

- A. There is no smoking on school property for fire prevention and New York State Law.
- B. Any holes in floors or walls shall be sealed with a fire resistant material.
- C. Contractor shall maintain existing fire extinguishers.
- D. Fire alarm and smoke detection systems shall remain in operation at all times.

1.07 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.
 - 1. Construction Fume Control: Each Contractor shall be responsible for the control of chemical fumes, gases, and other contaminants 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.
 - 2. Off-Gassing Control. Each 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.

1.08 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.

1.09 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 Contractor shall obtain UL Certification or Inspection from a Certified Electrical Organization for electrical installation if applicable.

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 WORKER 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 3323

SHOP DRAWINGS, SUBMITTALS, PRODUCT DATA, AND SAMPLES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Related Requirements Specified Elsewhere
 - 1. Section 01 3000 - Administrative Requirements
 - 2. Section 01 7800 - Closeout Submittals
 - 3. Section 02 8074 - Testing Laboratory Services
- B. Submit, to the Engineer, shop drawings, product data, and samples required by the specification sections.
- C. Attached is Submittal Cover Sheet that is to be filled out and returned to the Engineer (Section 01 3323.01) with each submittal.
- D. Make submittals to allow for checking, re-submittal, and rechecking, if required, without causing delay of the Construction Schedule.

1.02 PRODUCT DATA

- A. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, and other standard descriptive data.
 - 1. Modify product data to delete information that is not applicable to project.
 - 2. Supplement standard to provide additional information applicable to project.
 - 3. Clearly mark each copy to identify applicable materials, products, or models.
 - 4. Show dimensions and clearances required.
 - 5. Show performance characteristics and capacities.
 - 6. Show wiring or piping diagrams and controls.

1.03 CONTRACTOR RESPONSIBILITIES

- A. Review, approve, stamp, and sign shop drawings, submittals, product data, and samples prior to submission to Engineer.
- B. Verify:
 - 1. Field measurements.
 - 2. Field construction criteria.
 - 3. Catalog numbers and other data.
- C. Coordinate each submittal with requirements of Work and Contract Documents.
- D. Contractor's responsibility for errors and omissions in submittals is not relieved by Engineer's review of submittals.
- E. Contractor's responsibility for deviations in submittals from requirements of Contract Documents is not relieved by Engineer's review of submittals unless Engineer gives written acceptance of the specific deviations.
- F. Notify Engineer in writing, at time of submission, of deviations in submittals from requirements of Contract Documents.
- G. After Engineer's review, Contractor is to distribute copies of submittals to parties requiring same for co-ordination of work.
- H. Make required copies for distribution of shop drawings and product data that have been stamped and signed by the Engineer.

1.04 SUBMISSION REQUIREMENTS

- A. Submit number of copies of product data that will be required for distribution plus one copy that will be retained by Engineer.
- B. Accompany submittal with transmittal letter, containing:
 - 1. Date.
 - 2. Engineer's project title and number.

3. Contractor's name and address.
 4. Notification of deviations from Contract Documents.
 5. Additional pertinent data.
- C. Submittals shall include:
1. Date and revision dates.
 2. Engineer's project title and number.
 3. The names of:
 - a. Engineer.
 - b. Contractor.
 - c. Subcontractor.
 - d. Supplier.
 - e. Manufacturer.
 4. Identification of product.
 5. Relation to adjacent structure or materials.
 6. Field dimensions, clearly identified as such.
 7. Technical Specification section number.
 8. Applicable standards.
 9. A blank space, 4 x 4 inches, for the Engineer's stamp.
 10. Identification of deviations from Contract Documents.
 11. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements, and compliance with Contract Documents.
 - a. Submittals without Contractor's stamp will be returned without being reviewed.
- D. Shop Drawing Submittal Cover Sheet
1. Attach submittal cover sheet, with all blanks filled in for each shop drawing, product data, and sample.
- E. Prior to Commencement of Work, Owner will:
1. Notify occupants of work areas that may be disrupted by the abatement, of project dates and requirements for relocation.
 2. Submit to the Contractor results of pre-abatement air sampling including location of samples, equipment utilized, and method of analysis.
 3. Document that Owner's employees who will be required to enter the work area during abatement have received training equal to that detailed in Section 01560
 4. Provide to the Contractor information concerning access, shutdown, and protection requirements of certain equipment and systems in the work area.
 5. Submit to the Contractor results of bulk material analysis and air sampling data collected during the course of the abatement. These sample results are for information only. They serve only to monitor Contractor performance during the project and shall not release the Contractor from any responsibility to sample for OSHA compliance.
- F. Prior to Commencement of Work, Contractor shall:
1. NYS Department of Labor: Provide Owner with a copy of the notice to the Asbestos Control Program of the NYS Labor Department's Division of Safety and Health as per Part 56 of Title 12.
 2. Provide a copy of postings.
 3. NYSDEC: Submit to the Owner a copy of the annual "Industrial Waste Hauler Permit" specifically for asbestos-containing materials required pursuant to 6 NYCRR364. Submit certification that the proposed waste disposal site meets the requirements of 40 CFR 61.156 and any pertinent local and state regulations.
 4. Submit documentation satisfactory to the Owner that the Contractor's employees, including Superintendent, Foremen, Supervisors, and other company personnel or agents, who may be exposed to airborne asbestos fibers or who may be responsible for any aspects of abatement activities, have received adequate training. A copy of their Asbestos Handling Certificates will be provided. Foremen and Supervisors shall, at a minimum, meet the training requirements of a

- competent person as defined in 29 CFR 1926.1101. Copies of Asbestos Handling Certificates must be clear and legible or they will be rejected.
5. With the Owner, inspect the premises wherein all abatement and abatement related activities will occur and prepare a statement signed by both agreeing on building and fixture conditions prior to the commencement of work.
 6. Submit manufacturer's certification that HEPA vacuums, negative pressure ventilation units, and other local exhaust ventilation equipment conform to ANSI Z9.2-79.
 7. Submit a copy of the firm's asbestos handling license.
- G. During abatement activities, Contractor shall:
1. Submit daily job progress reports detailing abatement activities. Include review of progress with respect to previously established milestones and schedules, major problems and actions taken, injury reports, equipment breakdown, and bulk material.
 2. Submit copies of all transport manifests, trip tickets, and disposal receipts for all asbestos waste materials removed from the work area during the abatement process. The documentation must show the entire chain of custody from the time the asbestos is removed.
 3. The Asbestos Project Monitor will maintain work site entry logbooks with information on worker and visitor access. Copies of Asbestos Handler and Supervisor Certificates will be provided to the Owner, Engineer, and Contractor.
 4. Submit logs documenting filter changes on respirators, HEPA vacuums, negative pressure ventilation units, and other engineering controls.
 5. Submit results of air sampling data collected during the course of the abatement including OSHA compliance air monitoring results.
 6. Post in the clean room area of the worker decontamination enclosure a list containing the names, addresses, and telephone numbers of the Contractor, the Owner, the Engineer, the Asbestos Project Monitor, the General Superintendent, the Air Sampling Professional, the testing laboratory, the police department, the fire department, and any other personnel who may be required to assist during abatement activities (e.g., Safety Officer, Building Maintenance Supervisor, and Energy Conservation Officer).

1.05 RESUBMISSION REQUIREMENTS

- A. Product Data and Samples: Submit new data and samples as required for initial submittal.

1.06 CONTRACTOR'S DISTRIBUTION OF SUBMITTALS

- A. Distribute copies of shop drawings and product data that carry the Engineer stamp to:
1. Contractor's file.
 2. Job site file.
 3. Record Document file.
 4. Construction Manager.
 5. Owner
- B. Distribute samples as directed by Engineer.

1.07 ENGINEER

- A. Stamp and initial or sign certifying to review of submittal.
- B. Explanation of Engineer's Stamp:
1. NO EXCEPTION TAKEN: No corrections, no marks.
 2. MAKE CORRECTIONS NOTED: Minor amount of corrections; all items can be fabricated at Contractor's risk without further correction; checking is complete and all corrections are obvious without ambiguity.
 3. REVISE AND RESUBMIT: Minor amount of corrections; noted items must not be fabricated without further correction; checking is not complete; details of items noted by checker are to be further clarified; items not noted to be corrected can be fabricated at Contractor's risk under this stamp.

4. REJECTED: Drawings are rejected as not in accordance with the Contract, too many corrections, or other justifiable reason. The drawing must be corrected and resubmitted. No items are to be fabricated under this stamp.
5. SUBMIT SPECIFIED ITEM: Item is not as specified. Submit named manufacturer.

C. Return submittals to Contractor for distribution.

1.08 SUBMITTALS REQUIRED FOR REVIEW

- A. The following is the Submittal Cover Sheet for the required submittals. Contractor is responsible for reviewing each section to determine required submittals.

END OF SECTION

SUBMITTAL COVER SHEET



EISENBACH & RUHNKE ENGINEERING, P.C.
291 Genesee St., Utica, NY 13501 315-735-1916

The Contractor shall fill out lines 1 through 7 below and staple this cover sheet to submitted product data sheet, sample, shop drawing, or other items submitted to the Architect/Engineer. Each submittal shall have its own Submittal Cover Sheet.

Project Name: Yonkers Public Schools
Riverside High School
Interior Renovations, Doors, Security and Site Work

Contractor:

E&R Project No.: Y19RIV01 YPS#10874

Project Manager:

Address:

Phone:

Architect/Engineer: Eisenbach and Ruhnke Engineering, P.C.

Owner: Yonkers Public Schools
One Larkin Center
Yonkers, NY 10701

Project Manager: Jack Eisenbach
Address: 291 Genesee Street
Utica, NY 13501
Phone: 315-735-1916

-
1. Date: _____
 2. Submittal Number: _____
 3. Submitted Item: _____
 4. Manufacturer: _____
 5. Person Submitting: _____
 6. Spec. Location: Section _____ Article _____ Paragraph _____ Subparagraph _____
 7. And/Or Drawing Number: _____

Architect/Engineer's Notes: _____

Contractor's Stamp

Architect/Engineer's Stamp

- No exception taken.
- Make Corrections Noted. Do not resubmit. See Notes above.
- Submit Specified Item. Resubmit. See Notes above.
- Revise and Resubmit. Resubmit. See Notes above.
- Rejected. See Notes above.

Checking of submittals is only for general conformance with the design concept of the Project and general compliance with the information given in Contract Documents. Any action shown is subject to the requirements of the Drawings and Specifications. Contractor is responsible for dimensions to be confirmed and correlated at the job site, quantities, information that pertains solely to the fabrication processes or to techniques of construction, coordination of the work of all trades, and the satisfactory performance of his work.

By: _____ Date: _____
EISENBACH & RUHNKE ENGINEERING

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittals.
- B. References and standards.
- C. Testing and inspection agencies and services.
- D. Control of installation.
- E. Manufacturers' field services.
- F. Defect Assessment.

1.02 RELATED REQUIREMENTS

- A. Document 00 7200 - General Conditions: Inspections and approvals required by public authorities.
- B. Section 01 3000 - Administrative Requirements: Submittal procedures.
- C. Section 01 4216 - Definitions.
- D. Section 01 4219 - Reference Standards.
- E. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCE STANDARDS

- A. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.
- B. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing; 2014a.

1.03A CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Engineer for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Engineer for a decision before proceeding

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Design Data: Submit for Engineer's knowledge and action as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.
 - 1. Include required product data and shop drawings.
- C. Test Reports: After each test/inspection, promptly submit two copies of report to Engineer and to Contractor.
 - 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. Conformance with Contract Documents.
 - k. When requested by Engineer, provide interpretation of results.
2. Test report submittals are for Engineer's knowledge as construction contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.
- D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Engineer, in quantities specified for Product Data.
1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Engineer.
- 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 Owner'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 Engineer's benefit as contract administrator or for Owner.
1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.
- G. Erection Drawings: Submit drawings for Engineer's benefit as contract administrator or for Owner.
1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
 2. Data indicating inappropriate or unacceptable Work may be subject to action by Engineer or Owner.

1.05 REFERENCES AND STANDARDS

- A. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- B. Obtain copies of standards where required by product specification sections.
- C. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

1.06 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- B. Contractor Employed Agency:
 1. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.
 2. Laboratory: Authorized to operate in the State in which the Project is located.
 3. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 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 Engineer 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.

3.02 TESTING AND INSPECTION

- A. Testing Agency Duties:
 - 1. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
 - 2. Perform specified sampling and testing of products in accordance with specified standards.
 - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 4. Promptly notify Engineer and Contractor of observed irregularities or non-conformance of Work or products.
 - 5. Perform additional tests and inspections required by Engineer.
 - 6. Submit reports of all tests/inspections specified.
- 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 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 Engineer 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 Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- D. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Engineer.
- E. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

3.03 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, start-up of equipment, test, adjust, and balance equipment 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.

3.04 DEFECT ASSESSMENT

- A. Replace work or portions of the work not conforming to specified requirements.

END OF SECTION

SECTION 01 4100
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Regulatory requirements applicable to this project are the following:
- B. 29 CFR 1910 - Occupational Safety and Health Standards; current edition; as a work place.
- C. NFPA 101 - Life Safety Code, 2012.
- D. CODES, PERMITS, FEES, ETC.
 - 1. The Contractor shall furnish and pay for all 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 Engineer, Owner and Construction Manager as evidence that the work installed under this Section of the Specifications conforms with all applicable requirements of the Municipal and State Codes, National Board of Fire Underwriters, National Electric Code.
 - 2. Any items of work specified herein and shown on the drawings which conflict with aforementioned rules, regulations and requirements, shall be referred to the Engineer, Owner, and Construction Manager for decision, which decision shall be final and binding.
 - 3. The building is to be constructed under the following Rules and Regulations of the New York State Uniform Fire and Building Codes known as the "Building Codes of the State of New York" and consist of the following:
 - a. Building Code of New York State
 - b. State Education Department Planning Standards, including Commissioner's Regulation Part 155.5, 155.7
 - c. Energy Conservation Construction Code of New York State
 - d. Fire Code of New York State
 - e. Fuel Gas Code of New York State
 - f. Mechanical Code of New York State
 - g. Plumbing Code of New York State
 - 4. Classification of Construction: Type IIIA
 - 5. Occupancy Classification: Education E
 - 6. Electrical Certification: The Contractor shall obtain UL Certification or Inspection from a Certified Electrical Organization for electrical installation.
 - 7. 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.
- E. OSHA Part 1926 Safety and Health Regulations for Construction.

1.02 MANDATORY OSHA CONSTRUCTION SAFETY AND HEALTH TRAINING

- A. Effective July 18, 2008 - Pursuant to NYS Labor Law §220-h - On all public work projects of at least \$250,000 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.

1.03 QUALITY ASSURANCE

- A. Designer Qualifications: Where delegated engineering design is to be performed under the construction contract, provide the direct supervision of a Professional Engineer experienced in design of this type of work and licensed in New York State.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary sanitary facilities.
- B. Temporary Controls: Barriers, enclosures, and fencing.
- C. Security requirements.
- D. Vehicular access and parking.
- E. Waste removal facilities and services.
- F. Project identification sign.

1.02 RELATED REQUIREMENTS

- A. Section 01 5100 - Temporary Utilities.

1.03 TEMPORARY UTILITIES - SEE SECTION 01 5100

- A. Owner will provide the following:
 - 1. Electrical power, consisting of connection to existing facilities.

1.04 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.

1.05 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.06 FENCING

- A. Provide 6 foot (1.8 m) high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.07 INTERIOR ENCLOSURES

- A. Provide temporary partitions as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.
- B. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:

1.08 VEHICULAR ACCESS AND PARKING

- A. Coordinate access and haul routes with governing authorities and Owner.
- B. Provide and maintain access to fire hydrants, free of obstructions.
- C. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.09 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site periodically.

- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.10 PROJECT IDENTIFICATION

- A. Provide project identification sign of design and construction indicated on drawings.
- B. Erect on site at location indicated.
- C. No other signs are allowed without Owner permission except those required by law.

1.11 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 5060

SITE SAFETY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY:

- A. The purpose of this section is to specify 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 of 1970 (OSHA) and the Construction Safety Act of 1969, 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 every one 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.

1.03 DEFINITIONS

- A. Public shall mean anyone not involved with or employed by the contractor to perform the duties of this contract.
 - 1. Site shall mean the limits of the work area.
 - 2. Contractor shall mean the contractor, his/her subcontractors and any other person related to the contract execution.

1.04 REFERENCES:

- A. Code of Federal Regulations OSHA Safety and Health.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Barriers shall be constructed of sturdy lumber having a minimum size of 2'x 4'.
- 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

3.01 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. Each 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 each 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, each 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 5100
TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary Utilities: Provision of electricity, lighting, ventilation, and water.

1.02 REFERENCE STANDARDS

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

1.03 TEMPORARY ELECTRICITY

- A. Cost: By Contractor.
- B. Connect to Owner's existing power service.
 - 1. Do not disrupt Owner's need for continuous service.
 - 2. Exercise measures to conserve energy.
- C. Provide temporary electric feeder from existing building electrical service at location as directed.
- D. Complement existing power service capacity and characteristics as required.
- E. Provide power outlets for construction operations, with branch wiring and distribution boxes located at each floor. Provide flexible power cords as required.
- F. Permanent convenience receptacles may be utilized during construction.
- G. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.04 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain LED, compact fluorescent, or high-intensity discharge lighting as suitable for the application for construction operations in accordance with requirements of 29 CFR 1926 and authorities having jurisdiction.
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- C. Maintain lighting and provide routine repairs.

1.05 TEMPORARY VENTILATION

- A. Existing ventilation equipment may not be used.

1.06 TEMPORARY WATER SERVICE

- A. Provide and maintain suitable quality water service for construction operations at time of project mobilization.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 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.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.03 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 15 days after date of Agreement.
 - 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.

1.04 ASBESTOS

- A. Asbestos: All products, materials, etc., used in conjunction with this Project shall be Asbestos-Free.
 - 1. Contractor shall provide a letter to the Owner stating that no asbestos containing material has been used in this project.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the 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; remove from site.

2.02 NEW PRODUCTS

- A. Provide new products unless 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.

- C. Where other criteria are met, Contractor shall give preference to products that:
 - 1. If used on interior, have lower emissions, as defined.
 - 2. If wet-applied, have lower VOC content, as defined.
 - 3. Have a published GreenScreen Chemical Hazard Analysis.

2.03 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.

2.04 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

- A. Eisenbach & Ruhnke Engineering, P.C. will consider requests for substitutions only within 15 days after date of Letter of Award.
- B. Substitutions will not be considered during the bidding phase.
- C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- D. A request for substitution constitutes a representation that the submitter:
 - 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 Yonkers Public Schools.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure (after contract award):
 - 1. Submit one copy of request for substitution for consideration. Limit each request to one proposed substitution.
 - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
 - 3. Engineer will notify Contractor in writing of decision to accept or reject request.
 - 4. Samples, where applicable or requested.

3.02 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.

3.03 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. See Section 01 7419.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- G. Comply with manufacturer's warranty conditions, if any.
- H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- I. Prevent contact with material that may cause corrosion, discoloration, or staining.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 6116

VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Requirements for Indoor-Emissions-Restricted products.
- B. Requirements for VOC-Content-Restricted products.

1.03 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Submittal procedures.
- B. Section 01 4000 - Quality Requirements: Procedures for testing and certifications.
- C. Section 01 6000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

1.04 DEFINITIONS

- A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:
 - 1. Interior paints and coatings.
 - 2. Interior adhesives and sealants, including flooring adhesives.
- B. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:
 - 1. Exterior and interior adhesives and sealants, including flooring adhesives.
- C. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.
- D. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.
- E. Inherently Non-Emitting Materials: Products composed wholly of minerals or metals, unless they include organic-based surface coatings, binders, or sealants; and specifically the following:
 - 1. Concrete.
 - 2. Clay brick.
 - 3. Metals that are plated, anodized, or powder-coated.
 - 4. Glass.
 - 5. Ceramics.
 - 6. Solid wood flooring that is unfinished and untreated.

1.05 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 D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings; 2005 (Reapproved 2013).
- C. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

1.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.

1.07 QUALITY ASSURANCE

- A. VOC Content Test Method: 40 CFR 59, Subpart D (EPA Method 24), or ASTM D3960, unless otherwise indicated.

1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Report of laboratory testing performed in accordance with requirements.
- B. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.
- B. VOC-Content-Restricted Products: VOC content not greater than required by the following:
 1. Adhesives, Including Flooring Adhesives: SCAQMD 1168 Rule.
 2. Joint Sealants: SCAQMD 1168 Rule.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Yonkers Public Schools reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Yonkers Public Schools
- B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION

SECTION 01 70 00

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract apply to this Section.

1.02 SECTION INCLUDES

- A. Inspections prior to start of work.
- B. Examination, preparation, and general installation procedures.
- C. General installation of products.
- D. Progress cleaning.
- E. Protection of installed construction.
- F. Correction of Work.
- G. Requirements for alterations work, including selective demolition and asbestos abatement.
- H. Pre-installation meetings.
- I. Cutting and patching.
- J. Surveying for laying out the work.
- K. Cleaning and protection.
- L. Closeout procedures, except payment procedures.
- M. Final Cleaning.

1.03 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary of Contracts: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 01 3000 - Administrative Requirements: Submittals procedures.
- C. Section 01 4000 - Quality Requirements: Testing and inspection procedures.
- D. Section 01 5000 - Temporary Facilities and Controls
- E. Section 01 5000 - Temporary Facilities and Controls: Temporary interior partitions.
- F. Section 01 7419 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.
- G. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
 - 1. On request, submit documentation verifying accuracy of survey work.
 - 2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in conformance with Contract Documents.
 - 3. Submit surveys and survey logs for the project record.
- 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. Work of Yonkers Public School District or separate Contractor.

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

1.05 QUALIFICATIONS

- A. For demolition work, employ a firm specializing in the type of work required.
- B. For survey work, employ a land surveyor registered in the State in which the Project is located and acceptable to Engineer. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.

1.06 COORDINATION

- A. See Section 01 1000 for occupancy-related requirements.
- B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- C. Notify affected utility companies and comply with their requirements.
- D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- G. Coordinate completion and clean-up of work of separate sections.
- H. After Yonkers Public School District 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 School District's activities.

1.07 CODES, PERMITS, FEES, ETC. REFER TO SECTION 01 41 00 REGULATORY REQUIREMENTS

- A. Refer to Owner Contractor Agreement for additional requirements.
- B. Any items of work specified herein and shown on the drawings which conflict with aforementioned rules, regulations and requirements, shall be referred to the Engineer, Owner, and Architect for decision, which decision shall be final and binding.
- C. The building is to be constructed under the following Rules and Regulations of the 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

1.08 MANDATORY OSHA CONSTRUCTION SAFETY AND HEALTH TRAINING

- A. Effective July 18, 2008 - Pursuant to NYS Labor Law §220-h - On all public work projects of at least \$250,000 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

2.01 PATCHING 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.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Examine and verify specific conditions described in individual specification sections.
- C. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- D. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- 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.

3.02 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.

3.03 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 Engineer 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 Engineer, Yonkers Public School District, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Engineer of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.

- F. Utilize recognized engineering survey practices.
- G. Periodically verify layouts by same means.
- H. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

- A. 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.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 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 shown.
 - 2. Report discrepancies to Engineer 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.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 50 00 in locations indicated on drawings.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
 - 1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
 - 2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.
- D. 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. Relocate items indicated on drawings.
 - 4. 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.
 - 5. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): 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 systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
 - 3. 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. Disable existing systems only to make switchovers and connections; minimize duration of outages.
 - b. Provide temporary connections as required to maintain existing systems in service.
 - 4. Verify that abandoned services serve only abandoned facilities.

5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; 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.
- F. 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.
- G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
 1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Engineer.
- H. 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.
- I. Clean existing systems and equipment.
- J. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- K. Do not begin new construction in alterations areas before demolition is complete.
- L. Comply with all other applicable requirements of this section.

3.07 FIRE PREVENTION AND CONTROL

- A. Each Contractor shall abide by such rules and instructions as to fire prevention and control as required by the Owner, Owner's Representative, Engineer and Fire Department. The Contractor(s) shall take all necessary steps to prevent its employees from setting fires not required in the construction of the facility and shall be responsible for preventing the escape of fires set in connection with the construction and shall at all times provide the proper housekeeping to minimize potential fire hazards.
- 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 Construction 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.

3.08 SECURITY SYSTEM

- 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.

3.09 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. 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 mechanical, 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 and replace defective and non-conforming work.
- C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- E. Restore work with new products in accordance with requirements of Contract Documents.

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

3.10 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.11 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. 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.
- G. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

3.12 ADJUSTING

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

3.13 FINAL CLEANING

- A. Final cleaning shall be the responsibility of the General Construction 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 final project assessment.
 - 1. Clean areas to be occupied by Yonkers Public Schools prior to final completion before Yonkers Public Schools occupancy.
- C. Use cleaning materials that are nonhazardous.
- D. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- E. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- F. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- G. Clean filters of operating equipment.
- H. Clean debris from roofs, gutters, downspouts, and drainage systems.

- I. Clean site; sweep paved areas, rake clean landscaped surfaces.
- J. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.
- K. 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.
- L. 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.
- M. Cleaning Agents: Use cleaning materials and agents recommended by the manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
- N. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
- O. Wax all resilient flooring.
- P. 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
- Q. Leave Project clean and ready for occupancy.
- R. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

3.14 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
- B. Notify Engineer when work is considered ready for Substantial Completion.
- C. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Engineer's review.
- D. Correct items of work listed in executed Certificates of Substantial Completion and comply with requirements for access to Yonkers Public School District-occupied areas.
- E. Notify Engineer when work is considered finally complete.
- F. Complete items of work determined by Engineer's final inspection.

END OF SECTION

SECTION 01 7329

CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. This Section includes procedural requirements for cutting and patching.
 - 1. Refer to other Sections for specific requirements and limitations applicable to cutting and patching.
 - 2. Requirements of this Section apply to all contracts. Refer to various sections and divisions of these specifications for other requirements and limitations applicable to cutting and patching.
 - 3. Contractor acknowledges that the work involves renovation and alteration of existing improvements and, therefore, cutting and patching of the work is essential for the Project to be successfully completed. Contractor shall perform any cutting, altering, patching and fitting of the work necessary for the work and the existing improvements to be fully integrated and to present the visual appearance of an entire, completed, and unified project. In performing any work which requires cutting, fixing, or patching, Contractor shall use its best efforts to protect and preserve the visual appearance and aesthetics of the project to the reasonable satisfaction of both the Owner and the Architect.
 - 4. Each Contractor shall do all cutting, patching, repairing as necessary for their work. In all cases, the cutting, patching, repairing and finishing shall be performed by mechanics skilled in the particular trade required at no additional cost to the Owner.

1.3 RELATED SECTIONS

- A. Division 1 Section "Selective Removals" for demolition of selected portions of the building for alterations.
- B. Division 7 Section "Through-Penetration Firestop Systems" for patching fire-rated construction.
- C. Divisions 2 through 33 Sections for additional requirements and limitations applicable to cutting and patching individual parts of the Work.
- D. Requirements in this Section apply to general construction, HVAC, plumbing, and electrical installations. Refer to Divisions 22, 23, and 26 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.4 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.5 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching; show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.

4. Dates: Indicate when cutting and patching will be performed.
5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.6 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch the following operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 1. Primary operational systems and equipment.
 - a. Air or smoke barriers.
 - b. Fire-protection systems.
 - c. Control systems.
 - d. Communication systems.
 - e. Conveying systems.
 - f. Electrical wiring systems.
 - g. Operating systems of special construction in Division 13 Sections.
- C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 1. Water, moisture, or vapor barriers.
 - a. Membranes and flashings.
 - b. Exterior curtain-wall construction.
 - c. Equipment supports.
 - d. Piping, ductwork, vessels, and equipment.
 - e. Noise- and vibration-control elements and systems.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- E. If possible, retain original Installer or fabricator to cut and patch exposed Work listed below. If it is impossible to engage original Installer or fabricator, engage another recognized, experienced, and specialized firm.
 1. Processed concrete finishes.
 2. Stonework and stone masonry.
 3. Ornamental metal.
 4. Matched-veneer woodwork.
 5. Preformed metal panels.
 6. Roofing.
 7. Firestopping.
 8. Window wall system.
 9. Stucco and ornamental plaster.

10. Terrazzo.
 11. Finished wood flooring.
 12. Fluid-applied flooring.
 13. Aggregate wall coating.
 14. Wall covering.
 15. HVAC enclosures, cabinets, or covers.
- F. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.7 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.
- B. Prior to cutting and patching verify with Yonkers Public Schools all existing warranties in effect.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
- B. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
- B. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition. A sufficient time in advance of the construction of new walls, floors, pavement, or roofing etc. Each Contractor shall be responsible for properly locating and providing in place all sleeves, inserts and forms required for work.
- C. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining

construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete/Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
- D. All cutting of holes in existing walls, existing floors, existing roofs, existing ceilings, etc. for the removal of any existing work (including, but not limited to ducts, fans, fixtures, motors, equipment, drains, wiring, conduit, etc.) or for the installation of any new work shall be done in a neat manner by each Contractor. Debris caused by such cutting or removals will be removed by each Contractor.
- E. Where sleeves, inserts or openings are required in existing walls, floors, roofs, vaults and pavements of existing buildings or structures, all necessary cutting, furnishing and installing of sleeves, inserts, lintels, etc., shall be done by each Contractor as required by his work.
- F. Contractor(s) are hereby notified that the existing walls in the existing building are of varying materials. . All new openings in existing masonry walls shall be provided with steel lintels, minimum 4" bearing each side x wall thickness concrete masonry units filled solid on each side of the opening for proper support. See drawings for additional details and requirements.
- G. Adequate blocking, fastening, etc., required to support equipment, casework, etc., from existing walls shall be included as required to complete work.
- H. All surfaces where existing items are removed from existing walls, floors, ceilings, roofs, vaults, etc. shall be patched to match existing surfaces.
1. All patching shall be provided with prime and finish paint or other material to match existing. In areas indicated to be completely painted/finished by the contractor for construction, other prime contractors shall be required only to patch existing surfaces to match as required to accept new finishes.
 2. Proceed with patching after construction operations requiring cutting are complete.
- I. Removals of selected portions of the building for alterations is included in Section "Selective Removals".
- J. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

3.4 CLEANING

- A. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

END OF SECTION

SECTION 01 7419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

- A. Yonkers Public School District 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. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, 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.
- E. 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.
- F. Regulatory Requirements: 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.

1.02 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.

1.03 SUBMITTALS

- A. 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 Yonkers Public School District.
 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. Incinerator Disposal: Include the following information:
 - a. Identification of material.
 - b. Amount, in tons or cubic yards, of trash/waste material from the project delivered to incinerators.
 - c. State the identity of incinerators, total amount of fees paid to incinerator, and total disposal cost.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 5. 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.
 6. 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.
 7. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 3 EXECUTION

2.01 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, Yonkers Public School District, and Engineer.
- 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. Pre-bid meeting.
 2. Pre-construction 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

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract apply to work of this section.

1.02 SECTION INCLUDES

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

1.03 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Section 01 7000 - Execution and Closeout Requirements: Contract closeout procedures.
- C. Individual Product Sections: Warranties required for specific products or Work.

1.04 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 Owner's Representative, Engineer, and Architect of pending insurance changeover requirements.
 - 3. Obtain and submit releases permitting Owner's Representative, Engineer, and Architect 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 Owner's Representative, Engineer, and Architect a request to perform site inspection for the purpose of preparing a "punch list".
- C. On receipt of request Owner's Representative, Engineer, and Architect will prepare a punch list. Certificate of Substantial Completion after completion of all punch list items or will notify Contractor of items, either punch list or additional items identified by Architect that must be completed or corrected before certificate will be issued
- D. Certificate of Substantial Completion will be issued after completion of all punch list items or Owner's Representative, Engineer, and Architect will notify Contractor of items, either punch list or additional items identified by Architect, that must be completed or corrected before certificate will be issued. After completion of "punch list" items submit the following:
 - 1. Application for Payment showing 100 percent completion for portion of the Work claimed as substantially completed the following:
 - 2. Warranties (guarantees).
 - 3. Maintenance Manuals and instructions.
 - 4. Final cleaning.
 - 5. List of incomplete Work, recognized as exceptions to Architect's "punch list"..
 - 6. Engineer/Architect's punch list certifying all punch list items have been completed and signed off by the Owner's Representative and Contractor.
 - 7. Removal of temporary facilities and services.
 - 8. Removal of surplus materials, rubbish and similar elements.
- E. Request re inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.05 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
 - 1. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Owner's Representative, Engineer, and Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will not process a final Certificate for Payment until after the inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
- B. Following Final Inspection acceptance of work submit the following:
 - 1. Submit a final Application for Payment.
 - 2. Submit certified copy of Architect's Substantial Completion punch list items endorsed and dated Contractor and Owner's Representative certifying each item has been completed or otherwise resolved for acceptance.
 - 3. Release of liens from contractor and all entitles of contractor.
 - 4. AIA Document G707 Consent of Surety to Final Payment.
 - 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. Certification of Payment of Prevailing Wage Rates.
 - 9. Contractor's certified statement that no asbestos containing material was incorporated into the project.

1.06 SUBMITTALS

- A. Contractor shall submit all documentation identified in this section within sixty (60) days from the time the Contractor submits the list of items to be corrected, as referred to in Article 14.4.1 of the General Conditions, "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 sixty 60 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 thirty 30 days prior to the culmination date and again, seven 7 days prior to the culmination date by written notice.
- B. Project Record Documents: Submit documents to Engineer 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

3.01 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 Yonkers Public School District.
- 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.

3.02 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. The 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.
 - 1. Accurately record information in an understandable drawing technique.
- D. Content: Types of items requiring marking include, but are not limited to, the following:
 - 1. Revisions to details shown on Drawings.
 - 2. Changes made by Change Order or Construction Change Directive.
 - 3. Changes made following Engineer/Architect's written orders.
 - 4. 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.

3.03 RECORD CAD DRAWINGS: IMMEDIATELY BEFORE INSPECTION FOR CERTIFICATE OF SUBSTANTIAL COMPLETION, REVIEW MARKED-UP RECORD PRINTS WITH ARCHITECT AND OWNER'S REPRESENTATIVE. WHEN AUTHORIZED, PREPARE A FULL SET OF CORRECTED CAD DRAWINGS OF THE CONTRACT DRAWINGS, AS FOLLOWS:

- A. Format: Same CAD program, version, and operating system as the original Contract Drawings.
- B. Incorporate changes and additional information previously marked on Record Prints. Delete, re draw, and add details and notations where applicable.
 - 1. Refer instances of uncertainty to Architect through Owner's Representative for resolution.
- C. Owner will furnish Contractor one set of CAD Drawings of the Contract Drawings for use in recording information.
 - 1. Architect makes no representations as to the accuracy or completeness of CAD Drawings as they relate to the Contract Drawings.
 - 2. CAD Software Program: The Contract Drawings are available in Auto CAD 2007.

3.04 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. Record CAD Drawings: Organize CAD information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each CAD file.
- D. Identify Record Drawing as follows:
 - 1. Project name.
 - a. Date.
 - b. Designation "PROJECT RECORD DRAWINGS."

- c. Name of Architect and Owner's Representative.
- d. Name of Contractor.
- e. Contractor shall certify and sign each drawing

3.05 MAINTENANCE OF RECORDS

- A. The Contractor shall maintain the records required in Title 29 CFR 1926.1101 (n) and Part 56 of Title 12 of the Official Compilation of Codes, Rules and Regulations of the State of New York.
- B. The Contractor shall provide the Owner and Engineer with two electronic copies (disk in pdf format) and Two (2) printed copies of all records.

3.06 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.

3.07 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 Yonkers Public School District's permission, leave date of beginning of time of warranty until the 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.

END OF SECTION

SECTION 01 7900
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

- A. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
 - 1. HVAC systems and equipment.

1.02 RELATED REQUIREMENTS

- A. Section 01 7800 - Closeout Submittals: Operation and maintenance manuals.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures; except:
 - 1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority.
 - 2. Submit one copy to the Commissioning Authority, not to be returned.
 - 3. Make commissioning submittals on time schedule specified by Commissioning Authority.
 - 4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of overall Training Plan; submit in editable electronic format, Microsoft Word 2003 preferred.
- B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
 - 1. Submit to Commissioning Authority for review and inclusion in overall training plan.
 - 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 Contractor.
- 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.

1.04 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

3.01 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 Owner.
- B. Demonstrations conducted during Functional Testing need not be repeated unless Owner personnel training is specified.
- C. Demonstration may be combined with Owner personnel training if applicable.
- D. 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.
- E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
 - 1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.02 TRAINING - GENERAL

- A. Commissioning Authority will prepare the Training Plan based on draft plans submitted.
- B. Conduct training on-site unless otherwise indicated.
- C. Owner will provide classroom and seating at no cost to Contractor.
- D. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.
- E. Provide training in minimum two hour segments.
- F. The Commissioning Authority is responsible for determining that the training was satisfactorily completed and will provide approval forms.
- G. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.
- H. 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.
- I. 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.

- J. 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 01 9113
GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Commissioning is intended to achieve the following specific objectives; this section specifies the Contractor's responsibilities for commissioning:
 - 1. Verify that the work is installed in accordance with Contract Documents and the manufacturer's recommendations and instructions, and that it receives adequate operational checkout prior to startup: Startup reports and Prefunctional Checklists executed by Contractor are utilized to achieve this.
 - 2. Verify and document that functional performance is in accordance with Contract Documents: Functional Tests executed by Contractor and witnessed by the Commissioning Authority are utilized to achieve this.
 - 3. Verify that operation and maintenance manuals submitted to Owner are complete: Detailed operation and maintenance (O&M) data submittals by Contractor are utilized to achieve this.
 - 4. Verify that the Owner's operating personnel are adequately trained: Formal training conducted by Contractor is utilized to achieve this.
- B. The Commissioning Authority directs and coordinates all commissioning activities; this section describes some but not all of the Commissioning Authority's responsibilities.

1.02 RELATED REQUIREMENTS

- A. Section 01 7000 - Execution and Closeout Requirements: General startup requirements.
- B. Section 01 7800 - Closeout Submittals: Scope and procedures for operation and maintenance manuals and project record documents.
- C. Section 01 7900 - Demonstration and Training: Scope and procedures for Owner personnel training.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures; except:
 - 1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority, unless they require review by Architect; in that case, submit to Architect first.
 - 2. Submit one copy to the Commissioning Authority, not to be returned.
 - 3. Make commissioning submittals on time schedule specified by Commissioning Authority.
 - 4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of Prefunctional Checklists or Functional Test requirements; submit in editable electronic format, Microsoft Word 2010 preferred.
 - 5. As soon as possible after submittals made to Architect are approved, submit copy of approved submittal to the Commissioning Authority.
- B. Product Data: If submittals to Architect do not include the following, submit copies as soon as possible:
 - 1. Manufacturer's product data, cut sheets, and shop drawings.
 - 2. Manufacturer's installation instructions.
 - 3. Startup, operating, and troubleshooting procedures.
 - 4. Fan and pump curves.
 - 5. Factory test reports.
 - 6. Warranty information, including details of Owner's responsibilities in regard to keeping warranties in force.
- C. Manufacturers' Instructions: Submit copies of all manufacturer-provided instructions that are shipped with the equipment as soon as the equipment is delivered.
- D. Startup Plans and Reports.
- E. Completed Prefunctional Checklists.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

- A. Provide all standard testing equipment required to perform startup and initial checkout and required Functional Testing; unless otherwise noted such testing equipment will NOT become the property of Owner.
- B. Calibration Tolerances: Provide testing equipment of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. If not otherwise noted, the following minimum requirements apply:
 - 1. Temperature Sensors and Digital Thermometers: Certified calibration within past year to accuracy of 0.5 degree F (0.3 degree C) and resolution of plus/minus 0.1 degree F (0.05 degree C).
 - 2. Pressure Sensors: Accuracy of plus/minus 2.0 percent of the value range being measured (not full range of meter), calibrated within the last year.
 - 3. Calibration: According to the manufacturer's recommended intervals and when dropped or damaged; affix calibration tags or keep certificates readily available for inspection.
- C. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to Owner; such equipment, tools, and instruments are to become the property of Owner.
- D. Dataloggers: Independent equipment and software for monitoring flows, currents, status, pressures, etc. of equipment.
 - 1. Dataloggers required to for Functional Tests will be provided by the Commissioning Authority and will not become the property of Owner.

PART 3 EXECUTION

3.01 COMMISSIONING PLAN

- A. Commissioning Authority has prepared the Commissioning Plan.
 - 1. Attend meetings called by the Commissioning Authority for purposes of completing the commissioning plan.
 - 2. Require attendance and participation of relevant subcontractors, installers, suppliers, and manufacturer representatives.
- B. Contractor is responsible for compliance with the Commissioning Plan.
- C. Commissioning Plan: The commissioning schedule, procedures, and coordination requirements for all parties in the commissioning process.
- D. Commissioning Schedule:
 - 1. Submit anticipated dates of startup of each item of equipment and system to Commissioning Authority within 60 days after award of Contract.
 - 2. Re-submit anticipated startup dates monthly, but not less than 4 weeks prior to startup.
 - 3. Prefunctional Checklists and Functional Tests are to be performed in sequence from components, to subsystems, to systems.
 - 4. Provide sufficient notice to Commissioning Authority for delivery of relevant Checklists and Functional Test procedures, to avoid delay.

3.02 STARTUP PLANS AND REPORTS

- A. Startup Plans: For each item of equipment and system for which the manufacturer provides a startup plan, submit the plan not less than 8 weeks prior to startup.
- B. Startup Reports: For each item of equipment and system for which the manufacturer provides a startup checklist (or startup plan or field checkout sheet), document compliance by submitting the completed startup checklist prior to startup, signed and dated by responsible entity.
- C. Submit directly to the Commissioning Authority.

3.03 PREFUNCTIONAL CHECKLISTS

- A. A Prefunctional Checklist is required to be filled out for each item of equipment or other assembly specified to be commissioned.
 - 1. No sampling of identical or near-identical items is allowed.
 - 2. These checklists do not replace manufacturers' recommended startup checklists, regardless of apparent redundancy.
 - 3. Prefunctional Checklist forms will not be complete until after award of the contract; the following types of information will be gathered via the completed Checklist forms:
 - a. Certification by installing contractor that the unit is properly installed, started up, and operating and ready for Functional Testing.
 - b. Confirmation of receipt of each shop drawing and commissioning submittal specified, itemized by unit.
 - c. Manufacturer, model number, and relevant capacity information; list information "as specified," "as submitted," and "as installed."
 - d. Serial number of installed unit.
 - e. List of inspections to be conducted to document proper installation prior to startup and Functional Testing; these will be primarily static inspections and procedures; for equipment and systems may include normal manufacturer's start-up checklist items and minor testing.
 - f. Sensor and actuator calibration information.
- B. Contractor is responsible for filling out Prefunctional Checklists, after completion of installation and before startup; witnessing by the Commissioning Authority is not required unless otherwise specified.
 - 1. Each line item without deficiency is to be witnessed, initialed, and dated by the actual witness; checklists are not complete until all line items are initialed and dated complete without deficiencies.
 - 2. Checklists with incomplete items may be submitted for approval provided the Contractor attests that incomplete items do not preclude the performance of safe and reliable Functional Testing; re-submission of the Checklist is required upon completion of remaining items.
 - 3. Individual Checklists may contain line items that are the responsibility of more than one installer; Contractor shall assign responsibility to appropriate installers or subcontractors, with identification recorded on the form.
 - 4. If any Checklist line item is not relevant, record reasons on the form.
 - 5. Contractor may independently perform startup inspections and/or tests, at Contractor's option.
 - 6. Regardless of these reporting requirements, Contractor is responsible for correct startup and operation.
 - 7. Submit completed Checklists to Commissioning Authority within two days of completion.
- C. Commissioning Authority is responsible for furnishing the Prefunctional Checklists to Contractor.
 - 1. Initial Drafts: Contractor is responsible for initial draft of Prefunctional Checklist where so indicated in Contract Documents.
 - 2. Provide all additional information requested by Commissioning Authority to aid in preparation of checklists, such as shop drawing submittals, manufacturers' startup checklists, and O&M data.
 - 3. Commissioning Authority may add any relevant items deemed necessary regardless of whether they are explicitly mentioned in Contract Documents or not.
 - 4. When asked to review the proposed Checklists, do so in a timely manner.
- D. Commissioning Authority Witnessing: Required for:
 - 1. Each piece of primary equipment, unless sampling of multiple similar units is allowed by the commissioning plan.
 - 2. A sampling of non-primary equipment, as allowed by the commissioning plan.
- E. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.
 - 1. If difficulty in correction would delay progress, report deficiency to the Commissioning Authority immediately.

3.04 FUNCTIONAL TESTS

- A. A Functional Test is required for each item of equipment, system, or other assembly specified to be commissioned, unless sampling of multiple identical or near-identical units is allowed by the final test procedures.
- B. Contractor is responsible for execution of required Functional Tests, after completion of Prefunctional Checklist and before closeout.
- C. Commissioning Authority is responsible for witnessing and reporting results of Functional Tests, including preparation and completion of forms for that purpose.
- D. Contractor is responsible for correction of deficiencies and re-testing at no extra cost to Owner; if a deficiency is not corrected and re-tested immediately, the Commissioning Authority will document the deficiency and the Contractor's stated intentions regarding correction.
 - 1. Deficiencies are any condition in the installation or function of a component, piece of equipment or system that is not in compliance with Contract Documents or does not perform properly.
 - 2. When the deficiency has been corrected, the Contractor completes the form certifying that the item is ready to be re-tested and returns the form to the Commissioning Authority; the Commissioning Authority will reschedule the test and the Contractor shall re-test.
 - 3. Identical or Near-Identical Items: If 10 percent, or three, whichever is greater, of identical or near-identical items fail to perform due to material or manufacturing defect, all items will be considered defective; provide a proposal for correction within 2 weeks after notification of defect, including provision for testing sample installations prior to replacement of all items.
 - 4. Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing.
 - 5. Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing if the test failed due to failure to execute the relevant Prefunctional Checklist correctly; if the test failed for reasons that would not have been identified in the Prefunctional Checklist process, Contractor shall bear the cost of the second and subsequent re-tests.
- E. Functional Test Procedures:
 - 1. Some test procedures are included in Contract Documents; where Functional Test procedures are not included in Contract Documents, test procedures will be determined by the Commissioning Authority with input by and coordination with Contractor.
 - 2. Examples of Functional Testing:
 - a. Test the dynamic function and operation of equipment and systems (rather than just components) using manual (direct observation) or monitoring methods under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint).
 - b. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc.
 - c. Systems are run through all the HVAC control system's sequences of operation and components are verified to be responding as the sequence's state.
 - d. Traditional air or water test and balancing (TAB) is not Functional Testing; spot checking of TAB by demonstration to the Commissioning Authority is Functional Testing.
- F. Deferred Functional Tests: Some tests may need to be performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions; performance of these tests remains the Contractor's responsibility regardless of timing.

3.05 SENSOR AND ACTUATOR CALIBRATION

- A. Calibrate all field-installed temperature, relative humidity, carbon monoxide, carbon dioxide, and pressure sensors and gauges, and all actuators (dampers and valves) on this piece of equipment shall be calibrated. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.
- B. Calibrate using the methods described below; alternate methods may be used, if approved by Commissioning Authority and Owner beforehand. See PART 2 for test instrument requirements.

Record methods used on the relevant Prefunctional Checklist or other suitable forms, documenting initial, intermediate and final results.

- C. All Sensors:
 - 1. Verify that sensor location is appropriate and away from potential causes of erratic operation.
 - 2. Verify that sensors with shielded cable are grounded only at one end.
 - 3. For sensor pairs that are used to determine a temperature or pressure difference, for temperature make sure they are reading within 0.2 degree F (0.1 degree C) of each other, and for pressure, within tolerance equal to 2 percent of the reading, of each other.
 - 4. Tolerances for critical applications may be tighter.
- D. Sensors Without Transmitters - Standard Application:
 - 1. Make a reading with a calibrated test instrument within 6 inches (150 mm) of the site sensor.
 - 2. Verify that the sensor reading, via the permanent thermostat, gauge or building automation system, is within the tolerances in the table below of the instrument-measured value.
 - 3. If not, install offset, calibrate or replace sensor.
- E. Sensors With Transmitters - Standard Application.
 - 1. Disconnect sensor.
 - 2. Connect a signal generator in place of sensor.
 - 3. Connect ammeter in series between transmitter and building automation system control panel.
 - 4. Using manufacturer's resistance-temperature data, simulate minimum desired temperature.
 - 5. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter.
 - 6. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the building automation system.
 - 7. Record all values and recalibrate controller as necessary to comply with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction.
 - 8. Reconnect sensor.
 - 9. Make a reading with a calibrated test instrument within 6 inches (150 mm) of the site sensor.
 - 10. Verify that the sensor reading, via the permanent thermostat, gauge or building automation system, is within the tolerances in the table below of the instrument-measured value.
 - 11. If not, replace sensor and repeat.
 - 12. For pressure sensors, perform a similar process with a suitable signal generator.
- F. Sensor Tolerances for Standard Applications: Plus/minus the following maximums:
 - 1. Watthour, Voltage, Amperage: 1 percent of design.
 - 2. Pressure, Air, Water, Gas: 3 percent of design.
 - 3. Air Temperatures (Outside Air, Space Air, Duct Air): 0.4 degrees F (0.2 degree C).
 - 4. Relative Humidity: 4 percent of design.
 - 5. Barometric Pressure: 0.1 inch of Hg (340 Pa).
 - 6. Flow Rate, Air: 10 percent of design.
 - 7. Flow Rate, Water: 4 percent of design.
 - 8. AHU Wet Bulb and Dew Point: 2.0 degrees F (1.1 degrees C).
- G. Critical Applications: For some applications more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.
- H. Valve/Damper Stroke Setup and Check:
 - 1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
 - 2. Set pump/fan to normal operating mode.
 - 3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
 - 4. Command valve/damper to open; verify position is full open and adjust output signal as required.
 - 5. Command valve/damper to a few intermediate positions.
 - 6. If actual valve/damper position does not reasonably correspond, replace actuator or add pilot positioner (for pneumatics).
- I. Isolation Valve or System Valve Leak Check: For valves not associated with coils.

1. With full pressure in the system, command valve closed.
2. Use an ultra-sonic flow meter to detect flow or leakage.

3.06 TEST PROCEDURES - GENERAL

- A. Provide skilled technicians to execute starting of equipment and to execute the Functional Tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
- B. Provide all necessary materials and system modifications required to produce the flows, pressures, temperatures, and conditions necessary to execute the test according to the specified conditions. At completion of the test, return all affected equipment and systems to their pre-test condition.
- C. Sampling: Where Functional Testing of fewer than the total number of multiple identical or near-identical items is explicitly permitted, perform sampling as follows:
 1. Identical Units: Defined as units with same application and sequence of operation; only minor size or capacity difference.
 2. Sampling is not allowed for:
 - a. Major equipment.
 - b. Life-safety-critical equipment.
 - c. Prefunctional Checklist execution.
 3. XX = the percent of the group of identical equipment to be included in each sample; defined for specific type of equipment.
 4. YY = the percent of the sample that if failed will require another sample to be tested; defined for specific type of equipment.
 5. Randomly test at least XX percent of each group of identical equipment, but not less than three units. This constitutes the "first sample."
 6. If YY percent of the units in the first sample fail, test another XX percent of the remaining identical units.
 7. If YY percent of the units in the second sample fail, test all remaining identical units.
 8. If frequent failures occur, resulting in more troubleshooting than testing, the Commissioning Authority may stop the testing and require Contractor to perform and document a checkout of the remaining units prior to continuing testing.
- D. Manual Testing: Use hand-held instruments, immediate control system readouts, or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").
- E. Simulating Conditions: Artificially create the necessary condition for the purpose of testing the response of a system; for example apply hot air to a space sensor using a hair dryer to see the response in a VAV box.
- F. Simulating Signals: Disconnect the sensor and use a signal generator to send an amperage, resistance or pressure to the transducer and control system to simulate the sensor value.
- G. Over-Writing Values: Change the sensor value known to the control system in the control system to see the response of the system; for example, change the outside air temperature value from 50 degrees F to 75 degrees F to verify economizer operation.
- H. Indirect Indicators: Remote indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100 percent closed, are considered indirect indicators.
- I. Monitoring: Record parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of the relevant control systems; where monitoring of specific points is called for in Functional Test Procedures:
 1. All points that are monitored by the relevant control system shall be trended by Contractor; at the Commissioning Authority's request, Contractor shall trend up to 20 percent more points than specified at no extra charge.
 2. Other points will be monitored by the Commissioning Authority using dataloggers.
 3. At the option of the Commissioning Authority, some control system monitoring may be replaced with datalogger monitoring.

4. Provide hard copies of monitored data in columnar format with time down left column and at least 5 columns of point values on same page.
5. Graphical output is desirable and is required for all output if the system can produce it.
6. Monitoring may be used to augment manual testing.

3.07 OPERATION AND MAINTENANCE MANUALS

- A. See Section 01 7800 - Closeout Submittals for additional requirements.
- B. Add design intent documentation furnished by Architect to manuals prior to submission to Owner.
- C. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.
- D. Commissioning Authority will add commissioning records to manuals after submission to Owner.

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. Fire retardant treated wood materials.
- B. Concealed wood blocking, nailers, and supports toilet accessories and hardware.
- C. Miscellaneous wood nailers, furring, and grounds.

1.3 RELATED REQUIREMENTS

- A. Section 10 2800 - Toilet And Bath Accessories.

1.4 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.
- B. AWPA U1 - Use Category System: User Specification for Treated Wood; 2017.
- C. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. PS 1 - Structural Plywood; 2009.
- E. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; 2010.
- F. PS 20 - American Softwood Lumber Standard; 2015.
- G. 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 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. 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.

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, and installation.

1.8 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.
- B. Correct defective Work within a two (2) year period after Date of Substantial Completion.

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 carpentry 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.

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. Plywood Associated with Roofing Applications: Exterior Grade APA rated CDX underlayment.
- B. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, 3/4 inch (19 mm) thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
- C. Other Applications:
 - 1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
 - 2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
 - 3. Other Locations: PS 1, C-D Plugged or better.

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, and high humidity areas and 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.

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.
 - c. Substitutions: 01 2500 - Substitution Procedures
 2. Interior Type A: AWWPA 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 and bath accessories.
 3. Toilet Partitions
 4. Visual display boards

3.4 INSTALLATION OF CONSTRUCTION PANELS

- A. Blocking and Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches (610 mm) 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.

3.5 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.

3.6 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 07 8400
FIRESTOPPING**

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

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.

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. ITS (DIR) - Directory of Listed Products; current edition.
- F. FM 4991 - Approval Standard for Firestop Contractors; 2013.
- G. FM (AG) - FM Approval Guide; current edition.
- H. SCAQMD 1168 - Adhesive and Sealant Applications; 1989 (Amended 2017).
- I. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.
- J. UL (FRD) - Fire Resistance Directory; Current Edition.
- K. 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:

PART 2 PRODUCTS

2.1 MATERIALS

- A. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

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 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.
 - 3. 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 Floors By:
 - 1. Multiple Penetrations in Large Openings:
 - a. 1 & 2 Hour Construction: UL System F-A-8012; Hilti CFS-S SIL GG Firestop Silicone Sealant Gun-Grade or CFS-S SIL SL Firestop Silicone Sealant Self-Leveling.
 - 2. Uninsulated Metallic Pipe, Conduit, and Tubing:

- a. 1 & 2 Hour Construction: UL System F-A-1016; Hilti CP 680-P/M Cast-In Device.
- 3. Insulated Pipes:
 - a. 2 Hour Construction: UL System F-A-5015; Hilti CP 680-P/M Cast-In Device.
- C. Penetrations Through Walls By:
 - 1. Uninsulated Metallic Pipe, Conduit, and Tubing:
 - a. 2 Hour Construction: UL System W-J-1067; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 1 Hour Construction: UL System W-J-1067; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - 2. Electrical Cables Not In Conduit:
 - a. 2 Hour Construction: UL System C-AJ-3095; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - 3. Insulated Pipes:
 - a. 2 Hour Construction: UL System C-AJ-5091; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 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 (0.009 kg/cu m).
 - 2. Manufacturers:
 - a. Thermafiber, Inc; Product Thermafiber Safing: www.thermafiber.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
 - 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 General Conditions and other Division 1 Specification Sections, apply to this Section.

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 07 2500 - Weather Barriers: Sealants required in conjunction with air barriers and vapor retarders.
- C. Section 07 8400 - Firestopping: Firestopping sealants.
- D. Section 07 9513 - Expansion Joint Cover Assemblies: Sealants forming part of expansion joint cover assemblies.
- E. Section 08 8001 - GLAZING: Glazing sealants and accessories.
- F. Section 09 2116 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.

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 C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012 (Reapproved 2017).
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- D. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2016.
- 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 C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2013.

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. Sample product warranty.
 7. 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 Eisenbach and Ruhnke Engineers, P.C. and submit at least two physical samples for verification of color of each required sealant.
- F. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.
- G. Field Quality Control Plan: Submit at least two weeks prior to start of installation.
- H. 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.
- I. Field Quality Control Log: Submit filled out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.
- C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- D. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
1. Identification of testing agency.
 2. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
 - a. Test date.
 - b. Copy of test method documents.
 - c. Age of sealant upon date of testing.
 - d. Test results, modeled after the sample form in the test method document.
 - e. Indicate use of photographic record of test.
- E. Field Quality Control Plan:
1. Visual inspection of entire length of sealant joints.
 2. Field testing agency's qualifications.
 3. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.
- F. 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. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
 5. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Yonkers Public Schools.
 6. 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 Eisenbach and Ruhnke Engineers, P.C..
- G. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
1. Sample: At least 18 inches (457 mm) long.
 2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch (25.4 mm) by that percentage; if adhesion failure occurs before the "1 inch mark" is that distance from the substrate, the test has failed.
 3. If either adhesive or cohesive failure occurs prior to minimum elongation, take necessary measures to correct conditions and re-test; record each modification to products or installation procedures.

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. Correct defective work within a five year period after Date of Substantial Completion.
- C. 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 MANUFACTURERS

- A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
 1. Bostik Inc: www.bostik-us.com.
 2. Dow Corning Corporation: www.dowcorning.com/construction.
 3. Sika Corporation: www.usa-sika.com.
 4. W.R. Meadows, Inc: www.wrmeadows.com/sle.
- B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
 1. Sika Corporation: www.usa-sika.com.
 2. W.R. Meadows, Inc: www.wrmeadows.com.

2.2 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. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Openings below ledge angles in masonry.
 - e. Other joints indicated below.
 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. Intentional weepholes in masonry.
 - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
 - e. Joints between suspended panel ceilings/grid and walls.
- B. Vertical Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
1. Type ___ - Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.
- C. Interior Vertical Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
1. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
- D. Exterior and Interior Horizontal Joints: Single component, self-leveling, premium-grade polyurethane sealant

2.3 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 6116.

2.4 NONSAG JOINT SEALANTS

- A. Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 25 percent, minimum.
 2. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
 3. Color: To be selected by Eisenbach and Ruhnke Engineers, P.C. from manufacturer's standard range.
 4. Cure Type: Single-component, neutral moisture curing
 5. Service Temperature Range: Minus 65 to 180 degrees F (Minus 54 to 82 degrees C).
 6. Manufacturers:
 - a. Sika Corporation; Sikasil 728NS: www.usa-sika.com.
 - b. Substitutions: 01 2500 - Substitution Procedures
- B. 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, cabinets, casework, countertops and similar locations..
 3. Manufacturers:
 - a. 786 Mildew Resistant; Dow Corning.
 - b. Pecora Corporation; 898 Silicone Sanitary Sealant: www.pecora.com.
 - c. Sika Corporation; Sikasil GP: www.usa-sika.com.
 - d. Sanitary 1700; GE Silicones..
 4. Substitutions: 01 2500 - Substitution Procedures
- C. 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 Eisenbach and Ruhnke Engineers, P.C. from manufacturer's standard 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: 01 2500 - Substitution Procedures

2.5 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 Eisenbach and Ruhnke Engineers, P.C. from manufacturer's standard range.
 4. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).
 5. Manufacturers:
 - a. Sika Corporation; Sikaflex 1c SL: www.usa-sika.com.
 - b. Use for all horizontal exterior joints and Interior joints in wet areas..
- B. Type ___ - Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
1. Movement Capability: Plus and minus 25 percent, minimum.

2.6 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 horizontal 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 Eisenbach and Ruhnke Engineers, 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 Eisenbach and Ruhnke Engineers, 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. Fire-rated hollow metal doors and frames.
- B. Accessories, including glazing.

1.3 RELATED REQUIREMENTS

- A. Section 04 2000 - Unit Masonry.
- B. Section 08 7100 - Door Hardware.
- C. 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/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
- 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. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
- H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.
- I. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- J. 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.
- K. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2015a.
- L. ASTM C476 - Standard Specification for Grout for Masonry; 2019.
- M. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2016.

- N. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- O. ITS (DIR) - Directory of Listed Products; current edition.
- P. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- Q. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.
- R. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.
- S. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.
- T. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2017.
- U. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2013.
- V. UL (BMD) - Building Materials Directory; current edition.
- W. UL (DIR) - Online Certifications Directory; Current Edition.
- X. UL 10C - Standard for Positive Pressure 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.
 - 1. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 - 2. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 3. Locations of reinforcement and preparations for hardware.
 - 4. Details of anchorages, joints, field splices, and connections.
 - 5. Details of accessories.
 - 6. Details of moldings, removable stops, and glazing.
- D. Samples: If requested by YPS Office of Facilities Management and Fuller and D'Angelo, P.C. Submit two samples of metal, 2 by 2 inches (51 by 51 mm) in size, showing factory finishes, colors, and surface texture.
- E. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- F. 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 and SDI Certified.
- 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.
- D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40" above sill) or UL 10C.
 - 1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.

2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
3. Smoke Control Door Assemblies: Comply with NFPA 105.
 - a. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
- E. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.
- F.

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.

1.9 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.10 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 1. Ceco Door, an Assa Abloy Group company: 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; galvanized 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. Fire-Rated Doors:
 1. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 1, full flush continuous welded.
 - a. Door Face Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
 - b. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
 2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
 - a. Temperature-Rise Rating (TRR) Across Door Thickness: 250 degrees F (121 degrees C) maximum.
 - b. Provide units listed and labeled by UL (DIR) or ITS (DIR).
 - c. Attach fire rating label to each fire rated unit.
 3. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
 4. Door Thickness: 1-3/4 inch (44.5 mm), nominal.
 5. Door Face Sheets: Flush.
 6. Door Finish: Factory primed and field finished.
 7. Product:
 - a. Curries, an Assa Abloy Group Company; Series 707: www.assaabloydss.com.
 - b. Ceco Door, an Assa Abloy Group company; Legion: 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. Interior Door Frames, Fire-Rated: Full profile/continuously welded type..
 1. Fire Rating: Same as door, labeled.
 2. Frame Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.

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. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches (102 mm) as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.
- B. 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.
- C. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.
- D. Frame Anchors: Minimum of six wall anchors and two base anchors.
 1. T anchors for masonry.
- E. Frame Repairs:
 1. Repair dents, patch rust holes, fill in chips etc.

2. Body Filler With Hardener.
3. Color: Light Gray.
4. Manufacturer: 3M Product "Bondo Body Filler 265".

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. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- E. Install door hardware as specified in Section 08 7100.

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 (1.6 mm) 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 1613
FIBERGLASS DOORS AND ALUMINUM 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. Fiberglass reinforced polyester (FRP) doors.
- B. Aluminum Thermal Break Frames for fiberglass reinforced polyester doors.
- C. Snap trim.
- D. Factory installed Finish Hardware
- E. Insulated Infill panels.
- F. Foam door seal.
- G. Accessories.

1.3 RELATED REQUIREMENTS

- A. Section 04 2000 - Unit Masonry
- B. Section 05 5000 - Metal Fabrications for steel lintels.
- C. Section 08 7100 - Door Hardware.
- D. Section 08 8000 - Glazing.

1.4 REFERENCE STANDARDS

- A. AAMA 1304 - Voluntary Specification for Forced Entry Resistance of Side-Hinged Door Systems; 2018.
- B. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- C. ANSI A250.4 – Test Procedure and Acceptance Criteria for Physical Endurance of Steel Doors and Hardware Reinforcing.
- D. ASTM D 543 - Evaluating the Resistance of Plastics to Chemical Reagents
- E. ASTM D 570 - Water Absorption of Plastics
- F. ASTM D 790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
- G. ASTM-B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- H. ASTM-B117 – Standard Practices for Operating Salt Spray (Fog) Apparatus.
- I. ASTM B 221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- J. ASTM-C518 – Standard test Method for Steady-State Thermal Transmission Properties by Means of Heat
- K. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2010 (Reapproved 2018).
- L. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).
- M. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2014.

- N. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2016.
- O. ASTM-D3029 – Test Methods for Impact Resistance of Flat Rigid Plastic Specimens by Means of a Tup (Falling Weight) (Withdrawn 1995) (Replaced by ASTM-D5420).
- P. ASTM D 6670 - Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products
- Q. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.
- R. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- S. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- T. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- U. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).
- V. ASTM-E1886 – Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
- W. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes; 2017.
- X. ASTM F 476 - Security of Swinging Door Assemblies.
- Y. ASTM-F1642-04 – Standard Test Method for Glazing Systems Subject to Air Blast Loading.
- Z. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Obtain hardware templates from hardware manufacturer prior to starting fabrication.

1.6 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard details, installation instructions, hardware and anchor recommendations.
- C. Test Reports: Show compliance with specified criteria.
- D. Shop Drawings: Show layout and profiles; include assembly methods. Shop drawings to be prepared by door manufacturer.
 - 1. Indicate product components, including hardware reinforcement locations and preparations, accessories, finish colors, patterns, and textures.
 - 2. Indicate wall conditions, door and frame elevations, at 1/2" scale, half-sized detail sections, materials, gages, finishes, location of door hardware by dimension, and details of openings; use same reference numbers indicated on Drawings to identify details and openings. expansion provisions, and other components not included in the manufacturer's standard data. Include glazing details
- E. Selection Samples: Submit two complete sets of color chips, illustrating manufacturer's available finishes, colors, and textures.
 - 1. Where normal color and texture variations are expected, include two or more units in each sample to show the range of such variations.

- F. Architect reserves the right to require samples of typical fabricated section, showing joints, exposed fastenings (if any), quality of workmanship, hardware and accessory items, before fabrication of the work proceeds.
- G. Door Corner Sample: Submit corner cross sections, 10 inches (254 mm) by 10 inches (254 mm) in size, illustrating construction, finish, color, and texture.
- H. Manufacturer's Qualification Statement.
- I. Maintenance Data: Include instructions for repair of minor scratches and damage.
- J. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Yonkers Public Schools's name and registered with manufacturer; include detailed terms of warranty.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than ten years of documented experience.
 - 1. Door and frame components from same manufacturer.
 - 2. Evidence of a compliant documented quality management system.
- B. Standards: Comply with the requirements and recommendations in applicable specifications and standards by NAAMM, AAMA, and AA, including the terminology definitions, and specifically including the "Entrance Manual" by NAAMM, except to the extent more stringent requirements are indicated.
- C. All materials, equipment and operation supplied shall conform to all Code requirements including Accessibility for the Handicapped.
- D. Installer Qualifications: Company specializing in installing products of the type specified in this section with not less than five (5) years of documented experience, and approved by the manufacturer..
- E. The manufacturer shall provide a factory trained technician to visit this project and instruct the installers in the proper installation of the door and frame assemblies.

1.8 FIELD MEASUREMENT:

- A. Verify field measurements prior to fabrication of doors and frames to insure proper fitting of assemblies. Successful bidders are expected to field verify all dimensions, sizes, quantities and the material required to complete this project. Failure to do so will not relieve the successful contractor from the necessity of furnishing any and all materials that may be required, without any additional costs to the Owner.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Mark doors with location of installation, door type, color, and weight.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Materials shall be inspected for damage, and the manufacturer shall be advised immediately of any discrepancies. Unsatisfactory materials are not to be used
- C. Handling: Protect materials and finish from damage during handling and installation.
- D. Store materials in original corrugated packaging, under cover, protected from exposure to harmful weather conditions and from direct contact with water.
 - 1. Doors shall be "floated" within cartons, with no portion of the door having contact with the outer shell of the container.
 - 2. Store at temperature and humidity conditions recommended by manufacturer.
 - 3. Do not use non-vented plastic or canvas shelters.
 - 4. Immediately remove wet wrappers.
 - 5. Store in position recommended by manufacturer, elevated minimum 4 inches (102 mm) above grade, with minimum 1/4 inch (6.4 mm) space between doors.

1.10 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Special Project Warranty:
 - 1. Provide a written warranty signed by Manufacturer, Installer and Contractor, agreeing to replace, at no cost to the YPS Office of Facilities Management, any doors or frames that fail in materials or workmanship, within the time period of acceptance, as indicated below. Failure of materials or workmanship includes excessive deflection, faulty operation of entrances, deterioration of finish, or construction, in excess of normal weathering, and defects in hardware, weather stripping, and other components of the work. In addition the manufacturer further certifies that they have factory installed all hardware and such hardware is also guaranteed not to come loose during the guarantee period.
 - 2. Warranty Time Period: Ten Years from substantial completion.
 - 3. In addition, a limited lifetime (while the door is in its specified application in its original installation) warranty covering: Failure due to corrosion on FRP components.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Fiberglass Reinforced Plastic (FRP) Doors:
 - 1. Special-Lite, Inc; PO Box 6, Decatur, Michigan 49045. Toll Free (800) 821-6531. Phone (269) 423-7068. Fax (800) 423-7610. Web Site www.special-lite.com. E-Mail info@special-lite.com.: www.special-lite.com.
 - 2. Subject to compliance with requirements, other manufacturers are acceptable:
 - a. Tubelite - Reed City, Michigan

2.2 ALUMINUM DOOR FRAMES

- A. General:
 - 1. Materials and Accessories
 - a. Aluminum Members: Provide 6061 or 6063-T5, alloy and temper as recommended by manufacturer for strength, corrosion resistance, and application of required finish and control of color; ASTM B 221 for extrusions, ASTM B 209 for sheet/plate, with a minimum wall thickness of 0.125".
 - b. All materials shall be of the same manufacturer. No splitting of Door and Frame components will be permitted for aluminum frames.
 - c. Fasteners: Provide Aluminum, non-magnetic stainless steel or other non-corrosive metal fasteners, guaranteed by the manufacturer to be compatible with the doors, frames, stops, panels, hardware, anchors, and other items being fastened. For exposed fasteners (if any), provide Phillips head flat head screws with finish matching the item to be fastened.
 - d. Do not use exposed fasteners, except where unavoidable for the assembly of units, or unavoidable for the fastening of hardware. Provide only concealed screws in glazing stops.
 - e. Reinforcement and Brackets: Manufacturer's standard formed or fabricated steel units, of shapes, plates, of bars, with 2.0 ounce hot-dip zinc coating, complying with ASTM A 123, applied after fabrication.
 - f. Expansion Anchor Devices: Lead shield or toothed steel, drilling expansion bolt anchors.
 - g. Bituminous Coating: Cold applied asphalt mastic complying with SSPC-PS 12, compounded for 30-mil thickness per coat.
 - h. Sealants and Gaskets: Provide sealants and gaskets in the fabrication, assembly and installation of the work, which are recommended by the manufacturer to remain permanently elastic, non-shrinking, non-migrating and weatherproof.
 - i. Hardware:

- a) Premachine and reinforce frame members for hardware in accordance with manufacturer's standards and door hardware schedule.
 - b) Factory install door hardware.
 - j. Anchors:
 - a) Anchors appropriate for wall conditions to anchor framing to wall materials.
 - b) Door Jamb and Header Mounting Holes: Maximum of 24-inch centers.
 - c) Secure head and sill members of transom, side lites, and similar conditions.
 - k. Applied Door Stops.
 - a) 5/8" x 1-1/4" or 5/8" x 1-3/4", 0.125" wall thickness, with screws and weather-stripping.
 - b) Provide solid 1/2" aluminum bar behind door stop for closer shoe attachment.
 - c) Pressure gasketing for weathering seal.
 - d) Counter punch fastener holes in door stop to preserve full-metal thickness under fastener head.
 - e) Minimum 1/2" aluminum bar reinforcement under doorstop for required hardware attachments, aluminum to meet ASTM-B221.
 - l. Pressure gasketing for weathering seal.
 - m. Counter punch fastener holes in door stop to preserve full-metal thickness under fastener head.
 - n. Caulking: Caulk joints before assembling frame members.
 - o. g. Frame Member to Member Connections:
 - a) Secure joints with fasteners.
 - b) Provide hairline butt joint appearance.
- B. Thermally Broken Aluminum Storefront Framing:
- 1. Model: SL-600TB, Special-Lite, Inc
 - 2. Size and Type: As indicated on the Drawings.
 - 3. Profiles: 6 inch (150 mm) deep, 2 inch (51 mm) wide at jambs, and 2 inch (51 mm) wide at headers.
 - 4. Perimeter Frame Members:
 - a. Storefront frame with thermally broken pocket filler.
 - b. Factory fabricated by frame manufacturer.
 - c. Open-back framing is not acceptable.
 - 5. Thermal Strut.
 - a. Fiber reinforced plastic, no other materials will be accepted.
 - 6. Hardware
 - a. Pre-machine and reinforce frame members for hardware in accordance with manufacturer's standards and door hardware schedule.
 - b. Surface mounted closures will be reinforced for but not prepped or installed at factory.
 - c. Factory install door hardware.
 - 7. Anchors:
 - a. Anchors appropriate for wall conditions to anchor framing to wall materials.
 - b. Door Jamb and Header Mounting Holes: Maximum of 24-inch centers.
 - c. Secure head and sill members of transom, side lites, and similar conditions.
- C. Frame Capping:
- 1. Model: SL-70.
 - 2. Extruded Capping: With insert frame as indicated on the Drawings.
 - 3. Finish: Match framing

2.3 FIBERGLASS REINFORCED POLYESTER (FRP) DOORS:

- A. Model.
 - 1. SL-17 Pebble Grain FRP/ Aluminum Hybrid Door.
- B. Door Size:
 - 1. See Door Schedule.
- C. Construction.
 - 1. Door Thickness.
 - a. 1-3/4".
 - 2. Stiles & Rails.
 - a. Aluminum extrusions made from 6063 aluminum alloys with a minimum temper of T5.
 - b. Minimum 2-5/16" deep one-piece extrusion with have integral reglets to accept face sheet on both interior and exterior side of door which secure face sheet into place and permit flush appearance.
 - c. Screw or snap in place applied caps are not acceptable.
 - d. Top rails must have integral legs for interlocking continuous extruded aluminum flush cap.
 - e. Bottom rails must have integral legs for interlocking continuous weather bar with single nylon brush weather stripping or manually adjustable SL-301 door bottom with two nylon brush weather stripping.
 - f. Meeting stiles to include integral pocket to accept pile brush weather seal.
 - 3. Corners.
 - a. Mitered.
 - b. Secured with 3/8" diameter full-width steel tie rod through extruded splines top and bottom which are integral to standard tubular shaped rails.
 - c. 1-1/4" x 1-1/4" x 3/16" 6061 aluminum angle reinforcement at corner to give strong, flat surface for locking hex nut to bear on.
 - d. Weld, glue, or other methods of corner joinery are not acceptable.
 - 4. Core.
 - a. Poured-in-place polyurethane foam.
 - b. Laid in foam cores are not acceptable.
 - c. Foam Plastic Insulated Doors: IBC 2603.4.
 - a) Foam plastic shall be separated from the interior of a building by an approved thermal barrier.
 - b) Approved thermal barrier must meet the acceptance criteria of the Temperature Transmission Fire Test and Integrity Fire Test as stated in NFPA 275.
 - c) IBC 2603.4.1.7 foam plastic insulation, having a flame spread index less than 75 and a smoke developed index of not more than 450 shall be permitted as a door core when the face is metal minimum 0.032" aluminum or 0.016" steel.
 - d) Standard door assembly can be tested to show it meets these requirements without the use of thermal barrier. If no independent testing conducted all doors with foam plastic core must have
 - 5. Face Sheet.
 - a. Exterior
 - a) 0.120" thick, pebble texture, through color with integral surfaseal film FRP sheet.
 - b. Interior
 - a) 0.120" thick, pebble texture, through color with integral surfaseal film FRP sheet.
 - b) Optional painted finish consult manufacturer.
 - c) Class C standard optional Class A available consult manufacturer.
 - c. Attachment of face sheet.

- a) Extruded stiles and rails to have integral reglets to accept face sheet on both interior and exterior side of door which secure face sheet into place and permit flush appearance.
 - b) Use of glue to bond face sheet to core or extrusions is not acceptable.
6. Cutouts.
 - a. Manufacture doors with cutouts for required vision lites, louvers, and panels.
 7. Hardware.
 - a. Pre-machine doors in accordance with templates from specified hardware manufacturers.
 - b. Surface mounted closures will be reinforced for but not prepped or installed at factory.
 - c. Factory install door hardware.
 8. Reinforcements.
 - a. Aluminum extrusions made from 6061 or 6063 aluminum alloys.
 - b. Sheet and plate to conform to ASTM-B209.
 - c. Alloy and temper to be selected by manufacturer for strength, corrosion resistance, and application of required finish, and control of color.
 - d. Bars and tubes to meet ASTM-B221.

2.4 INSULATED INFILL PANELS

- A. Infill Panels: IP: Insulated, aluminum sheet face and back, with edges formed to fit glazing channel and sealed.
 1. Thickness: 2-5/8.
 2. Exterior Skin: Aluminum 0.04 inch (1 mm) thick.
 3. Insulation Core: Isocyanurate insulation core with R value of 14.56.
 4. Exterior and Interior Substrate: 3/16" High density tempered hardboard inch (4.7 mm) thick.
 5. Interior Skin: Aluminum 0.016 inch thick
 6. Exterior Finish: Smooth standard color. Kyner .
 7. Interior Finish: Aluminum Clear anodized.
 8. Warranty: 25 years.
 9. Product: "Mapes-R" as manufactured by Mapes Architectural Panels; sales@mapes.com / www.mapespanels.com

2.5 FINISH HARDWARE:

- A. Provide and factory install finish hardware for each door leaf as specified in Division 8 "Finish Hardware".
- B. SL-82 Class I Aluminum Recessed Pull Handles. Color selected by Architect.
- C. SL-301 Concealed adjustable brush. Install door manufacturer's multi-directional adjustable bottom with double nylon brush weatherstripping. Door bottom must be concealed and adjust to accommodate irregular tapered floor conditions.
- D. Concealed Adjustable Meeting Stile Astragal at Pairs of Doors. Install door manufacturer's adjustable astragal with double pile weather seal weatherstripping.
- E. Receive Hardware supplied in accordance with this Section, and coordinate with additional Hardware requirements of Section 08 7100. Report discrepancies (in writing) to the Architect immediately.
- F. Reinforce, cut, drill and tap doors and frames as required to receive Hardware, except do not drill and tap for surface mounted closers and holders, which will be applied at the jobsite. Comply with Hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.
 1. Reinforcement:
 - a. Stile Edge: 1" High density mineral, FRP Edge Banding.
 - b. Top Rail: 6" High density mineral.

- c. Bottom Rail: 2" High density mineral.
- G. Install all Hardware, except surface mounted closers and holders, at the fabrication plant. Remove only Hardware as required for final finishing or delivery to jobsite. Package and identify such Hardware and ship with doors and frames for installation at the project site.
- H. Painting: All existing surfaces to remain exposed, and all disturbed areas shall be painted to match existing surfaces.
- I. Hinge and hardware fasteners Stainless steel Type 304

2.6 FABRICATION:

- A. Door and frame components from the same manufacturer.
- B. Sizes and Profiles: The required sizes for door and frame units, and profiles requirements are shown on the drawings.
- C. Co-ordination of Fabrication: Check the actual frame or door openings in the construction work by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress, as directed by Contractor, and avoid delays of the work.
- D. Complete the cutting, fitting, forming, drilling and grinding of all metal work prior to the cleaning, finishing, treatment and application for coatings. Remove burrs from cut edges, and ease edges and corners to a radius of approximately 1/64".
- E. No Welding of joints will be accepted.
- F. Conceal fasteners, wherever possible, except as otherwise noted.
- G. Maintain continuity of line and accurate relation of planes and angles. Provide secure attachments and support at mechanical joints, with hairline fit at contacting members.
- H. Reinforce the work as necessary for performance requirements, and for support to the structure. Separate dissimilar metals with bituminous paint or preformed separators which will prevent corrosion. Separate metal surfaces at moving joints with non-metallic separators to prevent "freeze-up" of joints.
- I. Shop Fabrication
 - 1. All shop fabrication to be completed in accordance with manufactures process work instructions.
 - 2. Quality control to be performed before leaving each department.
- J. Shop Fabrication
 - 1. All shop fabrication to be completed in accordance with manufactures process work instructions.
 - 2. Quality control to be performed before leaving each department.

2.7 PERFORMANCE REQUIREMENTS

- A. Provide door assemblies that have been designed and fabricated in compliance with specified performance requirements.
- B. Wind-Borne-Debris Resistance: Identical full-size glazed assembly without auxiliary protection, tested by independent agency in accordance with ASTM E1996 and Wind Zone 4 - Additional Protection for Large and Small Missile impact and pressure cycling at design wind pressure.
- C. Forced Entry Resistance: Pass in accordance with AAMA 1304 test method.
- D. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 7.5 psf (359 Pa).
- E. Air Leakage: Maximum of 0.1 cfm per square foot at 6.27 psf (0.5 L/sec/sq m at 300 Pa) differential pressure, when tested in accordance with ASTM E283.
- F. Structural Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.

- G. Thermal Transmittance, Exterior Doors: AAMA 1503, U-value of 0.35, maximum, measured on exterior door in size required for this project.
- H. Fiberglass Reinforced Plastic (FRP) Face Sheet Properties:
1. Izod Impact Resistance: ASTM D256, 7 foot-pound force per inch of width (9.5 Nm per 25.4 mm of width), minimum, with notched izod.
 2. Tensile Strength at Break: ASTM D638, 13,250 psi (91.4 MPa), minimum.
 3. Water Absorption: ASTM D570, 0.16 percent, maximum, after 24 hours at 74 degrees F (23 degrees C).
 4. Provide Door assemblies that have been designed and fabricated to comply with requirements for system performance characteristics listed below, as demonstrated by testing manufacturer's corresponding stock systems according to test methods designated.
 5. Ignition Barrier: Doors not requiring a fire resistance rating shall comply with the requirements of IBC-2015 Section 2603.4.1.7. Foam plastic insulation shall have a flame spread index of 75 or less and a smoke-developed index of not more than 450. Door facings shall have a minimum thickness of 0.032" (0.8mm) aluminum sheet or steel having a base metal thickness of not less than 0.016" (0.4mm) at any point. Manufacturer may alternatively submit an evaluation and testing report from an acceptable agency, confirming testing, accordance with 2603.9, has been completed indicating compliance.
 6. Thermal Barrier: Insulated panels shall conform to the requirements of IBC-2015 2603.4. Foam plastic shall be separated from the interior of a building by an approved thermal barrier of 0.5-inch (12.7 mm) gypsum wallboard or equivalent thermal barrier material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA I275.
 7. Face Sheet.
 - a. Standard Interior and Exterior Class C 0.120" thick, pebble texture, through color with integral surfaseal film FRP sheet.
 - a) Flexural Strength, ASTM-D790: 21 x 103 psi.
 - b) Flexural Modulus, ASTM-D790: 0.7 x 106 psi.
 - c) Tensile Strength, ASTM-D638: 13 x 103 psi.
 - d) Tensile Modulus, ASTM-D638: 1.2 x 106 psi.
 - e) Barcol Hardness, ASTM-D2583: 55.
 - f) Izod Impact, ASTM-D256: 14.0 ft-lb/in.
 - g) Gardner Impact Strength, ASTM-D5420: 120 in-lb.
 - h) Water Absorption, ASTM-D570: 0.20%/24hrs at 77°F.
 - i) Surface Burning, ASTM-E84: Flame Spread ? 200, Smoke Developed ? 450.
 - j) Taber Abrasion Resistance, Taber Test: 0.007% Max Wt. Loss, cs-17 wheels, 1000g. Wt., 25 cycles.
 - k) Chemical ResistanceChemical Resistance.
 - (a) Excellent Rating.
 8. Door Core.
 - a. Density, ASTM-D1622: ≤ 5.0 pcf.
 - b. Compressive Properties, ASTM-D1621: Compressive Strength ≥ 60 psi, Compressive Modulus ≥ 1948 psi.
 - c. Tensile and Tensile Adhesion Properties, ASTM-D1623: Tensile Adhesion, 3" x 3" FRP Facers ≥ 53 psi, Tensile Adhesion, 1" x 1" Foam ≥ 104 psi.
 - d. Thermal and Humid Aging, ASTM-D2126: Volume Change at 158 °F, 100% humidity, 14 days $\leq 13\%$.
 - e. Thermal Conductivity, ASTM-C518, Thermal Resistance ≥ 0.10 m²K/W.

9. Door Panel.
 - a. Thermal Transmittance, AAMA 1503-98: U-Factor = 0.29 Btu/hr²?ft²?°F, CRFp = 55.
 - b. Indoor Air Quality, ASTM-D5116, ASTM-D6607: GreenGuard, GreenGuard Gold.
10. Door and Aluminum Tube Frame Assembly.
 - a. Physical Endurance, ANSI A250.4: 25,000,000 Cycles, No Damage.
 - b. Salt Spray, ASTM-B117: 500 hours minimum exposure.
 - c. Air Leakage, NFRC 400, ASTM-E283.
 - a) Opaque Swinging Door (< than 50% glass)
 - (a) 0.01 cfm/sqft @ 1.57 psf.
 - (b) 0.01 cfm/sqft @ 6.24 psf.
 - b) Commercially Glazed Swinging Entrance Door (> than 50% glass)
 - (a) 0.38 cfm/sqft @ 1.57 psf.
 - (b) 0.73 cfm/sqft @ 6.24 psf.
 - d. Structural Performance, ASTM E-330.
 - a) Single or Pair of Doors, 8'4" x 8'2" overall size, single point latching.
 - (a) ± 75 psf design pressure, pass.
 - e. Impact and Cycle Test, ASTM-E1886.
 - a) Single or Pair of Doors, 6'8" x 7'8" overall size, 3-point latching.
 - (a) 9 lbs. missile @ 50 fps, minimum 3 impacts, no rips, tears, or penetrations.
 - (b) ± 75 psf design pressure, pass.
 - f. Forced Entry, AAMA 1304.
 - a) Single or Pair of Doors, 6'8" x 7'8" overall size, 3-point latching.
 - (a) 300lb Pull Test, pass.
 - g. Impact Test, TAS 201.
 - a) Single or Pair of Doors, 6'8" x 7'8" overall size, 3-point latching.
 - (a) 9 lbs. missile @ 50 fps, minimum 3 impacts, no rips, tears, or penetrations.
 - h. Static Air Pressure, TAS 202.
 - a) Single or Pair of Doors, 6'8" x 7'8" overall size, 3-point latching.
 - (a) ± 65 psf design pressure, pass.
 - (b) Forced Entry, 300lb Pull Test, pass.
 - i. Cyclic Wind Pressure Loading, TAS 203.
 - a) Single or Pair of Doors, 6'8" x 7'8" overall size, 3-point latching.
 - (a) ± 65 psf design pressure, pass.
 - j. Security Test, ASTM-F476: Minimum Grade 40.
 - k. Blast Test, ASTM-F1642.
 - a) 6 psi @ 45 psi-msec, minimal hazard, operable.
11. Door and Thermally Broken Aluminum Frame Assembly.
 - a. Thermal Transmittance, NFRC 100.
 - a) Opaque Swinging Door (< than 50% glass)
 - (a) U-Factor = 0.31 Btu/hr²?ft²?°F.
 - b) Commercially Glazed Swinging Entrance Door (> than 50% glass)
 - (a) U-Factor = 0.64 Btu/hr²?ft²?°F.
 - b. Air Leakage, NFRC 400, ASTM-E283.
 - a) Opaque Swinging Door (< than 50% glass)
 - (a) 0.01 cfm/sqft @ 1.57 psf.
 - (b) 0.01 cfm/sqft @ 6.24 psf.
 - b) Commercially Glazed Swinging Entrance Door (> than 50% glass)

- (a) 0.38 cfm/sqft @ 1.57 psf.
- (b) 0.73 cfm/sqft @ 6.24 psf.
- c. Sound Transmission, ASTM-E90: STC = 30, OITC = 29.

2.8 FINISHES

- A. Fiberglass.
 - 1. Two-part aliphatic polyurethane paint.
 - a. Color: As indicated on drawings
 - b. Custom colors available consult manufacturer.
 - c. Unique, high-solids, high-build, multifunctional coating.
 - d. Low VOC, high-gloss, self-priming coating.
 - e. Impact Resistance, ASTM-D2794: 140 in-lbs (direct), 50 in-lbs (reverse) @ 5 mils thickness.
 - f. Taber Abrasion, 1 kg load, 1000 cycles, CS-17 wheel: 60.2 mg.
 - g. Graffiti cleaning with Amerase with gloss retention: 100 cycles.
 - h. Chemical Resistance.
 - a) Excellent.
 - (a) Acidic.
 - (b) Alkaline.
 - (c) Salt Solutions.
 - (d) Seawater.
 - (e) Fresh Water.
 - (f) Petroleum Products.
- B. Abuse resistant engineered surface with protective coating and through-molded color.
 - 1. Panel Texture: Pebble grain.

2.9 ACCESSORIES

- A. Foam window and door seal.
 - 1. Fill all exterior joint between windows and doors solid in accordance with manufacture's instructions.
 - 2. Cut back to permit application of joint sealant.
 - 3. Insulating-Foam Sealant: Dow Great Stuff Window & Door.
- B. Snap Trim as required. Match door and frame finish.
- C. Glazing: See Section 08 8000.
- D. Door Window Frames: Door window frames with glazing securely fastened within door opening.
 - 1. Size: As indicated on drawings.
- E. Lite Kits:
 - 1. Provide and factory install a Special-Lite FL-Series 2 piece extruded aluminum Class I Clear Anodized Lite Kit. Provide as per the drawings.
 - 2. Size as indicated on drawings.
 - 3. Factory Glazing: Refer to Section 08 8000 - Glazing.
- F. Door Hardware: See Section 08 7100.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify actual dimensions of openings by field measurements before door fabrication; show recorded measurements on shop drawings.

- B. Do not begin installation until substrates have been properly prepared.

3.2 PREPARATION

- A. Remove existing doors and frames, and dispose of all removed materials in accordance with local authorities having jurisdiction.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Clean and prepare substrate in accordance with manufacturer's directions.
- D. Protect adjacent work and finish surfaces from damage during installation.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions; do not penetrate frames with anchors.
- B. Install exterior doors in accordance with ASTM E2112.
- C. Set units plumb, level, and true-to-line, without warping or racking doors or frames, and with specified clearances; anchor securely in place.
- D. Set thresholds in continuous bed of sealant.
- E. Install perimeter sealant in accordance with requirements specified in Section 07 9005.
 - 1. Fill all exterior spaces and joint between windows and doors solid with foam in accordance with manufacture's instructions.
 - 2. Cut back to permit application of joint sealant.
- F. Separate aluminum and other metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials.
- G. Repair or replace damaged installed products.

3.4 ADJUSTING

- A. Lubricate, test, and adjust doors to operate easily, free from warp, twist or distortion, and to fit watertight for entire perimeter.
- B. Adjust hardware for smooth and quiet operation.
- C. Adjust doors to fit snugly and close without sticking or binding.

3.5 CLEANING

- A. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance.
- B. Do not use harsh cleaning materials or methods that would damage finish.

3.6 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.
- B. Protect installed doors to ensure that, except for normal weathering, doors will be without damage or deterioration at time of substantial completion.
- C. Provide protective treatment and other precautions required through the remainder of the construction period, to ensure that the doors and frames will be without damage or deterioration (other than normal weathering) at the time of acceptance.

END OF SECTION

SECTION 08 7101 DOOR HARDWARE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

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, power supplies, back-ups and surge protection.
- C. Related Sections:
 - 1. Section 08 11 13 – Hollow Metal Doors and Frames.
 - 2. Section 08 81 30 - Aluminum Frames and Aluminum FRP Doors.
 - 3. Section 08 81 00 – Glass and Glazing.
 - 4. Section 09 9123 – Interior Painting.
- 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 80 - Fire Doors and Windows.
 - 4. 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 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".

1.4 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 and Frame Preparation: Related Division 08 Sections (Steel, Aluminum and Wood) 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.

1.5 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. Ten years for manual door closers.
 - 4. Two years for electromechanical door hardware.

1.6 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.
- B. Continuing Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance including repair and replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

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.
 - 1. 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:
 - a. 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.
 - 2. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.
 - a. Permanent cylinders, cores, and keys to be installed by Owner.
- B. 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. Butt 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. 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. Match existing hinge sizes to fit existing frame mortises..
 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Interior Doors: Standard weight, steel, ball bearing hinges unless Hardware Sets indicate heavy weight.
 4. Acceptable Manufacturers:
 - a. McKinney Products (MK).
 - b. Bommer Industries (BO).
- B. Reinforcing Pivots:
1. For all interior doors.
 - a. Surface mounted top door and frame head mounting.
 - b. Install to frame using jack bolts.
 - c. Finish: Satin Stainless Steel 32D.
 2. Manufacturer: McKinney MK 55
- C. Continuous Hinges:
1. For exterior doors up to 450lbs, and 4'-0" wide.
 - a. To be constructed of extruded aluminum 6063-T6 alloy with thermoplastic polyester bearings.
 - b. Shall meet ANSI/BHMA A156.25.
 - c. Provide 12-24 x 1/2" steel self tapping screws and #12 x 1 1/2" Flathead Wood Screws, unless otherwise specified.
 2. Manufacturer: Markar (MA) 12HD , as specified in hardware sets.

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 straight- or clover-type cam.
 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.
- D. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
 1. Interchangeable Cores: Large Format Interchangeable Core insert, removable by use of a special key; usable with other manufacturers' cylinders.
- E. Exterior Cylinders: ANSI/BHMA A156.5, Grade 1, certified patented cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer's United States patents. Cylinders are to be factory keyed with owner having the ability for on-site original key cutting.
 1. Acceptable Manufacturers:
 - a. Medeco (MC) - Keymark X4 Series.

- F. Keying System: Each type of lock and cylinders to be factory keyed. Conduct specified "Keying Conference" to define and document keying system instructions and requirements. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner. Incorporate decisions made in keying conference, and as follows:
1. Master Key System: Cylinders are operated by a change key and a master key.
 2. Grand Master Key System: Cylinders are operated by a change key, a master key, and a grand master key.
 3. Great-Grand Master Key System: Cylinders are operated by a change key, a master key, a grand master key, and a great-grand master key.
 4. Existing System: Master key or grand master key locks to Owner's existing system.
 5. Keyed Alike: Key all cylinders to same change key.
- G. Key Quantity: Provide the following minimum number of keys:
1. Top Master Key: One (1)
 2. Change Keys per Cylinder: Two (2)
 3. Master Keys (per Master Key Group): Two (2)
 4. Grand Master Keys (per Grand Master Key Group): Two (2)
 5. Construction Control Keys (where required): Two (2)
 6. Permanent Control Keys (where required): Two (2)
- H. Construction Keying: Provide construction master keyed cylinders or temporary keyed construction cores where specified. Provide construction master keys in quantity as required by project Contractor. Replace construction cores with permanent cores. Furnish permanent cores for installation as directed under specified "Keying Conference".

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. Lock Trim Design: As specified in Hardware Sets.

2.5 CONVENTIONAL EXIT DEVICES

- A. 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. Mounting rails to be formed from smooth stainless steel, brass or bronze architectural materials no less than 0.072" thick, with push rails a minimum of 0.062" thickness. Painted or aluminum metal rails are not acceptable. Exit device latch to be investment cast stainless steel, pullman type, with deadlock feature. Provide flush end caps. Cylinder dogging at all exterior doors.
1. Acceptable Manufacturers:
 - a. Sargent: (SA) - 80 Series.
 - b. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
- B. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish. Provide keyed removable feature, stabilizers, and mounting brackets as specified in the Hardware Sets.
1. Acceptable Manufacturers:
 - a. Sargent (SA) - L980SxLAR
 - b. Corbin Russwin Hardware (RU) - 700/900 Series.
 - c. Yale Locks and Hardware (YA) - M200 Series.

2.6 DOOR CLOSERS

- A. 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 and metal covers standard. Install all closers to allow full 180 degree door swing.
 - 1. Acceptable Manufacturers:
 - a. Corbin Russwin Hardware (RU) – DC6000 Series.
 - b. Norton Door Controls (NO) - 7500 Series.

2.7 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. Rockwood Manufacturing (RO).
 - b. Trimco (TC).

2.8 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. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- C. Acceptable Manufacturers:
 - 1. Pemko Manufacturing (PE).
 - 2. Reese Enterprises, Inc. (RS).

2.9 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.

2.10 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.
- D. Antimicrobial Finishes: Where specified, finishes on locksets, latchsets, exit devices and push/pull trim to incorporate an FDA recognized. Silver Ion, antimicrobial coating (MicroShield™) listed for use on equipment as a suppressant to the growth and spread of a broad range of bacteria, algae, fungus, mold and mildew.

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.
- B. Wood Doors: Comply with ANSI/DHI A115-W 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.
- 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. 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.
- D. Reinforcing Pivots: Surface mount to existing frame using jack nuts (rivnuts). New doors shall be reinforced and tapped for surface installation.
- E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- F. 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. Manufacturer's Abbreviations:
 1. MK - McKinney
 2. RU - Corbin Russwin
 3. MC - Medeco
 4. RO - Rockwood
 5. PE - Pemko
 6. MA - Markar
 7. IVE - Ives
 8. HS - HES
 9. YA - Yale

3.9 Hardware Schedule

Set: 1

EXT. DBL. DRS

2	Hinge (cont)	MCK-12D	628	MK
1	Removable Mullion	910KM		RU
1	Exit Device (Rim,NL)	16-43 8804	630	SA
1	Exit Device (Rim, EO)	16-43 8800	630	SA
2	Recessed Door Pull	By Door Manufacturer		
3	Mortise Cylinder Housing	1070-114- A02- 7-Pin	626	SA
1	Rim Cylinder Housing	3070-178- 7-Pin	626	SA
4	LFIC Core	X4 322301N		MC
2	Closer (surface)	DC6210 A5	689	RU
2	Kick Plate	K1050 10" x 2" LDW	US32D	RO
1	Threshold	2550 A		PE
1	Rain Guard	346C		PE
1	Gasketing	2891ANB		PE

1 Sweep 18061CNB PE

Doors 002, 004, 005, 103 only:

1 Elec. Strike 9600/9500 as reqd. 630 HS

Notes: 2 mortise cylinders for cylinder dogging. 1 mortise cylinder for mullion. 1 rim cylinder used at exterior. Pulls by door manufacturer.

Set: 2

DBLE DR. STORAGE

6 Hinge (heavyweight) T4A3386 NRP US26D MK

1 Cylindrical Lock (storage) CL3357 PZD CT7D 626 RU

1 LFIC Core 8000 IC 626 RU

1 Set Flush Bolts FB 457 630 IVE

1 Dustproof strike DP 1 626 RU

2 Closer (surface, 180deg.) DC6210 A3 689 RU

2 Reinforcing Pivots MK5540 US32D MK

2 Kick Plates K1050 10" x 2" LDW US32D RO

Threshold Custom Alum. Plate See Detail. Coordinate with floor installation.

Set: 3

DBL DR. interior exit device

6 Hinge (heavyweight) T4A3386 NRP US26D MK

2 Exit Device (SVR,LBR,CR)43- FM-87-SVR-43 ETP 630 SA

2 Rim Cylinder Housing 3070-178- 7-Pin 626 RU

2 LFIC Core 8000 IC RU

2 Closer (surface, 180 deg) DC6210 A3 689 RU

2 Reinforcing Pivots MK5540 US32D MK

2 Kick Plate K1050 10" x 2" LDW US32D RO

SET: 4

SGL Store Room

3 Hinge (heavyweight) T4A3386 NRP US26D MK

1 Cylindrical Lock (Storeroom)CL3357 PZD CT7D 626 RU

1 LFIC Core 8000 IC RU

1 Closer (surface) DC6200 A10/DC6210 A3 689 RU

1 Reinforcing Pivot MK5540 US32D MK

1 Kick Plate K1050 10" x 2" LDW US32D RO

1 Door Stop 441 (441H as needed) US26D RO

Doors 210 and 307 only:

1 Elec. Strike 9600/9500 as reqd. 630 HS

SET 5

SGL CLASSROOM, TOILET, OFFICE

3	Hinge (heavyweight)	T4A3386 NRP	US26D	MK
1	Cylindrical Lock (intruder)	CL3352 PZD CT7D	626	RU
2	LFIC Core	8000 IC		RU
1	Closer (surface)	DC6200 A10/DC6210 A3	689	RU
1	Reinforcing Pivot	MK5540	US32D	MK
1	Kick Plate	K1050 10" x 2" LDW	US32D	RO
1	Door Stop	441 (441H as needed)	US26D	RO

SET 6

SGL EXT. EXIT DEV.

1	Hinge (cont)	MCK-12HD	628	MK
1	Exit Device (Rim,NL)	12-43 8804	630	SA
1	Recessed Door Pull	By door manufacturer		
1	Mortise Cylinder Housing	1070-114- A02- 7-Pin	626	RU
1	Rim Cylinder Housing	3070-178- 7-Pin	626	RU
2	LFIC Core	X4 322301N		MC
1	Closer (surface)	DC6210 A5	689	RU
1	Kick Plate	K1050 10" x 2" LDW	US32D	RO
1	Threshold	271A		PE
1	Rain Guard	346C		PE
1	Gasketing	2891ANB		PE
1	Sweep	18061CNB		PE
Door 101 only:				
1	Elec. Strike	9600/9500 as reqd.	630	HS

SET 7

SGL. INT. EXIT DEV.

3	Hinge (heavyweight)	T4A3386 NRP	US26D	MK
1	Exit Device (Rim)	12-43 8843 ETP	630	SA
1	Rim Cylinder Housing	3070-178- 7-Pin	626	RU
1	LFIC Core	X4 322301N		MC
1	Closer (surface)	DC6210 A5	689	RU
1	Reinforcing Pivot	MK5540	US32D	MK
1	Kick Plate	K1050 10" x 2" LDW	US32D	RO

SET 8

SGL Toilet

3	Hinge (heavyweight)	T4A3386 NRP	US26D	MK
1	Cylindrical Lock (intruder)	CL3352 PZD CT7D	626	RU
1	Occ. Indicator Aux. Deadbolt	D291	626	YA
2	LFIC Core	8000 IC		RU
1	Closer (surface)	DC6200 A10/DC6210 A3	689	RU
1	Reinforcing Pivot	MK5540	US32D	MK
1	Kick Plate	K1050 10" x 2" LDW	US32D	RO
1	Door Stop	441 (441H as needed)	US26D	RO

SET 9

1	Electric Strike	8300	628	HES
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(Install in existing frame. Extend wires through frame to door head.)

END OF SECTION

SECTION 08 8000
GLAZING

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. Insulated glass units
- B. Laminated safety glazing.
- C. Fire Rated safety glass
- D. Glazing compounds and accessories.

1.3 RELATED REQUIREMENTS

- A. Section 07 9005 - Joint Sealers: Sealant and back-up material.
- B. Section 08 1113 - Hollow Metal Doors and Frames: Glazed doors and borrowed lites.
- C. Section 08130 - Aluminum Frame and Aluminum FRP Doors
- D. Section 08 4313 - Aluminum-Framed Storefronts: Glazing furnished by storefront manufacturer.

1.4 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2015).
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- E. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.
- F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- G. GANA (GM) - GANA Glazing Manual; 2008.
- H. New York State Building Code Section 2406 Safety Glazing.

1.5 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual and GANA Sealant Manual for glazing installation methods.

1.7 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Sealed Insulating Glass Units: Provide a ten (10) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.
- C. Laminated Glass: Provide a five (5) year warranty to include coverage for delamination, including replacement of failed units.

PART 2 PRODUCTS

2.1 EXTERIOR GLAZING ASSEMBLIES

- A. Structural Design Criteria: Select type and thickness to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with New York State code.
 - 1. Use the procedure specified in ASTM E1300 to determine glass type and thickness.
 - 2. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
 - 3. Thicknesses listed are minimum.
- B. Air and Vapor Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier:
 - 1. In conjunction with vapor retarder and joint sealer materials described in other sections.
 - 2. To maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

2.2 GLASS MATERIALS

- A. Float Glass Manufacturers:
 - 1. Viracon
 - 2. Pilkington Building Products North America: .
 - 3. PPG Industries, Inc
 - 4. Substitutions: Refer to Section 01 6000 - Product Requirements.
- B. Float Glass: All glazing is to be float glass unless otherwise indicated.
 - 1. Heat-Strengthened and Fully Tempered : ASTM C1048.
 - 2. Thicknesses: As indicated; for exterior glazing comply with specified requirements for wind load design regardless of specified thickness.
- C. Laminated Glass: Float glass fully tempered laminated in accordance with ASTM C 1172.
 - 1. Laminated Safety Glass: Comply with 16 CFR 1201 test requirements for Category II.
 - 2. Plastic Interlayer: 0.060 inch (1.52 mm) thick, minimum.
 - 3. Where fully tempered is specified or required, provide glass that has been tempered by the tong-less horizontal method.
 - 4. Each pane of safety glazing installed shall be identified by a manufacturer's designation specifying who applied the designation, the manufacturer or installer and the safety glazing standard with which it complies.

2.3 MONOLITHIC GLAZING

- A. Single Safety Glazing: Non-fire-rated.
 - 1. Applications: Interior non fire rated doors
 - 2. Type: Laminated safety glass.
 - 3. Tint: Clear.
 - 4. Thickness: 1/4 inch (6 mm).
- B. Fire Rated Safety Glass conforming to Underwriters Laboratories, Inc. Fire Tests of Door Assemblies and the following:
 - 1. Location: All interior glazing in fire rated doors.
 - 2. Manufacturer: Technical Glass Products; ; fireglass.com
 - a. Firelite Plus, clear ceramic laminated with 2 pieces of PREMIUM FireLite and a proprietary interlayer specialty high impact fire rated glazing material.
 - b. Surface Grade: Premium
 - c. Thickness: 5/16"
 - d. U Value: 0.40

- e. Weight: 3.8-lbs/sq. ft.
- f. Sound Transmission Rating: 38 STC
- g. Glazing materials shall be optically clear, colorless and free from usual distortion.
- h. 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.
- i. Glazing material installed shall be certified and permanently labeled as meeting applicable requirements referenced in NFPA 80 and:
- j. ANSI Z97.1
- k. CPSC 16 CFR 1201, Category II 400 ft.lbs.
- l. 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

2.4 SEALED INSULATING GLASS UNITS

- A. Manufacturers:
 1. Viracon VE1-2M: www.viracon.com.
 2. Substitutions: Refer to Section 01 6000 - Product Requirements.
- B. Insulated Laminated Glass Units : Double pane with glass to elastomer edge seal. Comply with SPSC 16 CFR 1201 test requirements for Category II.
 1. Location: All Glazing within exterior doors.
 2. Comply with SPSC 16 CFR 1201 test requirements for Category II.
 3. Outer pane of FT Laminated-Fully Tempered, 1/8" glass, 0.060" PVB interlayer, 1/8" glass..
 4. Inner pane of FT - fully tempered 1/4" glass.
 5. Place low E coating on #2 surface within the unit.
 6. Transmittance:
 - a. Visible Light70%.
 - b. Solary Energy33%.
 - c. U-V10%
 7. Reflectance:
 - a. Visible Light Exterior11%Visible
 - b. Visible Light Interior12%Visible
 - c. Solar Energy31%
 8. NRFC U-Value:
 - a. Winter0.29 Btu/hr x sqft x F degrees.
 - b. Summer0.26 Btu/hr x sqft x F degrees.
 9. Shading coefficient0.44
 10. Relative Heat Gain:91 Btu/hr x sqft x F degrees
 11. Solar Factor (SHGC)0.38
 12. LSG1.84
 13. Durability: Certified by an independent testing agency to comply with ASTM E 2190.
 14. Purge interpane space with dry hermetic air.
 15. Total unit thickness of 1" inch (25.4 mm) minimum.

2.5 GLAZING COMPOUNDS

- A. Silicone Sealant : Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C 920, Type S, Grade NS, Class 25, Uses M, A, and G; cured Shore A hardness of 15 to 25; Black color.

2.6 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness, ASTM C864 Option I. Length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) x width of glazing rabbet space minus 1/16 inch (1.5 mm) x height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness, ASTM C 864 Option I. Minimum 3 inch (75 mm) long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.

PART 3 EXECUTION

3.1 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.
- D. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.
- E. Install sealant in accordance with manufacturer's instructions.

3.2 CLEANING

- A. Remove glazing materials from finish surfaces.
- B. Remove labels after Work is complete.
- C. Clean glass and adjacent surfaces.

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. Metal channel soffit/ceiling framing.
- B. Metal Trim
- C. Cementitious backing board.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.

1.3 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 07 8400 - Firestopping: Top-of-wall assemblies and penetrations at fire rated walls.
- C. Section 07 9200 - Joint Sealants.
- D. Section 09 3000 - Tiling.

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 D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- R. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.
- S. 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 (300 by 300 mm) 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 State Building 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.

2.2 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. Marino: www.marinoware.com.
- B. Non-structural Framing Accessories:
 - 1. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.
- C. 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. 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 unexposed base layer of vertical surfaces and 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 (16 mm)
 - b. Soffits and Ceilings: 5/8 inch (16 mm).
 5. Paper-Faced Products:
 - a. American Gypsum Company; FireBloc Type X Gypsum Wallboard: www.americangypsum.com/#sle.
 - b. National Gypsum Company; Gold Bond BRAND Fire-Shield Gypsum Board.
 - c. USG Corporation; USG Sheetrock Brand Firecode X Panels: www.usg.com/#sle.
- B. 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 (16 mm).
 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.
 - b. National Gypsum Company; Gold Bond Hi-Abuse XP Gypsum Board.
 - c. Substitutions: .See Section 01 2500 Substitution Procedures
- C. Cementitious Backing Board For Wet Areas:
 1. Application: Surfaces behind tile in wet areas including toilet 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: 1/2 inch (12.7 mm).
 - 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 (101 mm).
- B. Beads, Joint Accessories, and Other Trim: ASTM C1047, galvanized steel, unless noted otherwise.
1. Corner Beads: Low profile, for 90 degree outside corners.
 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.
 - b) Substitutions: See Section 01 2500 Substitution Procedures
- 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. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches (0.84 mm) in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.
- E. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch (0.84 to 2.84 mm) in Thickness: ASTM C954; steel drill screws, corrosion-resistant.
- F. Utility angle: 2"x 2" 20 ga. for attachments of intersection framing and right angle corner enclosures.
- G. 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. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
1. Level ceiling system to a tolerance of 1/1200.
- 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. Blocking: Install blocking for support of toilet partitions, casework, toilet accessories, and hardware. Comply with Section 06 1000 for wood blocking.

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 (10 meters) apart on walls and ceilings over 50 feet (16 meters) 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 (0.8 mm).
 - 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 the 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 (3 mm in 3 m) 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 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.
- D. Ceramic trim.

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 A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2012 (Revised).
 - 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 (457 by 457 mm) 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. Extra Tile: 2 percent 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 (10 degrees C) and below 100 degrees F (38 degrees C) during installation and curing of setting materials.

PART 2 PRODUCTS

2.1 TILE

- A. Porcelain Floor Tile: Group B1 fully vitrified.
 - 1. Moisture Absorption: <0.1 percent as tested in accordance with ISO 10545-3.
 - 2. Size: As indicated on Finish Schedule.
 - 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 Finish Schedule.
Pattern: As indicated on drawings
 - 8. Products:
 - a. Casalgrande Padana distributed by Prospec, 798 Pelham Parkway Pelham Manor, NY 10803.
 - b. Substitutions: Refer to Section 01 2500 - Substitution Procedures.
- B. 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 indicated on drawings..
4. Color(s): As indicated on drawings.
5. Trim Units: Matching cove shapes in sizes indicated.
6. Products:
 - a. United States Ceramic Tile.
7. Substitutions: Section 01 2500 Substitution Procedures.

2.2 TRIM AND ACCESSORIES

- A. Ceramic Trim: Matching bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.
 1. Applications:
 - a. Open Edges: Bullnose.
 - b. Inside Corners: Jointed.
 - c. Floor to Wall Joints: Cove base.
 2. Manufacturers: Same as for tile.
- B. Thresholds: 2 inches (51 mm) wide by full width of wall or frame opening; beveled edge on both long edges; without holes, cracks, or open seams.
 1. Material: Marble, honed finish.
 2. Applications:
 - a. At doorways where tile terminates.

2.3 SETTING MATERIALS

- A. Manufacturers:
 1. Mapei Corporation. Product: ULTRAFLEX 2.
 2. Substitutions: Section 01 2500 Substitution Procedures.
- B. Polymer modified thin-set mortar. ANSI A118.4.
 1. Applications: Use this type of bond coat where Large and Heavy Tile (LHT) mortar is indicated.
 2. Products:
 - a. Mapei Ultra-Flex 2.

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 WATERPROOFING/CRACK ISOLATION FOR THIN-SET TILE INSTALLATIONS

- A. Acrylic based, roller applied waterproofing/crack isolation system
 1. Mapelastic HPG; Mapei Corporation

2.6 GROUTS

- A. Manufacturers:
 1. Mapei Corporation ; Product Mapei Ultracolor, Plus FA
 2. Substitutions: Section 01 2500 Substitution Procedures.

2.7 ACCESSORY MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, Portland-cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated
- B. 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

- C. 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. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.
- D. Remove any remaining adhesive residue.
- E. Apply water proofing membrane in accordance with manufacturer's requirements at all floor applications.

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 thresholds where indicated.
- G. Sound tile after setting. Replace hollow sounding units.
- H. Keep control and expansion joints free of mortar, grout, and adhesive. Refer to TCNA (HB) EJ 171 for location and frequency of joints.
- I. Keep expansion joints free of adhesive or grout. Apply sealant to joints.
- J. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- K. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- L. 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.
- M. 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 as indicated on drawings, with standard grout, unless otherwise indicated.
 - 1. Use waterproofing membrane under all tile unless other underlayment is indicated.

3.5 INSTALLATION - WALL TILE

- A. Over interior concrete and masonry install in accordance with TCNA (HB) Method as indicated on drawings.

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. New and Replacement of acoustical panels and suspended grid indicated on drawings.

1.3 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 07 9200 - Joint Sealants.
- C. Divisions 23 and 26 for air outlets and inlets, light fixtures, and fire alarm.

1.4 REFERENCE STANDARDS

- A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2017.
- B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.
- D. 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.
- E. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.
- F. Ceilings and Interior Systems Construction Association (CISCA): Code of Practices.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

1.6 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate grid layout and related dimensioning.
- C. Product Data: Provide data on suspension system components and acoustical units.
- D. Samples: Submit two samples 12 x 12 inch (300 by 300 mm) in size illustrating material and finish of acoustical units.
- E. Samples: Submit two samples each, 12 inches (300 mm) long, of suspension system main runner.
- F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.7 QUALITY ASSURANCE

- A. 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

- B. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years documented experience.
- D. Installers Qualifications: Company specializing in the installation of acoustical ceilings specified in this section with minimum 5 years documented experience.
- 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 by YPS 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 removal and installation. Agenda shall include project conditions, coordination with work of other trades, and layout of items which penetrate ceilings.

1.8 EXTRA MATERIALS

- A. See Section 01 6000 - Product Requirements.
- B. Deliver extra acoustical units for YPS Office of Facilities Management's use in maintenance. 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. Panels: Furnish 5 percent of total acoustic unit area of extra panels to YPS Office of Facilities Management.
 - 2. Suspension System Components: Furnish 5 percent of each exposed component of the quantity installed.

1.9 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

1.10 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. Warranty Period: 30 years.

1.11 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.1 ACOUSTICAL UNITS

- A. Acoustical Panels, Type ACT-1 : Painted wet formed mineral fiber, with the following characteristics:
 - 1. Classification: ASTM E1264 Form 2, Pattern C E; Fire Class A.
 - a. Type III, Form 1, Pattern E I, Fire Class A.
 - 2. Size: 24 by 24 inches (610 by 610 mm) and 24 by 48 inch (610 by 1219 mm) as indicated on drawings

3. Thickness: 7/8 inches (2.1875 mm).
 4. Light Reflectance: 0.85 percent, determined in accordance with ASTM E1264.
 5. NRC Range: 0.75, determined in accordance with ASTM E1264.
 6. Articulation Class (AC): 170 , determined in accordance with ASTM E1264.
 7. Ceiling Attenuation Class (CAC): 35, determined in accordance with ASTM E1264.
 8. Panel Edge: Square.
 9. Color: White.
 10. Suspension System Type Prelude XL: Exposed grid.
 11. Products:
 - a. Armstrong World Industries, Inc: www.armstrongceilings.com.
 - a) Cirrus High NRC 563 for 24 x 24.
 - b. Substitutions: See Section 01 2500 - Substitution Procedures..
- B. Acoustical Panels, Type ACT-2: Mineral fiber with membrane-faced overlay, with the following characteristics:
1. Application(s): Kitchen and Servery.
 2. Classification: ASTM E1264 Type IV.
 - a. Form: 2, water felted.
 - b. Pattern: "E" - lightly textured.
 3. Size: 24 by 24 inches (610 by 610 mm).
 4. Thickness: 1 inches (____ mm).
 5. Composition: Water felted. with acoustically transparent membrane
 6. NRC Range: 0.80 to _____, determined in accordance with ASTM E1264.
 7. Sag/Humidity Resistance: Standard
 8. Fire Performance: Class A UL)
 9. Panel Edge: Square.
 10. Color: White.
 11. Suspension System Type Prelude XL: Exposed grid.
 12. Products:
 - a. Armstrong World Industries, Inc; Calla Health Zone 2230, www.armstrongceilings.com.

2.2 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.

2.3 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 (2 mm) galvanized steel wire.
- C. Perimeter Moldings: Same metal and finish as grid.
1. Minimum 7/8" horizontal flange
- D. Acoustical Sealant For Perimeter Moldings: Specified in Section 07 9200 - Joint Sealants.
- E. 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.
- B. Verify that layout of hangers will not interfere with other 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. Repair and Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
- D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
- E. 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.
- F. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- G. Support fixture loads using supplementary hangers located within 6 inches (152 mm) of each corner, or support components independently.
- H. 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. Cut to fit existing grid, tile and provide new units as required at new windows.
 - 2. Make field cut edges of same profile as factory edges.
- F. 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 (3 mm in 3 m).
- 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 Armstrong Item #5760 8 oz, 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 YPS Office of Facilities Management's use.

3.7 SCHEDULE

- A. As indicated on drawings.

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. Removals.
- B. Crack repair.
- C. Resilient tile flooring.
- D. Resilient base.
- E. 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 F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2016a.
- I. ASTM F-1869 Test Method for Measuring Moisture Vapor Emissions in Concrete.
- J. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2017.
- K. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs.
- L. ASTM F2420 - Standard Test Method for Determining Relative Humidity on the Surface of Concrete
- M. CAL (CHPS LEM) - Low-Emitting Materials Product List; California Collaborative for High Performance Schools (CHPS); current edition at www.chps.net/.
- N. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2015.
- O. Recycled Content: No
- P. ISO 9001 – Quality Management System: Meets and exceeds passing requirements
- Q. ISO 14001 – Environmental Management System: Meets and exceeds passing requirements

- R. FloorScore® Certified: Yes
- S. Environmental Product Declaration, EPD® (SCS Global Services): Verified

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 for Yonkers Public Schools'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.
 - 1. Manufacturers proposed for use, which are not named in this section, shall submit evidence of ability to meet performance requirements specified not less than 10 days prior to bid date.
 - a. Color Matching: Provide resilient flooring products, including wall base and accessories, from one manufacturer to ensure color matching.
 - b. Manufacturer capable of providing technical training and field service representation.
- 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 (21 degrees C) to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F (13 degrees C).

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 :
 - 1. Manufacturers:
 - a. R9 – Canyon Collection, Raskin Industries, 710 South Powerline Road, Suite G Deerfield Beach, FL 33442, 561-997-6658.
 - b. Substitutions: 01 2500 - Substitution Procedures.
 - 2. Composition: Virgin Vinyl – Dry Back
 - 3. Size (inches / mm): 12” x 24” (304.8 x 609.6mm)
 - 4. Gauge: .100” (2.5mm)
 - 5. Wear Layer: 28mil (.7mm) Phthalate-Free
 - 6. Finish: G88 Advanced Coating System – Antibacterial and Anti-Fungal treatment with ceramic coating
 - 7. Edge: Square
 - 8. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648.
 - 9. ASTM F925 – Resistance to Chemicals: Meets and exceeds passing requirements
 - 10. D2047-Coefficient of Friction (James Machine): Meets and exceeds passing requirements (>.6)
 - 11. ASTM F1515-Resistance to Light: Meets and exceeds passing requirements
 - 12. ASTM F1514-Resistance to Heat: Meets and exceeds passing requirements
 - 13. ASTM F970 - Static Load Limit: Meets and exceeds passing requirements (1,000 PSI-Modified)
 - 14. Squareness: ASTM F2421 - Passes - ± 0.10 ” max
 - 15. Size and Tolerance: ASTM F2055 - Passes - ± 0.016 in. per linear foot
 - 16. Thickness: ASTM F386 - Passes - as specified ± 0.005 ”
 - 17. VOC Content Limits: As specified in Section 01 6116.
 - 18. Color: As noted on drawings.
- B. Installation Method: Full Spread.
- C. Adhesive: As recommended by the manufacturer.

2.2 RESILIENT BASE

- 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.
 - 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 (100 mm) and 2-1/2 inch (62 mm).

4. Thickness: 0.125 inch (3.2 mm).
5. Length: 4 foot (1.2 m) sections.
6. Color: Solid color as indicated on drawings.

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. 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.
- C. Moisture Control System: One-coat moisture control system that suppresses excessive moisture vapor emissions in existing concrete prior to the installation of finished flooring.
 1. Product: Ardex MC Rapid, Moisture Control System, Ardex Engineered Cements, 400 Ardex Park Drive, Aliquippa, PA 1500, 888-512-7339, www.ardex.com.
- D. Filler for Coved Base: Plastic.

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. Test as Follows:
 - a. Internal Relative Humidity: ASTM F2170.
 - b. Moisture Vapor Emission: ASTM F1869.
 2. 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. Existing flooring shall be removed by Asbestos sub-contractor. Refer to Section 02 2080.
 1. Do not proceed until removal is completed and clearances authorized.
- B. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- C. 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.

- D. 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.
- E. 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.

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.
- 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.
- D. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- E. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
1. Resilient Strips: Attach to substrate using adhesive.
- F. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- G. Install flooring in recessed floor access covers, maintaining floor pattern.
- H. Install feature strips where indicated.
- I. Do not mix manufacturing batches of a color within the same area.
- J. Do not install resilient flooring over building expansion joints.
- K. Do not install defective or damaged resilient flooring.
- L. 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.

- M. Install resilient flooring without voids at seams. Lay seams together without stress.
- N. 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 out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a tile at perimeter.
 - 1. Lay tiles square with room axis, unless otherwise indicated.

3.5 INSTALLATION RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches (45 mm) 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.
 - 2. Add heavy duty cleaner to cool water following the manufacturer's instructions.
 - 3. Remove the solution with a wet-dry vacuum or auto scrubber until floor is dry and free of residue.
 - 4. Rinse the floor with clean water. Repeat the rinse process as necessary to remove all haze and residue.
 - 5. Apply three to five coats of high gloss or matte floor finish following the manufacturer's instructions.

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 9113
EXTERIOR PAINTING**

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. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. Exposed surfaces of steel lintels and ledge angles.
- 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, and operating parts of equipment.
 - 5. Glass.
 - 6. Concealed pipes, ducts, and conduits.

1.3 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 05 5000 - Metal Fabrications: Shop-primed items.
- 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. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.
- D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; 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 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. "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 (216 by 279 mm) 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 Eisenbach and Ruhnke Engineers, P.C. before preparing samples, to eliminate sheens definitely not required.
 3. Allow 15 days for approval process, after receipt of complete samples by Eisenbach and Ruhnke Engineers, P.C..
- D. Manufacturer's Instructions: Indicate special surface preparation procedures.
- E. 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.
- 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 Paint and Finish Materials: 1 gallon (4 L) 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 five (5) years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three (3) years experience.

1.8 MOCK-UP

- A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.
- B. Provide column & beam assembly illustrating paint color, texture, and finish.
- C. Locate where directed by Construction Manager.
- 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 (7 degrees C) and a maximum of 90 degrees F (32 degrees C), 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. 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 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer.
- B. Paints:
 - 1. Base Manufacturer: Sherwin-Williams Company; www.sherwin-williams.com.
- C. Substitutions: See Section 01 2500 - Substitution Procedures

2.2 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
 - 1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
 - 2. 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.
 - 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. Colors: As indicated on drawings.

2.3 PAINT SYSTEMS - EXTERIOR

- A. Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including galvanized and primed metal.
- B. Ferrous Metals, Unprimed Alkyd: Provide the following finish systems over unprimed exterior ferrous metal:
 - 1. Rust inhibiting, modified phenolic alkyd resin primer: Two finish coats over primer
 - a. Primer: Sherwin WilliamsKem Kromik Universal Metal Primer spreading rate recommended by manufacturer to achieve a dry film thickness of 3.3 to 4.4 mils.
 - 2. Topcoat: Two Coats Alkyd applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 3.0 to 5.6mils
 - a. Sherwin Williams: Pro Industrial Urethan Alkyd Enalmel.
- C. Ferrous Metals, Unprimed, Latex, 3 Coat:
 - 1. Rust inhibiting, modified phenolic alkyd resin primer: 2 finish coats over primer
 - a. Primer: Sherwin WilliamsKem Kromik Universal Metal Primer spreading rate recommended by manufacturer to achieve a dry film thickness of 3.3 to 4.4 mils.
 - 2. Topcoat: Acrylic Latex applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 2.1 to 4.2 mils
 - a. Sherwin Williams: Pro Industrial Acrylic.
- D. Ferrous Metals, Primed, Alkyd, 2 Coat:
 - 1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.

2. Topcoat: Two Coats Alkyd applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 3.0 to 5.6mils
 - a. Sherwin Williams: Direct To Metal Alkyd.
- E. Ferrous Metals, Primed, Latex, 2 Coat:
 1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
 2. Topcoat: Acrylic Latex applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 2.5 to 4.0
 - a. Sherwin Williams: Pro Industrial Acrylic.
- F. Galvanized Metals, Alkyd, 3 Coat:
 1. One coat galvanize primer.
 2. Two coats of alkyd enamel :
 - a. Intermediate coat: Alkyd enamel applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 3.0 to 5.6.
 - a) Sherwin Williams Direct To
 - b. Finish coat: Alkyd enamel applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 3.0 to 5.6.
 - a) Sherwin Williams Direct To Metal Alkyd Enamel Semi-Gloss Pure White

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. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Galvanized Surfaces:
 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
 2. Prepare surface according to SSPC-SP 2.
- H. 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 by power wire brushing, power sanding, power grinding, power tool chipping and power tool descaling, using methods recommended in writing by paint manufacturer and SSPC-SP 3. Protect from corrosion until coated.

3.3 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Apply each coat to uniform appearance.
- F. Sand metal surfaces lightly between coats to achieve required finish.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. 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 9123
INTERIOR PAINTING**

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Sections, apply to this Section.

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. 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 05 5213 - Pipe and Tube Railings.
- E. Section 09 2400 - Cement Plastering.
- F. 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 (216 by 279 mm) 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 (4 L) 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 (7 degrees C) and a maximum of 90 degrees F (32 degrees C), 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 (10 degrees C) for interiors unless required otherwise by manufacturer's instructions.
- D. Provide lighting level of 80 ft candles (860 lx) 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 Eisenbach and Ruhnke Engineers, 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 mils 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 mils 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 mils 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 mils 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

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 Eisenbach and Ruhnke Engineers, 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 9600
HIGH-PERFORMANCE EPOXY FLOOR COATING**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. High performance epoxy floor coating for refrigerated box.
- B. Surface preparation.

1.2 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. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.
- D. SSPC V1 (PM1) - Good Painting Practice: Painting Manual, Volume 1; 2016.
- E. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.3 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide complete list of all 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. Maintenance Data: Include cleaning procedures and repair and patching techniques.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.5 MOCK-UP

- A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.
- B. Locate where directed.
- C. Mock-up may remain as part of the work.

1.6 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 coating, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Coating Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.7 FIELD CONDITIONS

- A. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- B. Do not install materials when temperature is below 55 degrees F (13 degrees C) or above 90 degrees F (32 degrees C).
- C. Maintain this temperature range, 24 hours before, during, and 72 hours after installation of coating.
- D. Restrict traffic from area where coating is being applied or is curing.

1.8 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.
- C. Warranty: Include coverage for bond to substrate.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Provide high performance coating products from the same manufacturer.
 - 1. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by the same manufacturer.
- B. High-Performance Epoxy Floor Coatings:
 - 1. Sherwin-Williams Company; Armorseal 1000HS:
www.protective.sherwin-williams.com/industries/#sle.
 - 2. Substitutions: Section 01 6000 - Product Requirements.

2.2 HIGH-PERFORMANCE COATINGS

- A. Provide epoxy coating systems that meet the following minimum performance criteria, unless more stringent criteria are specified:
 - 1. Abrasion Resistance: 64.8 mg loss, when tested in accordance with ASTM D4060.
 - 2. Impact Resistance: 58 in. lbs., when tested in accordance with ASTM D2794.
 - 3. Hardness: HB, when tested in accordance with ASTM D3363.

2.3 TOP COAT MATERIALS

- A. Coatings - General: Provide complete multi-coat systems formulated and recommended by manufacturer for the applications indicated, in the thicknesses indicated; number of coats specified does not include primer or filler coat.
- B. Epoxy Floor Coating for Refrigerated Box:
 - 1. Number of top Coats: Two.

2.4 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by coating manufacturer.
 - 1. Anti-Corrosive for Metal, Epoxy; MPI #101.
 - a. Products:
 - a) Sherwin Williams; Recoatable Epoxy Primer.

2.5 ACCESSORY MATERIALS

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of coated surfaces.
- B. Slip-Resistant Additive: Micronized polymer spherically shaped particles/
 - 1. Product: H&C Products Group; Sharkgrip

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Do not begin application of coatings until substrates have been properly prepared.
- C. Verify that substrate surfaces are ready to receive work as instructed by the coating manufacturer. Obtain and follow manufacturer's instructions for examination and testing of substrates.
- D. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

- E. Proceed with coating application only after unacceptable conditions have been corrected.
 - 1. Commencing coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Clean surfaces of loose foreign matter.
- B. Existing Metal Floor Surface:
 - 1. Remove rust, loose mill scale, existing coatings and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning", and protect from corrosion until coated.
- C. Protect adjacent surfaces and materials not receiving coating from spatter and overspray; mask if necessary to provide adequate protection. Repair damage.

3.3 PRIMING

- A. Apply primer to all surfaces, unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.

3.4 COATING APPLICATION

- A. Apply coatings in accordance with manufacturer's written instructions, to thicknesses specified and recommendations in "MPI Architectural Painting and Specification Manual".
- B. Apply in uniform thickness coats, without runs, drips, pinholes, brush marks, or variations in color, texture, or finish. Finish edges, crevices, corners, and other changes in dimension with full coating thickness.
- C. Provide 2 top coats.
- D. Mix anti-slip additive into final coat prior to application.

3.5 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. Clean surfaces immediately of overspray, splatter, and excess material.
- C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

3.6 PROTECTION

- A. Protect finished work from damage.

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 and screens. (HDPE Toilet Partitions and NFPA 286 certification)

1.3 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Blocking and supports.
- 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 B 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 (76 x76 mm) 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 Minimum
- B. Zinc Aluminum Magnesium and Copper Alloy (Zamac): ASTM B 86.
- C. Stainless Steel Castings: ASTM A167, Type 304.
- D. Aluminum: ASTM B221, 6463-T5 alloy.

2.3 PLASTIC TOILET COMPARTMENTS

- A. Solid Plastic Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), tested in accordance with NFPA 286; floor-mounted unbraced.
 - 1. Color: To be selected from manufacturer's standards.
- B. Doors:
 - 1. Thickness: 1 inch (25 mm).
 - 2. Width: 24 inch (610 mm).
 - 3. Width for Handicapped Use: 36 inch (915 mm), out-swinging.
 - 4. Height: 55 inch (1397 mm).
 - 5. Aluminum heat sink fastened to bottom edges
- C. Panels:
 - 1. Thickness: 1 inch (25 mm).
 - 2. Height: 55 inch (1397 mm).
 - 3. Depth: As indicated on drawings.

- D. Pilasters: Pilasters shall be 81-1/2" 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. 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 (76 mm) 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 blocking, 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 1/4 inch (10 mm to 10 mm) space between wall and panels and between wall and end pilasters.

- C. Attach panel brackets securely to inwall blocking 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 (6 mm).
- B. Maximum Variation From Plumb: 1/8 inch (3 mm).

3.4 ADJUSTING/CLEANING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch (5 mm).
- 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. Paper Towel Dispenser. (Provided by Owner Installed by Contractor).
- G. Partition Mounted Sanitary Napkin Disposal.
- H. Semi-Recessed 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. Paper Towel Dispenser: Folded paper type, stainless steel, surface-mounted, with viewing slots on sides as refill indicator and tumbler lock.
 - 1. Products:
 - a. Furnished by Owner Installed by Contractor..

- 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 manufactured by Bobrick.
- E. Grab Bars: Stainless steel, smooth surface.
 - 1. Standard Duty Grab Bars:
 - a. Push/Pull Point Load: 250 pound-force (1112 N), minimum to meet and exceed ADA requirements.
 - b. Dimensions: 1-1/4 inch (32 mm) outside diameter, minimum 0.05 inch (1.3 mm) wall thickness, exposed flange mounting, 1-1/2 inch (38 mm) 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.
 - 1. Door: Seamless 18-gauge (1.2mm) stainless steel with satin finish door with returned edges and tumbler lock.
 - 2. Cabinet: Fully welded, 18-8, Type-304, 18-gauge (1.2mm) stainless steel.
 - a. Secured to cabinet with a concealed full-length stainless steel piano-hinge.
 - b. Equipped with two tumbler locks keyed like.
 - c. Graphic symbols identify products dispensed and coin denomination.
 - 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. B-47064C Semi-Recessed Free no-coin operation manufactured by Bobrick.
- 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.

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 (3.2 mm) 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..

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 22 0516

EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flexible pipe connectors.
- B. Expansion joints and compensators.
- C. Pipe loops, offsets, and swing joints.

1.02 RELATED REQUIREMENTS

- A. Section 21 0500 - Common Work Results for Fire Suppression.
- B. Section 22 1005 - Plumbing Piping.

1.03 REFERENCE STANDARDS

- A. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2015.
- B. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard; 2017.
- C. ASME B16.11 - Forged Fittings, Socket-welding and Threaded; 2016 (Errata 2017).
- D. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015a (Reapproved 2019).
- E. EJMA (STDS) - EJMA Standards; Tenth Edition.
- F. FM (AG) - FM Approval Guide; current edition.
- G. ITS (DIR) - Directory of Listed Products; current edition.
- H. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data:
 - 1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot (meter) and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
 - 2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.
- C. Manufacturer's Instructions: Indicate manufacturer's installation instructions, special procedures, and external controls.
- D. Maintenance Data: Include adjustment instructions.
- E. Project Record Documents: Record installed locations of flexible pipe connectors, expansion joints, anchors, and guides. See Section 01 7800 when submitting closeout documents.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Packing for Packed Expansion Joints: One set for each joint.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Comply with UL (DIR) requirements.

2.02 FLEXIBLE PIPE CONNECTORS - STEEL PIPING

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com/#sle.
 - 2. The Metraflex Company: www.metraflex.com/#sle.
 - 3. Or approved equivalent.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

- B. Inner Hose: Carbon steel.
- C. Exterior Sleeve: Single braided, stainless steel.
- D. Pressure Rating: 125 psi and 450 degrees F (862 kPa and 232 degrees C).

2.03 FLEXIBLE PIPE CONNECTORS - COPPER PIPING

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com/#sle.
 - 2. The Metraflex Company: www.metraflex.com/#sle.
 - 3. Or approved equivalent.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Inner Hose: Bronze.
- C. Exterior Sleeve: Braided bronze.
- D. Pressure Rating: 125 psi and 450 degrees F (862 kPa and 232 degrees C).
- E. Application: Copper piping.

2.04 EXPANSION JOINTS - STAINLESS STEEL BELLOWS TYPE

- A. Manufacturers:
 - 1. Flex-Weld, Inc; Keflex 7Q Series - Quadra-Side: www.kelcoind.com/#sle.
 - 2. Mercer Rubber Company: www.mercer-rubber.com/#sle.
 - 3. The Metraflex Company: www.metraflex.com/#sle.
 - 4. Or approved equivalent.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Pressure Rating: 125 psi and 400 degrees F (862 kPa and 204 degrees C).
- C. Application: Steel piping 4 inches (102 mm) and under.

2.05 EXPANSION JOINTS - EXTERNAL RING CONTROLLED STAINLESS STEEL BELLOWS TYPE

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com/#sle.
 - 2. The Metraflex Company: www.metraflex.com/#sle.
 - 3. Or approved equivalent.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Pressure Rating: 125 psi and 400 degrees F (862 kPa and 204 degrees C).
- C. Accessories: Internal flow liner.
- D. Application: Steel piping over 2 inches (50 mm).

2.06 EXPANSION JOINTS - SINGLE SPHERE, ELBOW COMPENSATOR

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com/#sle.
 - 2. The Metraflex Company: www.metraflex.com/#sle.
 - 3. Or approved equivalent.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Body: Teflon.
- C. Pressure Rating, Sizes 3/4 Inch to 2 Inch (20 mm to 50 mm): 150 psi and 210 degrees F (1040 kPa and 99 degrees C).
- D. Pressure Rating, Sizes 1-1/2 Inch to 12 Inch (32 mm to 300 mm): 150 psi and 250 degrees F (1040 kPa and 121 degrees C).
- E. Pressure Rating, Sizes 14 Inch to 24 Inch (350 mm to 600 mm): 105 psi and 250 degrees F (725 kPa and 121 degrees C).
- F. Joint: Tapped steel flanges.
- G. Accessories: Control rods.

H. Application: Steel piping 2 inches (50 mm) and over.

2.07 EXPANSION JOINTS - TWO-PLY BRONZE BELLOWS TYPE

A. Manufacturers:

1. Mercer Rubber Company: www.mercer-rubber.com/#sle.
2. The Metraflex Company: www.metraflex.com/#sle.
3. Or approved equivalent.
4. Substitutions: See Section 01 6000 - Product Requirements.

B. Construction: Bronze with anti-torque device, limit stops, internal guides.

C. Joint: Soldered.

D. Application: Copper piping.

2.08 EXPANSION JOINTS - LOW PRESSURE COMPENSATOR WITH TWO-PLY BRONZE BELLOWS

A. Manufacturers:

1. Mercer Rubber Company; _____: www.mercer-rubber.com/#sle.
2. The Metraflex Company; _____: www.metraflex.com/#sle.
3. Or approved equivalent.
4. Substitutions: See Section 01 6000 - Product Requirements.

B. Maximum Temperatures: 250 degrees F (121 degrees C).

C. Application: Copper or steel piping 3 inches (75 mm) and under.

2.09 EXPANSION JOINTS - STEEL WITH PACKED SLIDING SLEEVE

A. Working Pressure and Temperature: Class 150.

B. Application: Steel piping 2 inches (50 mm) and over.

2.10 EXPANSION JOINTS - COPPER WITH PACKED SLIDING SLEEVE

A. Working Pressure: 125 psi (862 kPa).

B. Maximum Temperature: 250 degrees F (121 degrees C).

C. Application: Copper or steel piping 2 inches (50 mm) and over.

2.11 EXPANSION LOOPS - HOSE AND BRAID

A. Manufacturers:

1. The Metraflex Company; Metraloop: www.metraflex.com/#sle.
2. Or approved equivalent.
3. Substitutions: See Section 01 6000 - Product Requirements.

B. Provide flexible loops with two flexible sections of hose and braid, two 90 degree elbows, and 180 degree return with support bracket and air release or drain plug.

C. Provide flexible loops capable of movement in the x, y, and z planes. Flexible loops to impart no thrust loads to the building structure.

2.12 EXPANSION JOINTS - EXTERNALLY PRESSURIZED EXPANSION JOINTS

A. Manufacturers:

1. Flex-Weld, Inc; Keflex Externally-Pressurized Expansion Joints: www.kelcoind.com/#sle.
2. The Metraflex Company; Metragator: www.metraflex.com/#sle.
3. Or approved equivalent.
4. Substitutions: See Section 01 6000 - Product Requirements.

B. Construction: Stainless steel with anti-torque device, limit stops, internal guides.

C. Maximum Allowable Working Pressure: 150 psig (1030 kPa) at 700 degrees F (372 degrees C).

D. Application: Steel piping 2 inches (50 mm) and over.

2.13 ACCESSORIES

A. Stainless Steel Pipe: ASTM A269/A269M, seamless type, Grade TP304.

- B. Pipe Alignment Guides:
 - 1. Manufacturers:
 - a. Flex-Weld, Inc: www.flex-weld.com/#sle.
 - b. The Metraflex Company; PGQ Glide Riser Guide: www.metraflex.com/#sle.
 - c. Or approved equivalent.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch (25 mm) thick insulation, minimum 3 inches (75 mm) travel.
- C. Swivel Joints:
 - 1. Fabricated steel body, double ball bearing race, field lubricated, with rubber (Buna-N) o-ring seals.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with EJMA (Expansion Joint Manufacturers Association) Standards.
- C. Install flexible pipe connectors on pipes connected to vibration isolated equipment. Provide line size flexible connectors.
- D. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.
- E. Anchor pipe to building structure where necessary. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.
- F. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.

END OF SECTION

SECTION 22 0517

SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe sleeves.
- B. Manufactured sleeve-seal systems.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 09 9123 - Interior Painting: Preparation and painting of interior piping systems.
- C. Section 22 0523 - General-Duty Valves for Plumbing Piping.
- D. Section 22 0553 - Identification for Plumbing Piping and Equipment: Piping identification.
- E. Section 22 0716 - Plumbing Equipment Insulation.
- F. Section 22 0719 - Plumbing Piping Insulation.

1.03 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).

1.04 SUBMITTALS

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

PART 2 PRODUCTS – N/A

END OF SECTION

SECTION 22 0523
GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Applications.
- B. General requirements.
- C. Ball valves.

1.02 RELATED REQUIREMENTS

- A. Section 22 0719 - Plumbing Piping Insulation.
- B. Section 22 1005 - Plumbing Piping.

1.03 REFERENCE STANDARDS

- A. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves; 2017.
- B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2018.
- C. ASME B16.34 - Valves - Flanged, Threaded and Welding End; 2017.
- D. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service; 2010a.
- E. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.
- F. NSF 61 - Drinking Water System Components - Health Effects; 2019.
- G. NSF 372 - Drinking Water System Components - Lead Content; 2016.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. See drawings for specific valve locations.
- B. Provide the following valves for the applications if not indicated on drawings:
 - 1. Shutoff: Ball, butterfly, gate or plug.
- C. Substitutions of valves with higher CWP classes or SWP ratings for same valve types are permitted when specified CWP ratings or SWP classes are not available.
- D. Required Valve End Connections for Non-Wafer Types:
 - 1. Copper Tube:
 - a. 2 NPS (50 DN) and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
 - b. 2-1/2 NPS (65 DN) to 4 NPS (100 DN): Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below.
- E. Domestic, Hot and Cold Water Valves:
 - 1. 2 NPS (50 DN) and Smaller:
 - a. Bronze and Brass: Provide with solder-joint or threaded ends.
 - b. Ball: One piece, full port, brass or bronze with brass trim.

2.02 GENERAL REQUIREMENTS

- A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
- B. Valve Sizes: Match upstream piping unless otherwise indicated.
- C. Valve Actuator Types:

1. Hand Lever: Quarter-turn valves 6 NPS (150 DN) and smaller except plug valves.
- D. Valves in Insulated Piping: With 2 NPS (50 DN) stem extensions and the following features:
 1. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
- E. General ASME Compliance:
 1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
 2. Solder-joint Connections: ASME B16.18.
- F. Valve Materials for Potable Water: NSF 61 and NSF 372.

2.03 BRASS BALL VALVES

- A. One-Piece, Reduced-Port with Brass Trim:
 1. Comply with MSS SP-110.
 2. Body: Forged brass.
 3. Ends: Threaded.
 4. Seats: PTFE.
 5. Stem: Brass.
 6. Ball: Chrome-plated brass.
- B. Two Piece, Full Port with Brass Trim:
 1. Comply with MSS SP-110.
 2. SWP Rating: 150 psig (1035 kPa).
 3. CWP Rating: 600 psig (4140 kPa).
 4. Body: Forged brass.
 5. Ends: Threaded.
 6. Seats: PTFE.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.
- B. Verify valve parts to be fully operational in all positions from closed to fully open.
- C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.
- D. Should valve is determined to be defective, replace with new valve.

3.02 INSTALLATION

- A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
- B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

END OF SECTION

SECTION 22 0529

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment components for equipment, piping, and other plumbing work.

1.02 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 B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2019.
- D. MFMA-4 - Metal Framing Standards Publication; 2004.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.

1.04 QUALITY ASSURANCE

- A. Comply with applicable building code.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
 - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 - 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
 - 4. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Metal Channel (Strut) Framing Systems:
 - 1. Comply with MFMA-4.
- C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
- D. Anchors and Fasteners:
 - 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

- D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- F. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- G. Secure fasteners according to manufacturer's recommended torque settings.
- H. Remove temporary supports.

END OF SECTION

SECTION 22 0553

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe markers.

1.02 RELATED REQUIREMENTS

- A. Section 09 9123 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Piping: Pipe markers.
- B. Valves: Tags.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Brimar Industries, Inc: www.pipemarker.com/#sle.
 - 2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
 - 3. Seton Identification Products: www.seton.com/#sle.
 - 4. Or approved equivalent.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Laminated three-layer plastic with engraved letters.
 - 1. Plastic: Comply with ASTM D709.

2.03 TAGS

- A. Manufacturers:
 - 1. Advanced Graphic Engraving: www.advancedgraphicengraving.com/#sle.
 - 2. Brady Corporation: www.bradycorp.com/#sle.
 - 3. Brimar Industries, Inc: www.pipemarker.com/#sle.
 - 4. Craftmark Pipe Markers: www.craftmarkid.com/#sle.
 - 5. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
 - 6. Seton Identification Products: www.seton.com/#sle.
 - 7. Or approved equivalent.
 - 8. Substitutions: See Section 01 6000 - Product Requirements.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch (40 mm) diameter.

- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch (40 mm) diameter with smooth edges.
- D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 PIPE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation: www.bradycorp.com/#sle.
 - 2. Brimar Industries, Inc: www.pipemarker.com/#sle.
 - 3. Craftmark Pipe Markers: www.craftmarkid.com/#sle.
 - 4. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
 - 5. Seton Identification Products: www.seton.com/#sle.
 - 6. Or approved equivalent.
 - 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Comply with ASME A13.1.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- E. Color code as follows:
 - 1. Potable, Cooling, Boiler, Feed, Other Water: Green with white letters.
 - 2. Fire Quenching Fluids: Red with white letters.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 9123 for stencil painting.

3.02 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Install ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

SECTION 22 0719
PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 22 1005 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019.
- B. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2016.
- C. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2019.
- D. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2018).
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER

- A. Manufacturers:
 - 1. CertainTeed Corporation: www.certainteed.com/#sle.
 - 2. Johns Manville Corporation: www.jm.com/#sle.
 - 3. Knauf Insulation; Earthwool 1000 Degree Pipe Insulation: www.knaufinsulation.com/#sle.
 - 4. or approved equal.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. K (Ksi) Value: ASTM C177, 0.24 at 75 degrees F (0.035 at 24 degrees C).
 - 2. Maximum Service Temperature: 850 degrees F (454 degrees C).
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturers:
 - 1. Aeroflex USA, Inc; Aerocel Stay-Seal with Protape (SSPT): www.aeroflexusa.com/#sle.
 - 2. Armacell LLC; AP Armaflex: www.armacell.us/#sle.
 - 3. K-Flex USA LLC; Insul-Tube: www.kflexusa.com/#sle.
 - 4. or approved equal.

- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: Minus 40 degrees F (Minus 40 degrees C).
 - 2. Maximum Service Temperature: 220 degrees F (104 degrees C).
 - 3. Connection: Waterproof vapor barrier adhesive.

2.04 JACKETS

- A. PVC Plastic.
 - 1. Manufacturers:
 - a. Johns Manville Corporation: www.jm.com/#sle.
 - b. or approved equal.
 - 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F (Minus 18 degrees C).
 - b. Maximum Service Temperature: 150 degrees F (66 degrees C).
 - c. Moisture Vapor Permeability: 0.002 perm inch (0.0029 ng/Pa s m), maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil (0.25 mm).
 - e. Connections: Brush on welding adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.03 SCHEDULES SEE P500

END OF SECTION

SECTION 22 0719.11

UNDER-LAVATORY PIPE AND SUPPLY COVERS - PLUMBEREX

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Under-lavatory pipe and supply covers.

1.02 RELATED REQUIREMENTS

- A. Section 22 1005 - Plumbing Piping.

1.03 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.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog illustrations of covers, sizes, and finishes.

PART 2 PRODUCTS

2.01 UNDER-LAVATORY PIPE AND SUPPLY COVERS

- A. Manufacturers:
 - 1. Plumberex Specialty Products, Inc: www.plumberex.com/#sle.
 - 2. or approved equal.
- B. General:
 - 1. Insulate exposed drainage piping including hot, cold, and tempered water supplies under lavatories or sinks per ADA Standards.
- C. ASTM E84 Compliant, Under-Lavatory Insulators:
 - 1. Manufacturers:
 - a. Plumberex Specialty Products, Inc: Plumberex Trap Gear; www.plumberex.com/#sle.
 - 2. Construction: Soft, non-laminated, flexible PVC with antimicrobial, antifungal, and UV-resistant properties. Fusion molded one piece universal design for multiple P-trap configurations. Adhesives, sewing threads, and two ply laminated materials shall not be allowed. Exterior surfaces shall be smooth nonabsorbent with no finger recessed indentations for easy cleaning. Supply riser shall be flexible and a minimum of 15 inches (381 mm) inches in length.
 - 3. Provide with weep hole for condensation drainage and ventilation.
 - 4. Fasteners: Reusable, fusion bonded Velcro and tamper resistant snap-locking fasteners with no sharp or abrasive external surfaces. No cable tie fasteners allowed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that walls, floor finishes, lavatories, and piping are prepared and ready for installation of under-lavatory guards.
- B. Confirm location and size of fixtures and piping before installation.

3.02 INSTALLATION

- A. Install under-lavatory guards according to manufacturer's written instructions..

END OF SECTION

SECTION 22 1005
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe, pipe fittings, specialties, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Domestic water.
 - 3. Flanges, unions, and couplings.
 - 4. Pipe hangers and supports.
 - 5. Valves.

1.02 RELATED REQUIREMENTS

- A. Section 22 0719 - Plumbing Piping Insulation.

1.03 REFERENCE STANDARDS

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2018.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2018.
- C. ASME B31.9 - Building Services Piping; 2017.
- D. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2020.
- E. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- F. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2020.
- G. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.
- H. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.
- I. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2016.
- J. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.
- K. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2012 (Reapproved 2018).
- L. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2017.
- M. ASTM D2855 - Standard Practice for the Two-Step (Primer & Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2015.
- N. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; 2017 (Revised 2018).
- O. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2012 (Revised 2018).
- P. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2015.
- Q. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018.
- R. NSF 61 - Drinking Water System Components - Health Effects; 2019.
- S. NSF 372 - Drinking Water System Components - Lead Content; 2016.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 SANITARY SEWER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: ASTM A74, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
- B. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
- C. PVC Pipe: ASTM D2729.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.03 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.

2.04 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches (80 mm) and Under:
 - 1. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.

2.05 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
 - 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 - 4. Vertical Pipe Support: Steel riser clamp.
- B. Plumbing Piping - Drain, Waste, and Vent:
 - 1. Hangers for Pipe Sizes 1/2 Inch (15 mm) to 1-1/2 Inches (40 mm): Malleable iron, adjustable swivel, split ring.
 - 2. Hangers for Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
 - 3. Wall Support for Pipe Sizes to 3 Inches (80 mm): Cast iron hook.
 - 4. Wall Support for Pipe Sizes 4 Inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.
- C. Plumbing Piping - Water:
 - 1. Hangers for Pipe Sizes 1/2 Inch (15 mm) to 1-1/2 Inches (40 mm): Malleable iron, adjustable swivel, split ring.
 - 2. Hangers for Cold Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
 - 3. Hangers for Hot Pipe Sizes 2 Inches (50 mm) to 4 Inches (100 mm): Carbon steel, adjustable, clevis.
- D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
 - 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
 - 2. Concrete Screw Type Anchors: Complying with ICC-ES AC193.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- C. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- D. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.

END OF SECTION

SECTION 22 1006
PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Drains.
- B. Cleanouts.
- C. Water hammer arrestors.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Product requirements for Owner furnished kitchen equipment.
- B. Section 01 6000 - Product Requirements: Procedures for Owner-supplied products.
- C. Section 22 1005 - Plumbing Piping.
- D. Section 22 3000 - Plumbing Equipment.
- E. Section 22 4000 - Plumbing Fixtures.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASME A112.6.3 - Floor and Trench Drains; 2019.
- C. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers; 2017.
- D. NSF 61 - Drinking Water System Components - Health Effects; 2019.
- E. NSF 372 - Drinking Water System Components - Lead Content; 2016.
- F. PDI-WH 201 - Water Hammer Arresters; 2017.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
- D. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.
- E. Sustainable Design Documentation: Submit appropriate evidence that materials used in potable water systems comply with the specified requirements.
- F. Operation Data: Indicate frequency of treatment required for interceptors.
- G. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- H. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors. See Section 01 7800 for closeout submittals.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept specialties on site in original factory packaging. Inspect for damage. Store in such a way that shall protect from damage following delivery.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS

- A. Manufacturers:
 - 1. Substitutions: See Section 01 6000 - Product Requirements.
- B. Floor Drains:
 - 1. Manufacturers:

2.03 CLEANOUTS

- A. Manufacturers:
 - 1. Jay R. Smith Manufacturing Company; www.jayrsmith.com/#sle.
 - 2. Josam Company; www.josam.com/#sle.
 - 3. MIFAB, Inc; www.mifab.com/#sle.
 - 4. Zurn Industries, LLC; www.zurn.com/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.

2.04 WATER HAMMER ARRESTORS

- A. Manufacturers:
 - 1. Cash Acme, a brand of Reliance Worldwide Corporation; www.cashacme.com/#sle.
 - 2. Jay R. Smith Manufacturing Company; www.jayrsmith.com/#sle.
 - 3. Watts Regulator Company, a part of Watts Water Technologies; www.wattsregulator.com/#sle.
 - 4. Zurn Industries, LLC; www.zurn.com/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Water Hammer Arrestors:
 - 1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range minus 100 to 300 degrees F (minus 73 to 149 degrees C) and maximum 250 psi (1700 kPa) working pressure.

2.05 FLOOR DRAIN TRAP SEALS

- A. Manufacturers:
 - 1. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Push-fit EPDM or silicone fitting with a one-way membrane.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- C. Encase exterior cleanouts in concrete flush with grade.
- D. Install floor cleanouts at elevation to accommodate finished floor.
- E. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.
- F. Pipe relief from backflow preventer to nearest drain.
- G. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatory sinks, washing machine outlets, or water closets.

END OF SECTION

SECTION 22 4000
PLUMBING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water closets.
- B. Urinals.
- C. Lavatories.

1.02 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Sealing joints between fixtures and walls and floors.
- B. Section 22 1005 - Plumbing Piping.
- C. Section 22 1006 - Plumbing Piping Specialties.
- D. Section 22 3000 - Plumbing Equipment.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASME A112.6.1M - Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2017).
- C. ASME A112.18.1 - Plumbing Supply Fittings; 2018, with Errata.
- D. ASME A112.18.9 - Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixtures; 2011 (Reaffirmed 2017).
- E. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2018.
- F. ASME A112.19.4M - Porcelain Enameled Formed Steel Plumbing Fixtures; 1994 (R2009).
- G. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks; 2017.
- H. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices; 2015.
- I. ASTM C1822 - Standard Specification for Insulating Covers on Accessible Lavatory Piping; 2015.
- J. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- K. FM (AG) - FM Approval Guide; current edition.
- L. IAPMO Z124 - Plastic Plumbing Fixtures; 2017.
- M. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- N. ITS (DIR) - Directory of Listed Products; current edition.
- O. NSF 61 - Drinking Water System Components - Health Effects; 2019.
- P. NSF 372 - Drinking Water System Components - Lead Content; 2016.
- Q. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Manufacturer's Instructions: Indicate installation methods and procedures.
- D. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept fixtures on site in factory packaging. Inspect for damage.
- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 REGULATORY REQUIREMENTS

- A. Comply with applicable codes for installation of plumbing systems.
- B. Comply with UL (DIR) requirements.
- C. Perform work in accordance with local health department regulations.
- D. Provide certificate of compliance from Authority Having Jurisdiction indicating approval of installation.

2.03 FLUSH VALVE WATER CLOSETS

- A. Floor Mounted Water Closets: Vitreous china, ASME A112.19.2, floor mounted, siphon jet flush action, china bolt caps.
 - 1. Bowl: ASME A112.19.2; 16.5 inches (420 mm) high with elongated rim.
 - 2. Flush Valve: Exposed (top spud).
 - 3. Flush Operation: Manual, oscillating handle.
 - 4. Handle Height: 44 inches (1117 mm) or less.
 - 5. Supply Size: 1 inches (25 mm).
 - 6. Outlet Size: 2-1/2" inches (38 mm).
 - 7. Color: White.
 - 8. Manufacturers:
 - a. American Standard, Inc; Madera: www.americanstandard-us.com/#sle.
- B. Wall Hung Water Closets: Vitreous china, ASME A112.19.2, siphon jet flush action, china bolt caps.
 - 1. Bowl: ASME A112.19.2; 16.5 inches (420 mm) high with elongated rim.
 - 2. Flush Valve: Exposed (top spud).
 - 3. Flush Operation: Manual, oscillating handle.
 - 4. Handle Height: 44 inches (1117 mm) or less.
 - 5. Supply Size: 1 inches (25 mm).
 - 6. Color: White.
 - 7. Manufacturers:
 - a. American Standard, Inc; AFWall: www.americanstandard-us.com/#sle.
- C. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
 - 1. Sensor-Operated Type: Solenoid or motor-driven operator, normal voltage hard-wired, infrared sensor with mechanical over-ride or over-ride push button.
 - 2. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.
 - 3. Manufacturers:
 - a. Sloan Valve Company: (no exceptions)
- D. Seats:

1. Manufacturers:
 - a. American Standard, Inc: www.americanstandard-us.com/#sle.
 - b. or approved equal.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
 2. Solid white plastic, open front, extended back, self-sustaining hinge, brass bolts, with cover.
- E. Water Closet Carriers:
1. Manufacturers:
 - a. Jay R. Smith MFG. Co: www.jrsmith.com/#sle.
 - b. JOSAM Company: www.josam.com/#sle.
 - c. Zurn Industries, Inc: www.zurn.com/#sle.
 - d. Or approved equal.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
 2. ASME A112.6.1M; adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.

2.04 WALL HUNG URINALS

- A. Wall Hung Urinal Manufacturers:
1. American Standard, Inc; Washbrook: www.americanstandard-us.com/#sle.
- B. Urinals: Vitreous china, ASME A112.19.2, wall hung with side shields and concealed carrier.
1. Flush Volume: 1.0 gallons (3.7 liters), maximum.
 2. Flush Valve: Exposed (top spud).
 3. Flush Operation: Manual, oscillating handle.
 4. Trap: Integral.
 5. Supply Size: 3/4 inch (19 mm).
 6. Outlet Size: 2 inches (50 mm).
- C. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
1. Sensor-Operated Type: Solenoid or motor-driven operator, normal voltage hard-wired, infrared sensor with mechanical over-ride or over-ride push button.
 2. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.
 3. Manufacturers:
 - a. Sloan Valve Company: (no exceptions)
- D. Carriers:
1. Manufacturers:
 - a. Jay R. Smith MFG. Co: www.jrsmith.com/#sle.
 - b. JOSAM Company: www.josam.com/#sle.
 - c. Viega LLC: www.viega.us/#sle.
 - d. Zurn Industries, Inc: www.zurn.com/#sle.
 - e. Or approved equal.
 - f. Substitutions: See Section 01 6000 - Product Requirements.
 2. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs.

2.05 LAVATORIES

- A. Lavatory Manufacturers:
1. American Standard, Inc; Lucerne: www.americanstandard-us.com/#sle.
- B. Vitreous China Wall Hung Basin: ASME A112.19.2; vitreous china wall hung lavatory, 20-1/2 by 18 - 1/4 inch (521 by 464 mm) minimum, with 4 inch (100 mm) high back, rectangular basin with splash lip, and front overflow.
1. Drilling Centers: 4 inch (100 mm).
- C. Supply Faucet Manufacturers:
1. American Standard, Inc: www.americanstandard-us.com/#sle.

- D. Sensor Operated Faucet: Cast brass, chrome plated, deck mounted with sensor located on neck of spout.
 - 1. Spout Style: Standard.
 - 2. Power Supply: Per manufacturer's requirements.
 - a. Cord and plug.
 - 3. Mixing Valve: None, single line for tempered water.
 - 4. Water Supply: 3/8 inch (9 mm) compression connections.
 - 5. Aerator: Vandal resistant, 0.5 GPM (1.89 LPM), laminar flow device.
 - 6. Automatic Shut-off: 30 seconds.
 - 7. Finish: Polished chrome.
- E. Thermostatic Mixing Valve: Thermostatic mixing valve, ASSE 1070 listed, with combination stop, strainer, and check valves, and flexible stainless steel connectors.
- F. Accessories:
 - 1. Carrier:
 - a. Manufacturers:
 - 1) Jay R. Smith MFG. Co: www.jrsmith.com/#sle.
 - 2) JOSAM Company: www.josam.com/#sle.
 - 3) Zurn Industries, Inc: www.zurn.com/#sle.
 - 4) Or approved equal.
 - b. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded studs for fixture hanger, bearing plate and studs.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. Verify that electric power is available and of the correct characteristics.

3.02 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall carriers and bolts.
- E. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.
- F. Plumbing contractor to coordinate with Electrical contractor to provide power for the Sensor operated fixtures 110 volts.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.05 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.06 CLEANING

- A. Clean plumbing fixtures and equipment.
- B. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

3.07 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.

- B. Do not permit use of fixtures by construction personnel.
- C. Repair or replace damaged products before Date of Substantial Completion.

3.08 SCHEDULES

- A. Fixture Heights: Install fixtures to heights above finished floor as indicated.
 - 1. Water Closet:
 - a. Accessible: 18 inches (455 mm) to top of seat.
 - 2. Water Closet Flush Valves:
 - a. Standard: 11 inches (280 mm) min. above bowl rim.
 - 3. Urinal:
 - a. Accessible: 17 inches (430 mm) to top of bowl rim.
 - 4. Lavatory:
 - a. Accessible: 34 inches (865 mm) to top of basin rim.

END OF SECTION

SECTION 23 0130.51

HVAC AIR-DISTRIBUTION SYSTEM CLEANING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cleaning of HVAC duct system, equipment, and related components.

1.02 RELATED REQUIREMENTS

- A. Section 01 4000 - Quality Requirements: Additional requirements for testing and inspection agencies.

1.03 DEFINITIONS

- A. HVAC System: For purposes of this section, the surfaces to be cleaned include all interior surfaces of the heating, air-conditioning and ventilation system from the points where the air enters the system to the points where the air is discharged from the system, including the inside of air distribution equipment, coils, and condensate drain pans; see NADCA ACR for more details.
 - 1. Above-ceiling plenum for supply air is required to be cleaned.
 - 2. Above-ceiling plenum for return air is required to be cleaned.
 - 3. Exhaust-only system is required to be cleaned.

1.04 REFERENCE STANDARDS

- A. NADCA ACR - Assessment, Cleaning and Restoration of HVAC Systems; 2013.
- B. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; current edition, including all revisions.
- C. UL 181A - Closure Systems for Use with Rigid Air Ducts; Current Edition, Including All Revisions.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.
- C. Material Safety Data Sheets (MSDS): For all chemical products proposed to be used in the cleaning process; submit directly to Owner.
- D. Project Closeout Report: Include field quality control reports, evidence of satisfactory cleaning, and documentation of items needing further repair.

1.06 QUALITY ASSURANCE

- A. Cleaning Contractor Qualifications: Company specializing in the cleaning and restoration of HVAC systems as specified in this section.
 - 1. Certified by one of the following:
 - a. NADCA, National Air Duct Cleaners Association: www.nadca.com
 - 2. Having minimum of three years documented experience.
 - 3. Employing for this project a supervisor certified as an Air Systems Cleaning Specialist by NADCA.

PART 2 PRODUCTS

2.01 TOOLS AND EQUIPMENT

- A. Vacuum Devices and Other Tools: Exceptionally clean, in good working order, and sealed when brought into the facility.
- B. Vacuum Devices That Exhaust Air Inside Building, Including Hand-Held and Wet Vacuums: Equipped with HEPA filtration with 99.97 percent collection efficiency for minimum 0.3-micron size particles and DOP test number.
- C. Vacuum Devices That Exhaust Air Outside Building, Including Truck- and Trailer-Mounted Types: Equipped with particulate collection including adequate filtration to contain debris removed from the HVAC system; exhausted in manner that prevents contaminant re-entry to building; compliant with applicable regulations as to outdoor environmental contamination.

PART 3 EXECUTION

3.01 PROJECT CONDITIONS

- A. Comply with applicable federal, state, and local requirements.
- B. Perform cleaning, inspection, and remediation in accordance with the recommendations of NADCA "Assessment, Cleaning and Restoration of HVAC Systems" (ACR) and as specified herein.
- C. Where NADCA ACR uses the terms "recommended", "highly recommended", or "ideally" in regard to a certain procedure or activity, do that unless it is clearly inapplicable to the project.
- D. Obtain Owner's approval of proposed temporary locations for large equipment.
- E. Designate a decontamination area and obtain Owner's approval.
- F. If unforeseen mold or other biological contamination is encountered, notify Architect immediately, identifying areas affected and extent and type of contamination.

3.02 EXAMINATION

- A. Inspect the system as required to determine appropriate methods, tools, equipment, and protection.
- B. Start of cleaning work constitutes acceptance of existing conditions.
- C. When concealed spaces are later made accessible, examine and document interior conditions prior to beginning cleaning.
- D. Document all instances of mold growth, rodent droppings, other biological hazards, and damaged system components.

3.03 PREPARATION

- A. When cleaning work might adversely affect life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with authorities having jurisdiction.
- B. Ensure that electrical components that might be adversely affected by cleaning are de-energized, locked out, and protected prior to beginning work.
- C. Air-Volume Control Devices: Mark the original position of dampers and other air-directional mechanical devices inside the HVAC system prior to starting cleaning.
- D. Access to Concealed Spaces: Use existing service openings and make additional service openings as required to accomplish cleaning and inspection.
 - 1. Do not cut openings in non-HVAC components without obtaining the prior approval of Owner.
 - 2. Make new openings in HVAC components in accordance with NADCA Standard 05; do not compromise the structural integrity of the system.
 - 3. Do not cut service openings into flexible duct; disconnect at ends for cleaning and inspection.
- E. Ceiling Tile: Lay-in ceiling tile may be removed to gain access to HVAC systems during the cleaning process; protect tile from damage and reinstall upon completion; replace damaged tile.

3.04 CLEANING

- A. Use any cleaning method recommended by NADCA ACR unless otherwise specified; do not use methods prohibited by NADCA ACR, or that will damage HVAC components or other work, or that will significantly alter the integrity of the system.
- B. Obtain Owner's approval before using wet cleaning methods; ensure that drainage is adequate before beginning.
- C. Ducts: Mechanically clean all portions of ducts.
- D. Hoses, Cables, and Extension Rods: Clean using suitable sanitary damp wipes at the time they are being removed or withdrawn from their normal position.
- E. Registers, Diffusers, and Grilles: When removing, take care to prevent containment exposure due to accumulated debris.

- F. Coils: Follow NADCA ACR completely including measuring static pressure drop before and after cleaning; do not remove refrigeration coils from system to clean; report coils that are permanently impacted.
- G. Collect debris removed during cleaning; ensure that debris is not dispersed outside the HVAC system during the cleaning process.
- H. Store contaminated tools and equipment in polyethylene bags until cleaned in the designated decontamination area.

3.05 REPAIR

- A. Repair openings cut in the ventilation system so that they do not significantly alter the airflow or adversely impact the facility's indoor air quality.
- B. At insulated ducts and components, accomplish repairs in such a manner as to achieve the equivalent thermal value.
- C. Reseal new openings in accordance with NADCA Standard 05.
- D. Reseal rigid fiber glass duct systems using closure techniques that comply with UL 181 or UL 181A.
- E. When new openings are intended to be capable of being re-opened in the future, clearly mark them and report their locations to Owner in project report documents.

3.06 FIELD QUALITY CONTROL

- A. Ensure that the following field quality control activities are completed prior to application of any treatments or coatings and prior to returning HVAC system to normal operation.
- B. Visually inspect all portions of the cleaned components; if not visibly clean as defined in NADCA ACR, re-clean and reinspect.
- C. Coils: Cleaning must restore the coil pressure drop to within 10 percent of the coil's original installed pressure drop; if original pressure drop is not known, coil will be considered clean if free of foreign matter and chemical residue based on visual inspection.
- D. Notify Architect when cleaned components are ready for inspection.
- E. When directed, re-clean components until they pass.
- F. Submit evidence that all portions of the system required to be cleaned have been cleaned satisfactorily.

3.07 ADJUSTING

- A. After satisfactory completion of field quality control activities, restore adjustable devices to original settings, including, but not limited to, dampers, air directional devices, valves, fuses, and circuit breakers.

3.08 WASTE MANAGEMENT

- A. Double-bag waste and debris in 6 mil, 0.006 inch (0.1524 mm) thick polyethylene plastic bags.
- B. Dispose of debris off-site in accordance with applicable federal, state and local requirements.

END OF SECTION

SECTION 23 0513

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General construction and requirements.
- B. Applications.
- C. Three phase electric motors.

1.02 REFERENCE STANDARDS

- A. NEMA MG 1 - Motors and Generators; 2018.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

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

1.04 QUALITY ASSURANCE

- A. Comply with NFPA 70.

PART 2 PRODUCTS

2.01 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Construction:
 - 1. Open drip-proof type except where specifically noted otherwise.
 - 2. Design for continuous operation in 104 degrees F (40 degrees C) environment.
 - 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
- B. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- C. Wiring Terminations:
 - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
 - 2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.02 APPLICATIONS

2.03 THREE PHASE POWER - SQUIRREL CAGE MOTORS

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
- C. Check line voltage and phase and ensure agreement with nameplate.

END OF SECTION

SECTION 23 0529

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment components for equipment, piping, and other HVAC/hydraulic work.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.

1.03 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 B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
- D. MFMA-4 - Metal Framing Standards Publication; 2004.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 3000.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.

1.06 QUALITY ASSURANCE

- A. Comply with applicable building code.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
 - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 - 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.

4. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - b. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - c. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 1. Comply with MFMA-4.
 2. Channel Material:
 - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
- C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
 1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch (13 mm) diameter.
 - b. Piping up to 1 inch (27 mm) nominal: 1/4 inch (6 mm) diameter.
 - c. Piping larger than 1 inch (27 mm) nominal: 3/8 inch (10 mm) diameter.
 - d. Trapeze Support for Multiple Pipes: 3/8 inch (10 mm) diameter.
- D. Anchors and Fasteners:
 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 2. Concrete: Use expansion anchors or screw anchors.
 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 4. Hollow Masonry: Use toggle bolts.
 5. Hollow Stud Walls: Use toggle bolts.
 6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
 7. Sheet Metal: Use sheet metal screws.
 8. Wood: Use wood screws.
 9. Plastic and lead anchors are not permitted.
 10. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- D. Unless specifically indicated or approved by Engineer, do not provide support from suspended ceiling support system or ceiling grid.
- E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- F. Equipment Support and Attachment:
 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.

- 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- G. Secure fasteners according to manufacturer's recommended torque settings.
- H. Remove temporary supports.

3.02 FIELD QUALITY CONTROL

- A. Inspect support and attachment components for damage and defects.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 23 0566

ANTI-MICROBIAL ULTRAVIOLET EMITTERS FOR HVAC DUCTS AND EQUIPMENT

PART 1 - GENERAL

1.01 ANTI-MICROBIAL ULTRAVIOLET EMITTERS DESCRIPTION

- A. The series UV-DUCT-FL includes modules for disinfecting air in air conditioning systems (HVAC) with a reduction of microbial load of 99.9%.
- B. These modules consist of a box structure (flange) from which two UV lamps emerge, in the form of "U", protected by a stainless-steel grid. They are generally applied along the ducts of air conditioning (pic. n.2).
- C. The modularity of this device allows a straightforward application in all types of conduct, also in the final sectors of the UTA (Air Handling Unit), with the ability to adapt to different needs and different sizes of ducts.
- D. The main characteristics of UV-DUCT-FL, as the compact dimensions and device controls, allow a quick and easy installation, directly inside the air conditioning ducts.
- E. DEVICE REQUIREMENTS
 - 1. UV-C device must consist of a box structure in stainless Steel (flange) from which two UV lamps emerge, in the form of "U", protected by a stainless-steel grid/cage. The air flow must pass entirely parallel or perpendicular to this "grid" of UV-C lamps.
- F. QUALITY ASSURANCE
 - 1. Manufacturer must be ISO 9001:2015 and 13485 certified (at least).
 - 2. The manufacturer for the above mentioned shall have at least 5 years of experience in the manufacturing and installation of such UV-C.
 - 3. Manufacturer must be a IUVA (International UltraViolet Association) member at least for 3 years.
 - 4. Manufacturer must be a registered EPA producer.
- G. DEVICE PERFORMANCE
 - 1. Device must be rated IP 20 or higher.
 - 2. UV-C bulbs shall be Selective UV-C lamp (emission peak at 253.7 nm) high output and high efficiency, pure quartz, PLL one end, ozone free; lamp's life should be at least 18,000 hours.
 - 3. Available lamp power must be 35W, 60W, or 95W.
 - 4. System should be powered by electronic ballasts specific for UV-C rays lamps.
 - 5. UV-C device must consist of a box structure in stainless Steel (flange) from which two UV lamps emerge, in the form of "U", protected by a stainless-steel grid/cage. The air flow must pass entirely parallel or perpendicular to this "grid" of UV-C lamps.
 - 6. The Stainless-steel supply box should contain lamps' LED Synoptic view showing each and single lamp operating and alarms.
 - 7. Device must be labeled to indicate: Power V, Hz, A, IP protection grade, - CEE 73/23 - 89/336 - 2002/95, year of production, item number.
- H. SUBMITTALS
 - 1. Manufacturer's data sheets on each product to be used, including:
 - a. Preparation instructions and recommendations
 - b. Installation methods
 - 2. Device drawings including components, overall dimensions and required clearances.
- I. DELIVERY, STORAGE, AND HANDLING
 - 1. Store products in manufacturer's packaging until ready for installation.
 - 2. Store products in-doors to protect from weather and excessive moisture.
- J. WARRANTY
 - 1. Manufacturer's standard limited warranty with the following warranty periods:
 - a. 2-year lamp warranty
 - b. 5-year limited device warranty

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Manufacturer Information: Light Progress S.r.l., which is located at: Loc. San Lorenzo, 40 – 52031 – ANGIARI (AR), Italy; Tel: 888-580-8738; Email: team@lightprogress.com); Web: <http://www.lightprogress.com>
- B. ULTRAVIOLET GERMICIDAL IRRADIATION DEVICES FOR HVAC
 - 1. UV-DUCT-FL:
 - a. Compact duct or plenum mounted UVGI device for air disinfection.
 - b. Product: UV-DUCT-FL as manufactured by Light Progress S.r.l.
 - c. Model: UV-DUCT-FL 2/35HP-NX, 110-277 V, 2,35 W, 254nm, high output, low pressure mercury vapor, U-lamp.
 - d. Model: UV-DUCT-FL 2/60HP-NX, 110-277 V, 2,60 W, 254nm, high output, low pressure mercury vapor, U-lamp.
 - e. Model: UV-DUCT-FL 2/95HP-NX, 110-277 V, 2,95 W, 254nm, high output, low pressure mercury vapor, U-lamp.
 - f. Dimensions:
 - 1) Stainless Steel box structure (LxWxH) of 16.14 inches x 5.12 inches x 2.76 inches
 - 2) Lamp length:
 - (a) UV-DUCT-FL 2/35/HP-NX = 7.2 inches
 - (b) UV-DUCT-FL 2/60/HP-NX = 15 inches
 - (c) UV-DUCT-FL 2/95/HP-NX = 20 inches

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until the air handling unit, plenum and main duct have been completely installed.
- B. If installation is the responsibility of another installer, notify project manager of unsatisfactory preparation before proceeding.
- C. PREPARATION
 - 1. Clean surface thoroughly prior to installation.
 - 2. Prepare surface using the methods recommended by the manufacturer for achieving the best result for installation.
 - 3. Ensure power supplied to the installation site is 110-277V, 50/60Hz.
- D. INSTALLATION
 - 1. Install in accordance with manufacturer's instructions.
 - 2. Installation shall be done just making two openings on the AHU/plenum/duct wall and inserting the module's lamps inside the AHU/plenum/duct according to provided installation template.
 - 3. To fix the device it should be enough to screw the SS body on the external wall of the channel, using supplied screws.
 - 4. Test for proper seal of the rubber gasket while device is in operation.
- E. PROTECTION
 - 1. Protect installed device until completion of project.

END OF PART 3

SECTION 23 0593

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.

1.02 RELATED REQUIREMENTS

- A. Section 23 0800 - Commissioning of HVAC.

1.03 REFERENCE STANDARDS

- A. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008 (Reaffirmed 2017).
- B. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems; 2015, with Errata (2017).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
 - 1. Include at least the following in the plan:
 - a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - d. Final test report forms to be used.
 - e. Procedures for formal deficiency reports, including scope, frequency and distribution.
- C. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
 - 1. Revise TAB plan to reflect actual procedures and submit as part of final report.
 - 2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
 - 3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
 - 4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 - 5. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. TAB Agency Qualifications:
 - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.

3.02 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.

- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.
- C. Beginning of work means acceptance of existing conditions.

3.03 PREPARATION

3.04 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

3.05 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

END OF SECTION

SECTION 23 0713
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct insulation.

1.02 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- B. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

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

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Test ductwork for design pressure prior to applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.

3.03 SCHEDULES - SEE DRAWING M500

END OF SECTION

SECTION 23 0800
COMMISSIONING OF HVAC

PART 1 GENERAL

1.01 SUMMARY

- A. See Section 01 9113 - General Commissioning Requirements for overall objectives; comply with the requirements of Section 01 9113.
- B. This section covers the Contractor's responsibilities for commissioning; each subcontractor or installer responsible for the installation of a particular system or equipment item to be commissioned is responsible for the commissioning activities relating to that system or equipment item.
- C. The Commissioning Authority (CA) directs and coordinates all commissioning activities and provides Prefunctional Checklists and Functional Test Procedures for Contractor's use.
- D. The entire HVAC system is to be commissioned, including commissioning activities for the following specific items:
 - 1. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.
- E. The Prefunctional Checklist and Functional Test requirements specified in this section are in addition to, not a substitute for, inspection or testing specified in other sections.

1.02 REFERENCE STANDARDS

- A. ASHRAE Guideline 1.1 - The HVAC&R Technical Requirements for the Commissioning Process; 2007, with Errata (2012).

1.03 SUBMITTALS

- A. Updated Submittals: Keep the Commissioning Authority informed of all changes to control system documentation made during programming and setup; revise and resubmit when substantial changes are made.
- B. Draft Prefunctional Checklists and Functional Test Procedures for Control System: Detailed written plan indicating the procedures to be followed to test, checkout and adjust the control system prior to full system Functional Testing; include at least the following for each type of equipment controlled:
 - 1. System name.
 - 2. List of devices.
 - 3. Step-by-step procedures for testing each controller after installation, including:
 - a. Process of verifying proper hardware and wiring installation.
 - b. Process of downloading programs to local controllers and verifying that they are addressed correctly.
 - c. Process of performing operational checks of each controlled component.
 - d. Plan and process for calibrating valve and damper actuators and all sensors.
 - e. Description of the expected field adjustments for transmitters, controllers and control actuators should control responses fall outside of expected values.
 - 4. Copy of proposed log and field checkout sheets to be used to document the process; include space for initial and final read values during calibration of each point and space to specifically indicate when a sensor or controller has "passed" and is operating within the contract parameters.
 - 5. Description of the instrumentation required for testing.
 - 6. Indicate what tests on what systems should be completed prior to TAB using the control system for TAB work. Coordinate with the Commissioning Authority and TAB contractor for this determination.
- C. Startup Reports, Prefunctional Checklists, and Trend Logs: Submit for approval of Commissioning Authority.
- D. HVAC Control System O&M Manual Requirements. In addition to documentation specified elsewhere, compile and organize at minimum the following data on the control system:

1. Specific step-by-step instructions on how to perform and apply all functions, features, modes, etc. mentioned in the controls training sections of this specification and other features of this system. Provide an index and clear table of contents. Include the detailed technical manual for programming and customizing control loops and algorithms.
 2. Full as-built set of control drawings.
 3. Full as-built sequence of operations for each piece of equipment.
 4. Full points list; in addition to the information on the original points list submittal, include a listing of all rooms with the following information for each room:
 - a. Floor.
 - b. Room number.
 - c. Room name.
 - d. Air handler unit ID.
 - e. Reference drawing number.
 - f. Air terminal unit tag ID.
 - g. Heating and/or cooling valve tag ID.
 - h. Minimum air flow rate.
 - i. Maximum air flow rate.
 5. Full print out of all schedules and set points after testing and acceptance of the system.
 6. Full as-built print out of software program.
 7. Electronic copy on disk of the entire program for this facility.
 8. Marking of all system sensors and thermostats on the as-built floor plan and HVAC drawings with their control system designations.
 9. Maintenance instructions, including sensor calibration requirements and methods by sensor type, etc.
 10. Control equipment component submittals, parts lists, etc.
 11. Warranty requirements.
 12. Copies of all checkout tests and calibrations performed by the Contractor (not commissioning tests).
 13. Organize and subdivide the manual with permanently labeled tabs for each of the following data in the given order:
 - a. Sequences of operation.
 - b. Control drawings.
 - c. Points lists.
 - d. Controller and/or module data.
 - e. Thermostats and timers.
 - f. Sensors and DP switches.
 - g. Valves and valve actuators.
 - h. Dampers and damper actuators.
 - i. Program setups (software program printouts).
- E. Project Record Documents: See Section 01 7800 for additional requirements.
1. Submit updated version of control system documentation, for inclusion with operation and maintenance data.
 2. Show actual locations of all static and differential pressure sensors (air, water and building pressure) and air-flow stations on project record drawings.
- F. Draft Training Plan: In addition to requirements specified in Section 01 7900, include:
1. Follow the recommendations of ASHRAE Guideline 1.1.
 2. Control system manufacturer's recommended training.
 3. Demonstration and instruction on function and overrides of any local packaged controls not controlled by the HVAC control system.
- G. Training Manuals: See Section 01 7900 for additional requirements.
1. Provide three extra copies of the controls training manuals in a separate manual from the O&M manuals.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

- A. Provide all standard testing equipment required to perform startup and initial checkout and required functional performance testing; unless otherwise noted such testing equipment will NOT become the property of Owner.
- B. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to Owner; such equipment, tools, and instruments are to become the property of Owner.

PART 3 EXECUTION

3.01 PREPARATION

- A. Cooperate with the Commissioning Authority in development of the Prefunctional Checklists and Functional Test Procedures.
- B. Furnish additional information requested by the Commissioning Authority.
- C. Prepare a preliminary schedule for HVAC pipe and duct system testing, flushing and cleaning, equipment start-up and testing, adjusting, and balancing start and completion for use by the Commissioning Authority; update the schedule as appropriate.
- D. Notify the Commissioning Authority when pipe and duct system testing, flushing, cleaning, startup of each piece of equipment and testing, adjusting, and balancing will occur; when commissioning activities not yet performed or not yet scheduled will delay construction notify ahead of time and be proactive in seeing that the Commissioning Authority has the scheduling information needed to efficiently execute the commissioning process.
- E. Put all HVAC equipment and systems into operation and continue operation during each working day of testing, adjusting, and balancing and commissioning, as required.
- F. Provide test holes in ducts and plenums where directed to allow air measurements and air balancing; close with an approved plug.
- G. Provide temperature and pressure taps in accordance with Contract Documents.

3.02 INSPECTING AND TESTING - GENERAL

- A. Submit startup plans, startup reports, and Prefunctional Checklists for each item of equipment or other assembly to be commissioned.
- B. Perform the Functional Tests directed by the Commissioning Authority for each item of equipment or other assembly to be commissioned.
- C. Provide two-way radios for use during the testing.
- D. Valve/Damper Stroke Setup and Check:
 - 1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
 - 2. Set pump/fan to normal operating mode.
 - 3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
 - 4. Command valve/damper open; verify position is full open and adjust output signal as required.
 - 5. Command valve/damper to a few intermediate positions.
 - 6. If actual valve/damper position does not reasonably correspond, replace actuator or add pilot positioner (for pneumatics).
- E. Isolation Valve or System Valve Leak Check: For valves not by coils.
 - 1. With full pressure in the system, command valve closed.
 - 2. Use an ultra-sonic flow meter to detect flow or leakage.
- F. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.

3.03 TAB COORDINATION

- A. TAB: Testing, adjusting, and balancing of HVAC.
- B. Coordinate commissioning schedule with TAB schedule.
- C. Review the TAB plan to determine the capabilities of the control system toward completing TAB.
- D. Provide all necessary unique instruments and instruct the TAB technicians in their use; such as handheld control system interface for setting terminal unit boxes, etc.
- E. Have all required Prefunctional Checklists, calibrations, startup and component Functional Tests of the system completed and approved by the Commissioning Authority prior to starting TAB.
- F. Provide a qualified control system technician to operate the controls to assist the TAB technicians or provide sufficient training for the TAB technicians to operate the system without assistance.

3.04 CONTROL SYSTEM FUNCTIONAL TESTING

- A. Prefunctional Checklists for control system components will require a signed and dated certification that all system programming is complete as required to accomplish the requirements of Contract Documents and the detailed Sequences of Operation documentation submittal.
- B. Do not start Functional Testing until all controlled components have themselves been successfully Functionally Tested in accordance with Contract Documents.
- C. Using a skilled technician who is familiar with this building, execute the Functional Testing of the control system as required by the Commissioning Authority.
- D. Functional Testing of the control system constitutes demonstration and trend logging of control points monitored by the control system.
 - 1. The scope of trend logging is partially specified; trend log up to 50 percent more points than specified at no extra cost to Owner.
 - 2. Perform all trend logging specified in Prefunctional Checklists and Functional Test procedures.
- E. Functionally Test integral or stand-alone controls in conjunction with the Functional Tests of the equipment they are attached to, including any interlocks with other equipment or systems; further testing during control system Functional Test is not required unless specifically indicated below.
- F. Demonstrate the following to the Commissioning Authority during testing of controlled equipment; coordinate with commissioning of equipment.
 - 1. Setpoint changing features and functions.
 - 2. Sensor calibrations.
- G. Demonstrate to the Commissioning Authority:
 - 1. That all specified functions and features are set up, debugged and fully operable.
 - 2. That scheduling features are fully functional and setup, including holidays.
 - 3. That all graphic screens and value readouts are completed.
 - 4. Correct date and time setting in central computer.
 - 5. That field panels read the same time as the central computer; sample 10 percent of field panels; if any of those fail, sample another 10 percent; if any of those fail test all remaining units at no extra cost to Owner.
 - 6. Functionality of field panels using local operator keypads and local ports (plug-ins) using portable computer/keypad; demonstrate 100 percent of panels and 10 percent of ports; if any ports fail, sample another 10 percent; if any of those fail, test all remaining units at no extra cost to Owner.
 - 7. Power failure and battery backup and power-up restart functions.
 - 8. Global commands features.
 - 9. Security and access codes.
 - 10. Occupant over-rides (manual, telephone, key, keypad, etc.).
 - 11. O&M schedules and alarms.
 - 12. Occupancy sensors and controls.
 - 13. All control strategies and sequences not tested during controlled equipment testing.

- H. If the control system, integral control components, or related equipment do not respond to changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice, under any of the conditions, sequences, or modes tested, correct all systems, equipment, components, and software required at no additional cost to Owner.

3.05 OPERATION AND MAINTENANCE MANUALS

- A. See Section 01 7800 for additional requirements.
- B. Add design intent documentation furnished by Architect to manuals prior to submission to Owner.
- C. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.
- D. Commissioning Authority will add commissioning records to manuals after submission to Owner.

3.06 DEMONSTRATION AND TRAINING

- A. See Section 01 7900 for additional requirements.
- B. Demonstrate operation and maintenance of HVAC system to Owner' personnel; if during any demonstration, the system fails to perform in accordance with the information included in the O&M manual, stop demonstration, repair or adjust, and repeat demonstration. Demonstrations may be combined with training sessions if appropriate.
- C. These demonstrations are in addition to, and not a substitute for, Prefunctional Checklists and demonstrations to the Commissioning Authority during Functional Testing.
- D. Provide classroom and hands-on training of Owner's designated personnel on operation and maintenance of the HVAC system, control system, and all equipment items indicated to be commissioned. Provide the following minimum durations of training:
- E. TAB Review: Instruct Owner's personnel for minimum 4 hours, after completion of TAB, on the following:
 - 1. Review final TAB report, explaining the layout and meanings of each data type.
 - 2. Discuss any outstanding deficient items in control, ducting or design that may affect the proper delivery of air or water.
 - 3. Identify and discuss any terminal units, duct runs, diffusers, coils, fans and pumps that are close to or are not meeting their design capacity.
 - 4. Discuss any temporary settings and steps to finalize them for any areas that are not finished.
 - 5. Other salient information that may be useful for facility operations, relative to TAB.
- F. HVAC Control System Training: Perform training in at least three phases:
 - 1. Phase 1 - Basic Control System: Provide minimum of 4 hours of actual training on the control system itself. Upon completion of training, each attendee, using appropriate documentation, should be able to perform elementary operations and describe general hardware architecture and functionality of the system.
 - a. This training may be held on-site or at the manufacturer's facility.
 - b. If held off-site, the training may occur prior to final completion of the system installation.
 - c. For off-site training, Contractor shall pay expenses of up to two attendees.
 - 2. Phase 2 - Integrating with HVAC Systems: Provide minimum of 8 hours of on-site, hands-on training after completion of Functional Testing. Include instruction on:
 - a. The specific hardware configuration of installed systems in this facility and specific instruction for operating the installed system, including interfaces with other systems, if any.
 - b. Security levels, alarms, system start-up, shut-down, power outage and restart routines, changing setpoints and alarms and other typical changed parameters, overrides, freeze protection, manual operation of equipment, optional control strategies that can be considered, energy savings strategies and set points that if changed will adversely affect energy consumption, energy accounting, procedures for obtaining vendor assistance, etc.
 - c. Trend logging and monitoring features (values, change of state, totalization, etc.), including setting up, executing, downloading, viewing both tabular and graphically and printing trends; provide practice in setting up trend logging and monitoring during training session.

- d. Every display screen, allowing time for questions.
- e. Point database entry and modifications.
- 3. Phase 3 - Post-Occupancy: Six months after occupancy conduct minimum of 4 hours of training. Tailor training session to questions and topics solicited beforehand from Owner. Also be prepared to address topics brought up and answer questions concerning operation of the system.
- G. Provide the services of manufacturer representatives to assist instructors where necessary.
- H. Provide the services of the HVAC controls instructor at other training sessions, when requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.

END OF SECTION

**SECTION 26 0500
COMMON WORK RESULTS – ELECTRICAL**

PART 1 - GENERAL

1.1 EXECUTION OF THE WORK

- A. These specifications call out certain duties of the Electrical Contractor and his Subcontractors. They are not intended as a material list of items required by the Contract. Any reference in these specifications and on the accompanying drawings to the Contractor, Electrical Contractor, Electrical Subcontractor or abbreviation "E.C.", shall be construed to mean the Contractor responsible for all electrical construction (Division 26) work for this project.
- B. This division of the specifications covers the electrical systems of the project. It includes work performed by the electrical trades as well as trades not normally considered as electrical trades.
- C. Provide all items and work indicated on the Drawings and all items and work called for in this division of the specifications in accordance with the conditions of Contract (Division 01 General Requirements Documents). This includes all incidentals, equipment, appliances services, hoisting, scaffolding, supports, tools supervision, labor consumable items, fees licenses, etc., necessary to provide complete systems. Perform start-up and checkout on each item and system to provide fully operable systems.
- D. Comply with all provisions of the Contract Documents including the General Conditions, and Division 01 General Requirements of the specifications.
- E. Certain terms such as "shall, provide, install, complete, start-up" are not used in some parts of these specifications. This does not indicate that the items shall be less than completely installed or that systems shall be less than complete.
- F. Examine and compare the Electrical Drawings with these specifications, and report any discrepancies between them to the Architect/Engineer and obtain from him written instructions for changes necessary in the work. At time of bid the most stringent requirements must be included in said bid.
- G. Examine and compare the Electrical Drawings and Specifications with the Drawings and Specifications of other trades, and report any discrepancies between them to the Architect/Engineer and obtain from him written instructions for changes necessary in the work. At time of bid, the most stringent requirements must be included in said bid.
- H. Install and coordinate the electrical work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interferences in a manner approved by the Architect/Engineer. All changes required in the work of the Contractor, caused by his neglect to do so, shall be made by him at his own expense.
- H. It is the intent of the Drawings and Specifications to provide a complete workable system ready for the Owner's operation. Any item not specifically shown on the Drawings or called for in the Specifications, but normally required to conform to the intent, are to be considered a part of the Contract.
- J. These specifications are basically equipment, installation, and performance Specifications. Some installation details are indicated on the Drawings. Where these differ from the Specifications, apply the more stringent at time of bid. Upon award of bid, contact Architect/Engineer for definite instructions.
- K. All materials furnished by the Contractor shall be new and unused (temporary lighting and power products are excluded) and free from defects. All materials used shall bear the Underwriter's Laboratory, Inc. label provided a standard has been established for the material in question.

- L. All products and materials shall be new, clean, free of defects and free of damage and corrosion.
- M. The exclusion from, or limitation in, the symbolism used on the Drawings or the language used in the Specifications for electrical work shall not be interpreted as a reason for omitting the accessories necessary to complete any required system or item of equipment.
- N. The use of words in the singular shall not be considered as limiting where other indications denote that more than one item is referred to.
- O. Except for conduit, conduit fittings, outlet boxes, wire and cable, all items of equipment or material shall be the product of one manufacturer throughout. Multiple manufacturers will not be permitted.
- P. Receive, inspect, store, install and wire Owner-furnished equipment where Owner furnished equipment is supplied.
- Q. Painting
 - 1. All manufactured electrical equipment such as switchgear, panelboards, control equipment, lighting fixtures, etc., shall have factory-applied finish as specified in the appropriate article in the Electrical Parts of the Specification.
 - 2. All other uncoated steel items such as boxes supports, hanger, rods, etc., shall be galvanized or have a shop coat of paint applied under this Part of the Specification. Normally shop coats shall be an approved primer containing at least 50 percent rust inhibitive pigment, applied before assembling the different parts.
 - 3. Including painting and retouching of:
 - a. Pre-finished enclosures of panelboards, switches, wireways, etc., where the finish has been slightly damaged in transit before assembling the different parts.
 - b. Any woodwork furnished in the electrical work.
 - c. Fixture hangers, except those received from manufacturers that are prefinished.
 - d. Miscellaneous iron brackets and supports.
 - e. Steel conduits buried in earth.
 - 4. Woodwork installed under this part of the specification shall be finished with filler sealer plus two (2) coats of PPG "Water Spar" gloss varnish.

1.2 COORDINATION OF THE WORK

- A. Certain materials will be provided by other trades. Examine the Contract Documents to ascertain these requirements.
- B. Carefully check space requirements with other trades and the physical confines of the area to ensure that all material can be installed in the spaces allotted thereto including finished suspended ceilings and the spaces within the existing building. Make modifications thereto as required and approved.
- C. No items foreign to the electrical system shall be run in the dedicated space of the electrical equipment. Dedicated space shall be defined as the width and depth of the equipment from the floor to the bottom of the structural ceiling. Foreign systems include but are not limited to ductwork, piping, sprinklers, drip trays, etc. Contractor shall be responsible to coordinate the locations of the dedicated spaces with all trades as required.

- D. Transmit to other trades all information required for work to be provided under their respective Sections in ample time for installation.
- E. Wherever work interconnects with work of other trades, coordinate with other trades to ensure that all trades have the information necessary so that they may properly install all the necessary connections and equipment. Identify all items of work that require access so that the ceiling trade will know where to install access doors and panels.
- F. Due to the type of installation, a fixed sequence of operation is required to properly install the complete systems. Coordinate, project and schedule work with other trades in accordance with the construction sequence.
- G. The locations of lighting fixtures, outlets, panels and other equipment indicated on the Drawings are approximately correct, but they are understood to be subject to such revision as may be found necessary or desirable at the time the work is installed in consequence of increase or reduction of the number of outlets, or in order to meet field conditions or to coordinate with modular requirements of ceilings, or to simplify the work, or for other legitimate causes.
- H. Exercise particular caution with reference to the location of panels, outlets, switches, etc., and have precise and definite locations approved by the Architect/Engineer before proceeding with the installation.
- I. The Drawings show only the general run of raceways and approximate location of outlets. Any significant changes in location of outlets, cabinets, etc., necessary in order to meet field conditions shall be brought to the immediate attention of the Architect/Engineer and receive his approval before such alterations are made. All such modifications shall be made without additional cost to the Owner.
- J. Obtain from the Architect/Engineer in the field, the location of such outlets or equipment not definitively located on the Drawings.
- K. Circuit "tags" in the form of arrows are used where shown to indicate the home runs of raceways to electrical distribution points. These tags show the circuits in each home run and the panel designation. Show the actual circuits numbers on the finished record tracing and on panel directory card. Where circuiting is not indicated, Electrical Contractor must provide required circuiting in accordance with the loading indicated on the drawings and/or as directed.
- L. The Drawings generally do not indicate the exact number wires in each conduit for the branch circuit wiring of fixtures, and outlets, or the actual circuiting. Provide the correct wire size and quantity as required by the indicated circuiting and/or circuit numbers indicated and control, wiring diagrams, if any, specified voltage drop or maximum distance limitations, and the applicable requirements of the NEC.
- M. Adjust location of conduits, panels, equipment, pull boxes, fixtures, etc. to accommodate the work to prevent interferences, both anticipated and encountered. Determine the exact route and location of each raceway (and bus duct) prior to fabrication.
 - 1. Right-of-Way:
 - a. Lines which pitch have the right-of-way over those which do not pitch. For example: steam, condensate, and plumbing drains normally have right-of way. Lines whose elevations cannot be changed to have right-of-way over lines whose elevations can be changed.
 - b. Make offsets, transitions and changes in direction in raceways (and bus duct) as required to maintain proper headroom in pitch of sloping lines whether or not indicated on the Drawings.
- N. Wherever the work is of sufficient complexity, prepare additional Detail Drawings to scale similar to that of the bidding Drawings, prepared on tracing medium of the same size as Contract Drawings. With these layouts, coordinate the work with the work of other trades. Such detailed work shall be clearly identified

on the Drawings as to the area to which it applies. Submit for review Drawings clearly showing the work and its relation to the work of other trades before commencing shop fabrication or erection in the field.

- O. Contractor shall furnish services of an experienced Superintendent, who shall be in constant charge of all work, and who shall coordinate his work with the work of other trades. No work shall be installed before coordinating with other trades.
- P. Coordinate with contractors for work under other Divisions of this specification for all work necessary to accomplish this contractor's work.
- Q. Where electrical connections are required, to equipment provided by the Owner or by other trades, this Contractor shall verify the exact requirements for these connections prior to ordering any materials or laying out any work. Where there is a discrepancy between the equipment being furnished and that shown on the Contract Drawings, the Contractor shall notify the Architect/Engineer for direction. Failure to comply with this coordination shall not constitute a reason for extra monies for equipment ordered or installed. Restocking charges will not be paid.

1.3 EXAMINATION OF SITE

- A. Prior to the submitting of bids, the Contractor shall visit the site of the job and shall familiarize himself with all conditions affecting the proposed installation and shall make provisions as to the cost thereof. Failure to comply with the intent of this paragraph will in no way relieve the contractor of performing all necessary work shown on the Drawings.

1.4 PROGRESS OF WORK

- A. The Contractor shall order the progress of his work so as to conform to the progress of the work of other trades and shall complete the entire installation as soon as the conditions of the building will permit. Any cost resulting from the defective or ill-timed work performed under this section shall be borne by the Contractor.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Ship and store all products and materials in a manner which will protect them from damage, weather and entry of debris. If items are damaged, do not install, but take immediate steps to obtain replacement or repair. Any such repairs shall be subject to review and acceptance of the Architect/Engineer.
- B. Delivery of Materials: Deliver materials in manufacturer's unopened container fully identified with manufacturer's name, trade name, type, class, grade, size and color.
- C. Storage of Materials, Equipment and Fixtures: Store materials suitably sheltered from the elements, but readily accessibly for inspection by the Architect/Engineer until installed. Store all items, susceptible to moisture damage, in dry, heated spaces.

1.6 EQUIPMENT ACCESSORIES

- A. Provide supports, hangers and auxiliary structural members required for support of the work according to Section 26 05 29 "Hangers and Supports for Electrical Systems."
- B. Furnish and set all sleeves for passage of raceways through structural, masonry and concrete walls or floors and elsewhere as will be required for the proper protection of each raceway (and bus duct) passing through building surfaces.

- C. Wall mounted equipment may be directly secured to wall by means of steel bolts. Maintain at least 1" air space between equipment and supporting wall. Groups or arrays of equipment may be mounted on adequately sized steel angles, channels, or bars. Prefabricated steel channels providing a high degree of mounting flexibility, such as those manufactured by Kindorf, Glob-Strutt and Unistrut, may be used for mounting arrays of equipment.

1.7 CUTTING, PATCHING

- A. The work shall be carefully laid out in advance. Where cutting, channeling, chasing or drilling of floors, walls, partitions, ceilings or other surfaces is necessary for the proper installation, support or anchorage of raceway, outlets or other equipment, the work shall be carefully done. Any damage to the building, piping, equipment or defaced finish plaster, woodwork, metalwork, etc. shall be repaired by skilled mechanics or the trades involved at no additional cost to the Owner.
- B. The Contractor shall do no cutting, channeling, chasing or drilling of unfinished masonry, tile, etc., unless he first obtains permission from the Architect/Engineer. If permission is granted, the Contractor shall perform this work in a manner approved by the Architect/Engineer
- C. Where conduits, mounting channels, outlet, junction, or pull boxes are mounted on a painted surface, or a surface to be painted, they shall be painted to match the surface. Whenever support channels are cut, the bare metal shall be cold galvanized.
- D. Slots, chases, openings and recesses through floors, walls, ceilings, and roofs will be provided by the various trades in their respective materials. The trade requiring them to properly locate such openings and be responsible for any cutting and patching caused by the neglect to do so.
- E. Structural steel fabricator and installer shall be responsible for the coordination of all framed openings in roof with approved equipment manufacturers. (Openings such as, but not limited to mechanical units, exhaust fans, curb mounted equipment, roof drains, skylights, stair openings, roof hatches, smoke hatches, duct thru roof penetrations, expansion joints, etc.)

Exact sizes and exact locations of all openings are to be verified with the approved shop drawings issued for the installation. The exact sizes shall be coordinated prior to any fabrication and installation by any/all trades. (Sizes and locations indicated on contract drawings are diagrammatic and for information only.)

Any fabrication and/or installation which have not been properly coordinated with approved equipment manufacturer and must be repaired, relocated, altered, replaced, re-installed or modified in any manner will be done to the satisfaction of the Owner with no additional cost to the Owner or design professional.

1.8 FIRESTOPPING

- A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire resistance of the assembly. Firestopping materials and installation requirements are specified in Division 7 Section "Firestopping".

1.9 NORMAL VOLTAGES (Unless Otherwise Noted)

- A. Primary Distribution – above 120/208 volts.
- B. Secondary Distribution – 120/208 Volt, 3 phase, 4 wire.

1.10 MOUNTING HEIGHTS

- A. Unless otherwise noted or required because of special conditions the mounting heights of all equipment shall match that in the existing building, if those mounting heights comply with A.D.A.

1.11 DEMOLITION AND CONTINUANCE OF EXISTING SERVICES – REFER TO SECTION 26 07 00

- A. All existing electrical services not specifically indicated to be removed or altered shall remain as they presently exist.
- B. Should any existing services, etc., interfere with new construction, the Contractor shall (after obtaining written approval from the Architect/Engineer) alter or reroute such existing equipment to facilitate new construction.
- C. Shut down of existing services shall be coordinated with the Owner prior to altering any existing situation. The Contractor shall notify the Owner in writing giving two (2) weeks advance notice of planned alteration. The Electrical Contractor and Owner shall develop a sequence necessary to shutdown existing services and provide temporary power to those items which must remain active.
- D. It shall be solely the Contractor's responsibility to guarantee continuity of present facilities (with respect to damage or alteration due to new construction) and any unauthorized alteration to existing equipment shall be corrected by the Contractor to the Architect/Engineer's satisfaction at the Contractor's expense.

1.12 CLEANING UP

- A. Contractor shall take care to avoid accumulation of debris, boxes, crates, etc., resulting from the installation of his work. Contractor shall remove from the premises each day all debris, boxes, etc., and keep the premises clean, subject to the Architect/Engineer's instructions, which shall be promptly carried out.
- B. Contractor shall clean all fixtures and equipment at the completion of the project.
- C. All switchboards, panelboards, wireways, trench ducts, cabinets, enclosures, etc. shall be thoroughly vacuumed clean prior to energizing equipment and at the completion of the project. Equipment shall be opened for observation by the Architect/Engineer as required.

1.13 WATERPROOFING

- A. Avoid, if possible, the penetration of any waterproof membranes such as roofs, machine room floors, basement walls, and the like. If such penetration is necessary, perform it prior to the waterproofing and furnish all sleeves or pitch-pockets required. Advise the Architect/Engineer and obtain written permission before penetrating any waterproof membrane, even where such penetration is shown on the Drawings.
- B. If Contractor penetrates any walls or surfaces after they have been waterproofed, he shall restore the waterproof integrity of that surface as directed by the Architect/Engineer at his own expense, using workmen skilled in that trade.

1.14 SUPPORTS AND FASTENERS

- A. Provide supports, hangers and auxiliary structural members required for support of the work according to Section 26 05 29 "Hangers and Supports for Electrical Systems" and Section 26 05 48 "Vibration and Seismic Control for Electrical Components."
- B. Furnish and set all sleeves for passage of raceways through structural, masonry and concrete walls or floors and elsewhere as will be required for the proper protection of each raceway (and bus duct) passing through building surfaces.

- C. Wall mounted equipment may be directly secured to wall by means of steel bolts. Maintain at least 1" air space between equipment and supporting wall. Groups or arrays of equipment may be mounted on adequately sized steel angles, channels, or bars. Prefabricated steel channels providing a high degree of mounting flexibility, such as those manufactured by Kindorf, Glob-Strutt and Unistrut, may be used for mounting arrays of equipment.

1.15 PROHIBITED LABELS AND IDENTIFICATIONS

- A. Prohibited Markings: In all public areas, tenant areas and similar locations within the project, the inclusion or installation of any item, element or assembly which bears on any exposed surface any name, trademark, or other insignia which is intended to identify the manufacturer, the vendor, or other source(s) from which such object has been obtained, is prohibited. Also prohibited is the inclusion or installation of any article which bears visible evidence that an insignia, name, label, or other device had been removed.
- B. Exception: Required Underwriter's Laboratory labels shall not be removed nor shall identification specifically required under the various technical sections of the specifications be removed.

1.20 CONNECTION TO EXISTING UTILITIES AND SYSTEMS

- A. If connecting to an existing system, the Electrical Contractor shall be responsible to verify the integrity of the system being connected to. All applicable testing and acceptance will apply.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. If products and materials are specified or indicated on the Drawings for a specific item or system, use those products or materials. If products and materials are not listed in either of the above, use first class products and materials, subject to approval of Shop Drawings where Shop Drawings are required or as approved in writing where Shop Drawings are not required.
- B. All equipment capacities, etc. are listed for job site operating conditions. All equipment sensitive to altitudes or ambient temperatures shall be derated and method of derating shown on Shop Drawings. Where operating conditions shown differ from the laboratory test conditions, the equipment shall be derated and the method of derating shown on Shop Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Follow manufacturer's instructions for installing, connecting, and adjusting all equipment. Provide one copy of such instructions to the Architect/Engineer before installing any equipment. Provide a copy of such instructions at the equipment during any work on the equipment. Provide all special supports, connections, wiring, accessories, etc.
- B. Use mechanics skilled in their trade for all work.
- C. Keep all items protected before and after installation. Clean up all debris.
- D. Perform all tests required by local authorities in addition to tests specified herein, such as life safety systems.
- E. Applicable equipment and materials to be listed by Underwriters' Laboratories and Manufactured in accordance with ASME, NEMA, ANSI or IEEE standards, and as approved by local authorities having jurisdiction as mentioned in Division 1.

- F. Before commencing Work, examine all adjoining, underlying. Work on which this Work is in any way dependent for perfect workmanship and report any condition which prevents performance of first class work. Become thoroughly familiar with actual existing conditions to which connections must be made or which must be changed or altered.

3.2 PREMIUM TIME WORK

- A. The following Work shall be performed at night or weekend other than holiday weekends as directed and coordinated with the Owner.
 - 1. All tie-in, cut-over and modifications to the existing electrical system and other existing system requiring tie-ins or modifications shall be arranged and scheduled with the Owner to be done at a time as to maintain continuity of the service and not interfere with normal building operations.

3.3 PROJECT MANAGEMENT AND COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specification to ensure efficient and orderly installation of each part of the work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
 - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's Construction Schedule
 - 2. Preparation of the Schedule of Values
 - 3. Installation and removal of temporary facilities and controls
 - 4. Delivery and processing of submittals
 - 5. Progress meetings
 - 6. Pre-installation conferences
 - 7. Project closeout activities
 - 8. Startup and adjustment of systems
 - 9. Project closeout activities
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into the work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

3.4 SUBMITTALS

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
 1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate required installation sequence.
 - c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
 2. Number of Copies: Submit three opaque copies of each submittal. Architect, through Construction Manager, will return one copy.
 - a. Submit five copies where Coordination Drawings are required for operation and maintenance manuals. Architect and Construction Manager will retain two copies; remainder will be returned. Markup and retain one returned copy as a Project Record Drawing.
 3. Refer to individual Sections for Coordination Drawing requirements for work in those Sections.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project Site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
 1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

3.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project Superintendent, provide other administrative and supervisory personnel as required for proper performance of the work.

3.6 PROJECT MEETINGS

- A. General: Attend meetings and conferences at Project Site, unless otherwise indicated.

- B. Preconstruction Conference: Attend a preconstruction conference before starting construction, at a time convenient to Owner, Construction Manager, and Architect, but no later than 15 days after execution of the Agreement.

END OF SECTION

SECTION 26 0505
SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical demolition.

1.02 SUBMITTALS

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

PART 3 EXECUTION

2.01 EXAMINATION

- A. Verify that abandoned wiring and equipment serve only abandoned facilities.
- B. Beginning of demolition means installer accepts existing conditions.

2.02 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B. Coordinate utility service outages with utility company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.

2.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Remove, relocate, and extend existing installations to accommodate new construction.
- B. Remove abandoned wiring to source of supply.
- C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.
- E. Repair adjacent construction and finishes damaged during demolition and extension work.
- F. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

END OF SECTION

SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal-clad cable.
- B. Wiring connectors.
- C. Electrical tape.
- D. Wire pulling lubricant.
- E. Cable ties.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2018).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011 (Reapproved 2017).
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010, with Editorial Revision (2020).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2020).
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2009.
- G. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- J. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- K. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- L. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.

- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductor Material:
 - 1. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 2. Tinned Copper Conductors: Comply with ASTM B33.
- H. Conductor Color Coding:
 - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 - 2. Color Coding Method: Integrally colored insulation.
 - 3. Color Code:
 - a. Equipment Ground, All Systems: Green.

2.03 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

2.04 ACCESSORIES

- A. Electrical Tape:
 - 1. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F (-18 degrees C) and suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
- B. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
- C. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into raceway at same time.
 - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- D. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

- E. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
- F. Install conductors with a minimum of 12 inches (300 mm) of slack at each outlet.
- G. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- H. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- I. Make wiring connections using specified wiring connectors.
 - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 - 3. Do not remove conductor strands to facilitate insertion into connector.
 - 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
- J. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
- K. Insulate ends of spare conductors using vinyl insulating electrical tape.
- L. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- M. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
- D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 26 0529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 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 B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2019.
- D. MFMA-4 - Metal Framing Standards Publication; 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

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

1.04 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Comply with applicable building code.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
 - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 - 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
 - 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 - 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
 - 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 - 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 - 1. Comply with MFMA-4.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
- F. Anchors and Fasteners:

1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Equipment Support and Attachment:
 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Secure fasteners according to manufacturer's recommended torque settings.
- I. Remove temporary supports.

END OF SECTION

SECTION 26 0533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 2 PRODUCTS

1.01 BOXES

- A. General Requirements:
1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 3. Use suitable concrete type boxes where flush-mounted in concrete.
 4. Use suitable masonry type boxes where flush-mounted in masonry walls.
 5. Use raised covers suitable for the type of wall construction and device configuration where required.
 6. Use shallow boxes where required by the type of wall construction.
 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 12. Wall Plates: Comply with Section 26 2726.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
 3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

END OF SECTION

SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Warning signs and labels.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

1.03 REFERENCE STANDARDS

- A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.
- B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - 2. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70, including but not limited to the following.
 - a. Service equipment.
 - b. Industrial control panels.
 - c. Motor control centers.
 - d. Elevator control panels.
 - e. Industrial machinery.
- B. Identification for Conductors and Cables:
 - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.
 - 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
 - 1. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.

2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.
 3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
 4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
 5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) high; Four, located at corners for larger sizes.
- B. Identification Labels:
1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

2.03 WARNING SIGNS AND LABELS

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
1. Materials:
 2. Minimum Size: 7 by 10 inches (178 by 254 mm) unless otherwise indicated.
- C. Warning Labels:
1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
 3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
1. Surface-Mounted Equipment: Enclosure front.
 2. Flush-Mounted Equipment: Inside of equipment door.
 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 4. Elevated Equipment: Legible from the floor or working platform.
 5. Interior Components: Legible from the point of access.
 6. Conductors and Cables: Legible from the point of access.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

END OF SECTION

SECTION 26 0923
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Occupancy sensors.
- B. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 26 0529 - Hangers and Supports for Electrical Systems.
- B. Section 26 0533.16 - Boxes for Electrical Systems.
- C. Section 26 2726 - Wiring Devices: Devices for manual control of lighting, including wall switches, wall dimmers, and fan speed controllers.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

2.02 OCCUPANCY SENSORS

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell.com/#sle.
 - 2. Lutron Electronics Company, Inc: www.lutron.com/#sle.
 - 3. Sensor Switch Inc: www.sensorswitch.com/#sle.
 - 4. WattStopper: www.wattstopper.com/#sle.
 - 5. or approved equal.
- B. All Occupancy Sensors:
 - 1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
 - 2. Sensor Technology:
 - a. Passive Infrared (PIR) Occupancy Sensors: Designed to detect occupancy by sensing movement of thermal energy between zones.
 - 3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
 - 4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.

5. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
 6. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.
- C. Wall Switch Occupancy Sensors:
1. All Wall Switch Occupancy Sensors:
 - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
 - b. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
- D. Ceiling Mounted Occupancy Sensors:
1. All Ceiling Mounted Occupancy Sensors:
 - a. Description: Low profile occupancy sensors designed for ceiling installation.
 - b. Unless otherwise indicated or required to control the load indicated on drawings, provide low voltage units, for use with separate compatible accessory power packs.
- E. Power Packs for Low Voltage Occupancy Sensors:
1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.
 2. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on drawings.
 3. Input Supply Voltage: Dual rated for 120/277 V ac.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.
- F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.
- G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of lighting control devices provided under this section.
- C. Install lighting control devices in accordance with manufacturer's instructions.
- D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- E. Install lighting control devices plumb and level, and held securely in place.
- F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 2726.

- G. Provide required supports in accordance with Section 26 0529.
- H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

3.03 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.

END OF SECTION

SECTION 26 2726
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Wall plates.

1.02 RELATED REQUIREMENTS

- A. Section 26 0533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); 2017g.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- D. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2015).
- E. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2016.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- H. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

2.02 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices, Unless Otherwise Indicated: White with white nylon wall plate.

2.03 WALL SWITCHES

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell.com/#sle.
 - 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 - 3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
 - 4. or approved equal.
- B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

2.04 WALL PLATES

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell-wiring.com/#sle.
 - 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 - 3. Lutron Electronics Company, Inc: www.lutron.com/#sle.
 - 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
 - 5. or approved equal.
- B. Wall Plates: Comply with UL 514D.
 - 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 - 2. Size: Standard.
 - 3. Screws: Metal with slotted heads finished to match wall plate finish.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of wiring devices provided under this section.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- I. Install wall switches with OFF position down.
- J. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- K. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

END OF SECTION

SECTION 26 5100
INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Exit signs.

1.02 RELATED REQUIREMENTS

- A. Section 26 0529 - Hangers and Supports for Electrical Systems.
- B. Section 26 0533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.
- B. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- F. UL 1598 - Luminaires; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

- A. Manufacturers:
 - 1. Acuity Brands, Inc: www.acuitybrands.com/#sle.
 - 2. Cooper Lighting, a division of Cooper Industries: www.cooperindustries.com/#sle.
 - 3. Hubbell Lighting, Inc: www.hubbellighting.com/#sle.
 - 4. or approved equal.
- B. Provide products that comply with requirements of NFPA 70.
- C. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- D. Provide products listed, classified, and labeled as suitable for the purpose intended.
- E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

- G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

2.03 EMERGENCY LIGHTING UNITS

- A. Manufacturers:
 - 1. Acuity Brands, Inc: www.acuitybrands.com/#sle.
 - 2. Cooper Lighting, a division of Cooper Industries: www.cooperindustries.com/#sle.
 - 3. Hubbell Lighting, Inc: www.hubbellighting.com/#sle.
 - 4. or approved equal.
- B. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
- C. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
- D. Battery:
 - 1. Size battery to supply all connected lamps, including emergency remote heads where indicated.
- E. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
- F. Provide low-voltage disconnect to prevent battery damage from deep discharge.

2.04 EXIT SIGNS

- A. Description: Exit signs complying with NFPA 101 and applicable state and local codes, and listed and labeled as complying with UL 924.
 - 1. Number of Faces: Single- or double-face as indicated or as required for installed location.
 - 2. Directional Arrows: As indicated or as required for installed location.
- B. Powered Exit Signs: Internally illuminated with LEDs unless otherwise indicated.
 - 1. Self-Powered Exit Signs:
 - a. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
 - b. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
 - c. Provide low-voltage disconnect to prevent battery damage from deep discharge.
- C. Accessories:
 - 1. Provide compatible accessory high-impact polycarbonate vandal shields where indicated.
 - 2. Provide compatible accessory wire guards where indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of luminaires provided under this section.

- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Install accessories furnished with each luminaire.
- G. Bond products and metal accessories to branch circuit equipment grounding conductor.
- H. Emergency Lighting Units:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- I. Exit Signs:
- J. Install lamps in each luminaire.

END OF SECTION

SECTION 26 5600
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior luminaires.
- B. Poles and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 26 0529 - Hangers and Supports for Electrical Systems.
- B. Section 26 0533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. AASHTO LTS - Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signal; 2013 (Revised 2019).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2006.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 1598 - Luminaires; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

- A. Manufacturers:
 - 1. Acuity Brands, Inc: www.acuitybrands.com/#sle.
 - 2. Cooper Lighting, a division of Cooper Industries: www.cooperindustries.com/#sle.
 - 3. Hubbell Lighting, Inc: www.hubbellighting.com/#sle.
 - 4. or approved equal.
- B. Provide products that comply with requirements of NFPA 70.
- C. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- D. Provide products listed, classified, and labeled as suitable for the purpose intended.
- E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

2.03 POLES

- A. All Poles:
 - 1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
 - 2. Structural Design Criteria:
 - a. Comply with AASHTO LTS.
 - b. Wind Load: Include effective projected area (EPA) of luminaire(s) and associated supports and accessories to be installed.
 - 3. Material: Steel, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires in accordance with NECA/IESNA 501.
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Install accessories furnished with each luminaire.
- G. Bond products and metal accessories to branch circuit equipment grounding conductor.
- H. Install lamps in each luminaire.

END OF SECTION

SECTION 28 1000
SECURITY SYSTEMS GENERAL CONDITIONS

1.01 GENERAL

- a. Installation of Electronic Security System to include but not limited to:
1. Closed Circuit Television (CCTV)
 2. Building Access Control
 3. Perimeter Door Alarms
 4. Video Intercom
 5. Burglar alarm
 6. Additional interfaces: Building Lighting, and electrified locks
- b. Electronic security related equipment such as cameras, card readers, controllers, power supplies and others will be furnished to the bidder by the City of Yonkers (COY) / Yonkers Public Schools (YPS) authority. The electrical contractor (EC) is to provide all necessary labor, pipe, fasteners, wire and other electrical components needed to INSTALL AND TERMINATE owner's provided materials AS WELL AS WORK WITH OWNER's REPRESENTATIVE DURING THE COMMISSIONING PROCESS and to provide the owner with a complete, turn key system. Aiming and focusing cameras is part of this contract.
1. All wire, conduit, supporting devices, boxes, connections, stub ups and rough in will be provided by the EC. EC shall connect and terminate and punch down the devices to the patch panel/ control panel designated in the security drawings. EC shall machine label, tag on both ends, and test for continuity, on all connections. EC shall certify network cabling and provide supporting test reports to the District to ensure proper wire has been properly installed and cable lengths are identified and appropriate for the type of cable. EC shall test for ground faults and wire integrity on card access, burglar alarm and door stations wiring prior to turn over to owner.
 2. The EC shall provide firestopping for all penetrations required for work of their contract.
 3. Electronics system's Commissioning shall be done by the District's representative. EC shall have a responsible electrician/foreman with knowledge of the project on site during commissioning to correct any installation faults as instructed by District's representative.
 4. All burglar alarm device wiring is to be home-run to designated closet.
- c. Install system as per security drawing's set SE-100's to and including SE-700's and follow specific notes regarding intent, means and methods
- d. The general conditions for contracts of construction, referred to in the contract documents as the general conditions, together with the following articles of the specifications, which amend, modify and supplement various articles and provisions of the general conditions, are made part of the Contract and shall apply to all work under the Contract.
- e. All articles or parts of articles of the general conditions not so amended, modified or supplemented by these specifications shall remain in full force and effect. Should any discrepancy become apparent between the general conditions and the specifications the Contractor shall notify Owner/Engineer, in writing and the Owner/Engineer shall interpret and decide such matters in accordance with the provisions of the General Conditions.
- f. The Contractor shall comply with all applicable governmental regulations and with all Federal, State, County, City, and other applicable codes and ordinances.

- g. These specifications call out certain duties of the Contractor and his suppliers. They are not intended as a material list of items required by the Contract.
- h. Contractor should note that it shall be necessary to coordinate with other contractors who will be working in the space at the same time as this work.
- i. It is the intent of these specifications to provide complete and workable electronic security system ready for the Owner's use. Any item not specifically shown on the drawings or called for in the specifications, but normally required to conform with the intent, are to be considered as part of the Contract.
- j. These specifications are equipment and performance specifications. Actual installation shall be as indicated on the Drawings. Any discrepancies found between the Specification and the Drawing shall be immediately brought to the attention of the Owner/Engineer. In the event of a discrepancy, the greater quantity or quality of work shall be considered part of the project.

1.02 DEFINITIONS

- a. Certain terms such as "shall", "provide", "install", "complete", "startup" are not used in some parts of these specifications. This does not indicate that the items shall be less than completely installed or that systems shall be less than complete.
- b. Utilize the following abbreviations for discernment on the Drawings and within the Specifications:
 - 1. NEC National Electrical Code
 - 2. OSHA Occupational Safety and Health Act
 - 3. ANSI American National Standards Institute
 - 4. NFPA National Fire Protection Association
 - 5. IEEE Institute of Electrical and Electronics Engineers
 - 6. CCTV Closed Circuit Television
 - 7. UL Underwriters' Laboratories, Inc.
 - 8. ASTM American Society of Testing Materials
 - 9. FCC Federal Communications Commission
 - 10. FBO Furnished by others
 - 11. EC Bidding (electrical) contractor
- c. Utilize the following definitions for discernment within the Specifications:
 - 1. "PROVIDE" means to supply, purchase, transport, place, erect, connect, test and turn over to the District, complete and ready for regular operation, the particular work referred to.
 - 2. "FURNISH" means to purchase, procure, acquire, and deliver complete with related accessories.
 - 3. "INSTALL" means to move from property line, set in place, join, unite, fasten, link, attach, set up or otherwise connect together before testing and turning over to District of equipment supplied under another division. Installation to be complete and ready for regular operation, the particular work referred to.
 - 4. "WIRING" or "CABLING," means the inclusion of all fittings, conductors, connectors, connections, termination's and termination hardware and all other items necessary and/or required in connection with such work.

5. "DATA GATHERING PANEL", "iSTAR", "CONTROLLERS" means the inclusion of installations of all I/O hardware, power supplies, alarm controllers, reader controllers, output relays, communications devices and housings necessary to interface card readers, alarm contacts, door locking and control hardware, etc. to the system.
6. "CONDUIT" or "CABLE TRAY" or "LADDER RACK" means the inclusion of all fittings, hangers, supports, sleeves, etc.
7. "AS DIRECTED" means as directed by the District or his representative.
8. "CONCEALED," means embedded in masonry or other construction, installed behind wall furring or within double partitions, or installed within hung ceilings or under raised floors.
9. "EXPOSED" means not installed underground or "CONCEALED" as defined above.
10. "APPROVED," means as accepted and authorized, in writing, by the District or Engineer.
11. "COY", "YPS" or "OWNER" means City of Yonkers, Yonkers Public Schools
12. "ENGINEER" or "AGENT" means District or his designated representative

1.03 SCOPE OF WORK

- a. The work covered by these specifications includes the installations described herein and illustrated on the drawings, including all labor necessary to perform and complete such construction, all materials and equipment incorporated in or to be incorporated in such installations and all services, facilities, tools and equipment necessary or used to perform and complete such installations.
- b. The scope of work includes, but is not limited to, the work described herein and in the following specifications sections, as applicable:
 1. Division 26 – Electrical Specification
 2. Preparation and submission of unit pricing sheets, shop drawings, testing reports, record drawings, and documentation.
 3. Termination, connectorization, labeling, testing and documentation of all cables and components provided under these specification sections.
 4. Tile cuts, as noted on the drawings and in the individual specification sections, under equipment racks, server racks, frames, cabinets, etc.
 5. Fire stopping of all conduits, cable trays, rated wall and floor penetrations, etc. as noted.
 6. Furnish shop drawings to the Construction Manager and the Engineer and receive written approval prior to fabrication, assembly and installation. The shop drawing submission shall be within sufficient time to allow endorsement by the Engineer prior to commencement of the work.

7. Provide system's installation changes that were made due to field conditions to the District. Documentation including copies of all relevant drawings and equipment manuals.
 8. Provide warranty services for bidder's work portion only for the specified period from the date of acceptance.
 9. Remove and dispose of all refuse related to the security system installation from site.
 10. Panduit Laser Machine Labeling and documentation of all cables, wiring boxes, equipment cabinets, pull boxes and termination strips installed under this contract. Use of hand label machines such as 'Brother-P-Touch' is not acceptable
 11. Installation, final connections and terminations of all security cabling and District's provided equipment.
 12. Position cameras in the direction that is acceptable to the District and follow District's instruction for camera views. Be present and work with District's representative during commissioning and re-point cameras as needed to the owner's
 13. Be present at and work with District's commissioning agent during system's turn on. Remedy all installation and wiring faults as per agent's direction.
- c. Bidding Contractor - Provided under this contract. Follow Division 26 for additional scope instructions
1. 120 VAC power wiring. Connection between 120 VAC power sources and all security equipment panels and equipment cabinets.
 2. Conduits, electrical, and pull boxes (provided under electrical work). NEMA Type 1 enclosure for all junction boxes provided under this work.
 3. Fire-stopping of all rated wall and floor penetrations.

1.04 MATERIALS SUPPLIED BY OTHERS AND INSTALLED UNDER THIS WORK

- a. All Electronic Equipment noted on Drawings SE-000 to SE-700's inclusive.

1.05 SITE VISIT

- b. Prior to bid submission, the Contractor shall visit the site and examine the drawings of other trades to determine the existing design conditions that may affect the work. The Contractor shall be held responsible for any assumptions in regard thereto.
- c. The Contractor shall verify all dimensions and distances in the field and document the cable lengths and materials to be furnished and installed. The provision and installation of non-specified miscellaneous hardware, i.e., nuts, bolts, tie wraps, etc., and shall be the Contractor's responsibility.
- d. Contractor should note this is an existing facility under construction. Existing site conditions, other contract documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work.
- e. Existing Contract Documents for all other trades shall be made available for review through the General Contractor.

1.06 CONTRACTOR QUALIFICATIONS

- a. The Contractor shall provide Contractor Qualifications to include name/address of three (3) similar security projects performed in the past 5 years.

1.07 BIDDING

- a. Substitute Equipment
 1. All cable and fiber (where applicable) shall be bid as specified.
 2. Equivalency in quality, performance, construction, and function shall be demonstrated by submitting, as applicable or required by the Engineer, the following:
 - a) Specifications.
 - b) Laboratory test data.
 - c) List of advantages to the District and the Engineer.
 - d) Cost differences compared to the "as specified" bid package.
 3. The drawings and specifications are based on specific equipment, functions and arrangements. Additions or revisions to equipment, materials, and labor may be necessary for the proper fit and function of any proposed substitute items to the purpose, arrangement and intent originally indicated. It is the responsibility of the Bidder to determine the electrical needs for such additions and/or revisions and identify them in the Bidder's submittal.
 4. Costs for any additional labor and additions or revisions to wiring, space requirements, equipment or other materials, required for the use of substitute equipment shall be included by the Bidder without claim for subsequent additional payment.
 5. Consideration in the Bidding for a proposed substitute will be given only if, in the opinion of the Engineer, the substitute is equal to and/or offers significant advantage to the project over the specified item.
- b. Installation materials supplied shall be complete, model numbers accurate, and the performance shall conform to manufacturer's specifications.
- c. All materials shall be new and shall conform to applicable codes.
- d. Repair or replace any items damaged during installation.
- e. Procure and pay for all necessary permits, licenses, inspections, and observe any requirements stipulated therein.
- f. Comply with all applicable labor regulations and applicable union and trade regulations.
- g. The installation shall conform to the latest safety codes and regulations. Where conflicts exist, the most stringent code or regulation shall apply.

- h. Adhere to all Quality Assurance items in the Sub-Contract Agreement issued by the District/Engineer.

1.08 SUBMITTALS

- a. As directed by the District/Engineer and the Construction Program, submit hand marked detailed field changes so that they can be incorporated onto the final as-built set (by others)
- b. Shop drawings shall be based on actual equipment, installation, and field conditions. Note however, that locations and other information provided herein are only approximate. Therefore, where possible, make equipment and field measurements prior to the preparation of shop drawings, fabrication and installation to ensure proper fit and function of the equipment. However, this requirement shall not delay the progress of the work. Allow for trimming and fitting wherever the taking of field, or other measurements, before fabrication might delay the work. Costs for failure to coordinate equipment details with site conditions and designated equipment locations shall be borne by the Security Contractor.
- c. The review and approval of shop drawings shall be general only and shall not relieve the Contractor from responsibility for proper installation or for deviations from the specifications or drawings due to field conditions; conflict with the work of others that may result from such deviations; or for errors of any sort.
- d. Shop drawings shall include and clearly indicate any proposed modification of the specifications or drawings.
- e. Shop drawings shall include and clearly indicate the addition of any items not detailed herein, but necessary to provide a properly functioning and complete system.
- f. Changes to riser diagrams for power and grounding, Security systems cabling and fiber optic/patch panel, data gathering panels, power supplies interconnections, and all Security field devices.

1.09 DELIVERY, STORAGE AND HANDLING

- a. Delivery of Materials: Coordinate with owner's designated agent
- b. Storage of Materials, Equipment and Fixtures: Store materials suitably sheltered from the elements, but readily accessible for inspection until installed. Store all items subject to moisture damage in dry, heated spaces. Provide space requirements for storage in submittals list. The General Contractor shall assign storage space.
- c. Store all materials in a secure fashion to prevent the loss of these materials due to pilferage or theft.

1.10 COORDINATION OF WORK

- a. Carefully check space requirements and the physical confines of the area of work to ensure that all material can be installed in the spaces allotted thereto, including equipment racks, and cable supports.
- b. Transmit to other trades in a timely manner all information required for work to be provided under their respective Sections in ample time for installation.

- c. Wherever work interconnects with or contacts the work of other trades, coordinate with other trades to ensure that all trades have the information necessary so that they may properly install all the necessary connections and equipment. Identify all items of work that require access so that the floor tile trade shall know where to install tile cutouts.
- d. Attend all construction meetings, at the project site or at other location, as requested by the Owner or General Contractor.
- e. When directed by the Owner, the Contractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper compliance with the design intent.

1.11 CODES, REGULATIONS AND STANDARDS

- a. The installation shall be in compliance with the requirements of the National Electrical Code, OSHA, recommendations and the rules, regulations and requirements of all state and federal codes.
- b. The installation shall comply fully with all county, city, and state laws and ordinances, regulations and codes applicable to the installation.
- c. All equipment shall be equal to or exceed the minimum requirements of NEMA, IEEE, ASME, ANSI and Underwriters' Laboratories.

1.12 SPECIAL CONDITIONS

- a. The requirements and recommendations of all standards, specifications and codes referred to herein, including the security systems drawings, shall be considered a part of these specifications.
- b. All local fees, permits, and services of inspection authorities shall be obtained and paid for by the Contractor. The Contractor shall cooperate fully with local utility companies with respect to their services. Contractor shall include in his price, all costs to be incurred relative to the installation of the system described herein.

1.13 WARRANTY

- a. For a period of 1 year after full acceptance, Contractor to Repair/Replace any defects in its work/materials to remedy the condition.

1.14 MATERIALS

- a. Where specific items are called out in the specification or indicated on the drawings for a specific application, use those products or materials. Otherwise, use first class products and materials that have been approved by the owner/engineer at the time of bid. Materials substituted after the time of bid a subject to prior approval by the Owner/Engineer.

1.15 GENERAL INSTALLATION

- a. Requirements herein referring to materials, or work related to, or that may affect the system but not within the work scope of this specification, shall apply to the supplying and/or installing contractor who shall comply with said requirements. Where conflict exists with other specifications concerning such work, this specification takes precedence unless otherwise approved in writing by the Owner/Engineer.

- b. Follow manufacturers' instructions for installing, connecting, and adjusting all equipment and cabling.
- c. The locations of equipment, power outlets, boxes, devices, etc. indicated on the drawings are approximately correct and are understood to be subject to such revision as may be found necessary or desirable at the time the work is installed.
- d. Exercise particular caution with reference to the location of all field devices they have precise and definite locations accepted by the Owner/Engineer before proceeding with the installation.
- e. Maintain a current copy of this bid specification at the job site at all times.
- f. Maintain a complete file of shop drawings and other submissions at the job site at all times. These shop drawings and submissions shall be made available to the Owner/Engineer at his request.
- g. Keep all items protected before and after installation, with dust and moisture proof barrier materials. It shall be the contractor's responsibility to ensure the integrity of these protective measures throughout the life of the project.
- h. Ensure that safe ingress and egress from all work sites is maintained during movement and installation of materials.
- i. Clean up all debris generated by installation activities. Keep all work areas free of debris at all times.
- j. Perform all tests required by local authorities in addition to tests specified herein.
- k. At all times during the construction, protect all equipment from damage and theft. Equipment in the equipment room shall not be installed until such time as other trades have completed their work in that area so that the equipment will not be moved or damaged.
- l. Upon project completion, provide hand corrected as-built drawings and documentation as defined herein.

1.16 STAFFING

- a. The Contractor shall keep a qualified foreman in charge of the work at all times. The foreman shall be present in the field at all times during the performance of the work. Such foreman shall be replaced if deemed unsatisfactory by the Owner.
- b. The Contractor shall provide a supervisory work force sufficient to efficiently execute the Contractor's responsibilities.
- c. The Contractor shall provide the level of manpower necessary to meet all construction schedules.
- d. The Contractor shall use only skilled, experienced and reliable workers and shall discontinue the services of anyone employed on this project upon written request of the Owner.
- e. Manufacturer's installation instructions shall be used for in-process quality control and final acceptance of the work installation.

- f. Craft personnel shall be required to provide and use the proper tools and test equipment in the performance of each activity. Tools must be in good working order and test equipment must be properly calibrated. Contractor is responsible for safe storage of tools and is responsible for their security.

1.17 COMPONENT INSTALLATION

a. Location of Equipment

1. The specifications describe only approximate locations of the work. Verify all locations in the field.
2. Some access doors may be existing. Bidder is to wire owner provided electrified locks as needed for both new and existing doors.
3. Locate equipment and accessories to provide easy access for proper service and maintenance.

b. Conduit and Raceway System

1. Security cabling shall be in ferrous conduit, as shown on the drawings and described in the electrical and conduit specifications.
 - a) With Owner's prior approval, properly supported exposed security cabling shall be permitted above an accessible finished ceiling within the secure areas.
 - b) All security wiring installed in an inaccessible area shall be installed in appropriate metallic conduit.
2. Exposed conduit shall be parallel with, or at right angles to, walls and ceilings. It shall be adequately supported by means of approved galvanized iron clamps or hangers.
3. Conduit fill shall not exceed 40% of conduit cross-sectional area.
4. Nominal trade sizes for conduit shall be 3/4-inch minimum and 4-inch maximum.
5. All junction boxes and pull boxes utilized in the raceway system shall be installed.

c. Mounting Boxes/Enclosures

1. Mounting boxes and enclosures shall be rigidly and securely mounted to the building structure. Wiring contained in them shall be accessible. Install blanking devices or threaded plugs in all unused holes.
2. Clean all interiors thoroughly before installing plates, panels or covers.

d. Electrical Power 120 VAC

1. Any Electrical work to be provided and installed by the Contractor as described herein, shall be performed in accordance with all applicable electrical codes.

2. Review and coordinate electrical power system installation with the Electrical Trade Contractor to ensure proper function and operation of the Security systems.
 3. Verify that all power circuits designated for Security equipment, both fixed-in-place and portable, are properly wired, phased and grounded. Report any discrepancies found to the Engineer and the Owner/Engineer so that appropriate corrective action can be taken.
 4. Provide distribution of electrical power within all equipment racks, enclosures and consoles. For each branch circuit provide a minimum of two (2) spare receptacles in each plugmold strip. Provide a minimum of one (1) unswitched receptacle power strip (rack mounted) per each equipment rack cabinet group.
- e. Finishes
1. All enclosures, housings and supporting structures supplied by the Contractor not having a standard factory protective finish shall be painted. Paint specifications will be supplied by the Owner/Engineer or indicated herein.
 2. Any equipment or materials supplied, which are exposed to public view, shall be approved by the Owner/Engineer. Provide, as may be required by the Owner/Engineer, custom color and/or finish for all such items. This does NOT exclude equipment or materials that are supplied with standard colors or finishes as specified herein.
 3. Finish and color of blank, perforated vent, and custom rack panels shall match each other as closely as possible.
- f. Installation of Cabling
1. Run all wiring in compliance with the requirements of the electrical specification and in accordance with authorities and codes having jurisdiction. Provide separate conduit for control wiring under this Section. Follow manufacturers' instructions for installing, connecting, and adjusting all equipment and cabling.
 2. Installation of all wire and cable shall include ensuring proper:
 - a) Types
 - b) Lengths
Routing
 - c) Quantities
 - d) Pulling tensions
 - e) Circuit identification
 - f) Wire/cable group separations

3. Do not pull through any box, enclosure, or fitting where change of conduit or raceway alignment or direction occurs. Do not bend conductors to less than recommended radius. Employ temporary guides, sheaves, rollers, and other necessary items to protect cables from excess tension, abrasion, or damaging bending during pulling.
4. Provide wire pulling lubricants and pulling tensions strictly in accordance with wire and cable manufacturer's recommendations.
5. Cover edges of cable pass through holes in chassis, racks, boxes, plates, etc. with rubber grommets or Heyco or Brady GRNY nylon grommets.
6. Use Velcro-type cable ties for bundling cabling as required and securing cable bundles to racks as required. Use integral brass grommets for screw attachment. Attach to backboards using flat-headed screws with rigid support. Lengths vary as required. Types vary as required.
7. Provide ample service loops at each termination so that plates, panels, and equipment can be de-mounted for inspection, service, and so equipment in drawers or on slides can move freely.
8. Permanently identify all wires and cables at each end by labeling with Panduit or Brady (for example, not Brother P Touch type) wire markers printed on LaserJet or dot matrix printer via computer software program. Labeling information shall include the following:
 - a) Cable prefixes and cable numbers as per Security Wiring Riser and CCTV Wiring Riser drawings.
 - b) Descriptive information related to the cable's equipment source.
 - c) Descriptive information related to the cable's equipment destination.
 - d) Enter all identifications on wire/cable run schedules and/or as part of the shop drawings.
9. Use the same wire color coding for the same circuit, circuit functions, or phasing throughout the system. No splices shall exist in any length of wire run except where noted on specification drawings or approved by the Engineer.
10. Exercise care in wiring to avoid damage to cables. Cables shall be well supported and neatly dressed between racks, cabinets, consoles, or modules. Make all connections to jacks and connectors with rosin-core solder. Soldering shall be neat and shall not exhibit "cold" solder joints. Avoid "solder splatter" which can cause shorts in exposed terminals or wiring.
11. Connections made with screw actuated pressure type terminal strips shall be made by stripping approximately 6mm of insulation from the stranded conductor, inserting the un-tinned wire into the pressure terminal, and tightening the terminal screw using a small screw driver which securely fits the screw head.
12. All exposed shield drain wires shall be sheathed in properly sized clear tubing, clear shrink tube, or white "spaghetti". Floating shields (at device outputs) shall be insulated using the proper size heat shrink tubing and completely protected against shorting to any other conductors or connector shell.

13. CAT-6/5E for CCTV, Intercoms and other connections shall only be using proper crimp type connectors of appropriate for the equipment or device terminations.
14. Cable Separation
 - a) Cabling shall be bundled separately from other system cabling. Each cable bundle shall be tie wrapped and supported J - hooks every 5-feet.
 - b) Separate cables running parallel to electrical cables/conduits by a minimum of 12-inches. Maintain at least 18-inch separation from all lighting ballasts and fixtures.
 - c) Cables, which must cross-electrical cables/conduits, shall do so only at 90-degree angles.
- g. Installation of Security Equipment Panels
 1. Provide security equipment panel installation in accordance with the provided SE series drawings.
- h. Installation of Security Equipment Racks and Cabinets
 1. Provide security equipment rack and cabinet installation in accordance with industry expected standards and per provided SE drawings.

1.18 IDENTIFICATION

- a. Furnish a nameplate for each security equipment panel, NEMA and power supply enclosures provided under this work. Plates shall be Panduit, self-laminating or 2 1/4" lamacoid or aluminum with a black enamel background with etched or engraved upper case 1/4" white letters or black and white laminated Bakelite plate with beveled edges. Coordinate labeling and nameplate requirements with the Owner/Engineer prior to installation. Nameplates shall be screwed on with countersunk screws.
- b. All cables and terminal strips shall be labeled with machine generated black uppercase lettering on a permanent adhesive label stock, covered with a permanent water resistant sealer. Labels shall be placed on both ends of the cable and no more than 6" from the point at which the cable is broken out into individual copper pairs or from the connector or terminal block. All labels shall be readily visible.
- c. Hand lettered label stock shall not be accepted for final installation. Hand lettered stock is only acceptable for use with temporary labeling required during construction phases.
- d. If at any time during the project, the cable label becomes illegible or removed, the Contractor shall immediately replace it with a duplicate pre-printed cable label.
- e. All cable IDs shall be both physically and visually accessible upon completion of the project.

1.19 FIRE STOP PENETRATION SEALANT

- a. Provide fire-resistant materials of a type and composition necessary to restore fire ratings to all wall or floor or ceiling penetrations. Material must be properly classified and meet national and local codes.

- b. All penetrations through fire rated floors and walls shall be sealed to prevent the passage of cold smoke, fire, toxic gas or water through the penetration either before, during or after a fire. The fire rating of the penetration seal shall be at least that of the floor or wall into which it is installed, so that the original fire rating of the floor or wall is maintained as required by Article 300-21 of the National Electrical Code.
- c. No flammable material may be used to line the chase or hole in which the fire stop material is to be installed.
- d. When damming materials are to be left in place after the seal is complete, and then all such materials shall be non-flammable.
- e. When damming materials are to be left in place after the seal is complete, and then all such materials shall be non-flammable.
- f. The sealant shall remain resilient and pliable to allow the removal and/or addition of cable without the necessity of drilling holes. It shall adhere to itself perfectly to allow any and all repairs to be made with the same material. It shall allow for vibration, expansion and/or contraction of anything passing through the penetration without affecting the seal, or cracking, crumbling and spalling.
- g. When sealant is injected into a penetration, the material shall expand to surround all the items within the penetration and maintain pressure against the walls of the penetration as well as the pass- through items. The material shall cure within five minutes. No heat shall be required to further expand the material to prevent the passage of fire and smoke or water.
- h. The materials shall have been subjected to fire exposure in accordance with standard time-temperature curve in the Standard, UL, ASTM E 119 and NFPA 251. The fire stop material shall have also been subjected to the hose stream test in accordance with UL 10B.

1.20 GROUNDING

- a. Grounding and shielding shall conform to the following procedures. AC grounding applies only to power circuits intended for powering Security equipment.
- b. It is the primary intent of the following procedures to provide a safe system for personnel to operate.
- c. The power cord from active equipment shall not have its third prong-grounding conductor defeated.
- d. To reduce noise voltages in the system it is intended that only one ground connection path exist between two pieces of equipment.
- e. Where mounting hardware is indicated as a means of grounding, ensure both a solid electrical and mechanical connection is made.
- f. Cable shields shall be considered grounded if connected to the shield connection points provided by the manufacturer of active equipment.
- g. Conduit/mounting boxes:

1. Permanently and effectively, bond to building earth ground per applicable codes. Insulated connections between conduit and wall boxes, junction boxes, or wireways are not permitted.
- h. Passive Equipment Chassis: Connect an appropriately sized (green) insulated ground cable to the copper ground terminal block (provided under the electrical contract), to the ground bus bar within each equipment rack. This ground bus bar shall be bonded to bright metal of each equipment rack with the appropriate anti-oxidant employed at the copper to rack interface. Each adjacent equipment rack shall have its grounding conductor home-run to the copper ground terminal block.

1.21 SYSTEM PROGRAMING AND INIALIZATION

- a. Programming, software and materials necessary for initial configuration, programming and start-up of access control and CCTV systems is by others.
 1. Provide all labor and materials necessary to during system's commissioning.
 2. Provide labor to attend weekly project meetings for the duration of the project.

1.22 TRAINING

- a. Allow a minimum of 8 hours to walk the site with the owner for needed training on provided materials and installations to show location of junction boxes, breaker panels etc.

1.23 INSPECTIONS AND TESTING

- a. Help perform field I/O calibration and commissioning, system commissioning and integrated system program commissioning. Document all commissioning information on commissioning data sheets that shall be submitted prior to acceptance testing. Notify the Owner/Engineer in writing of the testing schedule so that operating personnel may observe calibration and commissioning.
 1. Inspections and Cable Testing
 2. System Programming
 3. System Operation
 4. Component Commissioning
 5. Primary Power Failure
 6. Fire alarm Interface Test
- b. After the installation is complete, in addition to any other required testing as described herein, and at such times as the Owner/Engineer directs, be present while the Owner/Engineer conducts an operating test for approval. The installation shall be demonstrated to be in accordance with the requirements of this specification. Any defects revealed shall be corrected promptly at the Contractor's expense and the tests performed again.
- c. As a minimum, test, as described below, all cables installed under these specifications.
 1. Conduct cable testing as described below upon completion of installation. Test fully completed systems only.
 2. Multi-conductor metallic cables: End-to-end testing of each cable pair/conductor for continuity ground fault, proper termination, shorts and crossed pairs.

3. If a bad conductor is found, replace the entire cable. Remove any cables that contain a defective conductor from ceiling and/or floor duct. Do not abandon defective cables in place.
- d. The Owner/Engineer reserves the right to observe of any or all portions of the testing process.
- e. The Owner/Engineer further reserves the right to conduct, using contractor equipment and labor, a random re-test of 10% of the cables to confirm documented test results. Such retests may be observed and reported on by a third-party contractor retained by the Owner/Engineer.
- f. All test results and corrective procedures are to be documented and submitted to the Owner/Engineer within five (5) working days of test completion

1.24 ACCEPTANCE

- a. Submit a detailed acceptance procedure designed to demonstrate compliance with contract installation requirements at least 2 weeks before the start of testing. This procedure to be approved prior to the start of the testing.
- b. During acceptance testing, provide services to owner's security systems technician.
- c. Coordinate testing period so that free access, work lighting and electrical power are available on site.
- d. Furnish three portable VHF or UHF business band, two-way radios with sufficient range to cover the entire project. Include extra rechargeable batteries, battery charger and belt "holsters".
- e. Ensure that technical areas are in a clean and orderly condition, ready for acceptance testing.

1.25 RECORD DRAWINGS

- a. During construction, the Contractor shall keep an accurate record of all deviations between the work as shown on the drawings and that, which is accurately installed.

END OF SECTION

SECTION 28 4600
FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire alarm system revisions, including all components, wiring, and conduit.
- B. Replacement and removal of existing fire alarm system components, wiring, and conduit indicated.

1.02 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.
- C. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Corrigendum 2012).
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. NFPA 72 - National Fire Alarm and Signaling Code; Most Recent Edition Cited by Referring Code or Reference Standard.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. NFPA 72 "Record of Completion", filled out to the extent known at the time.
- C. Manufacturer's detailed data sheet for each control unit, initiating device, and notification appliance.
- D. Certification by Contractor that the system design will comply with Contract Documents.
- E. Evidence of maintenance contractor qualifications, if different from installer.
- F. Inspection and Test Reports:
 - 1. Submit NFPA 72 "Inspection and Test Form," filled out.
- G. Project Record Documents: See Section 01 7800 for additional requirements; have one set available during closeout demonstration:
 - 1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
 - 2. "As installed" wiring and schematic diagrams, with final terminal identifications.
 - 3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.
- H. Closeout Documents:
 - 1. Certification by manufacturer that the equipment has been installed in compliance with manufacturer's installation requirements, is complete, and is in satisfactory operating condition.
 - 2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm equipment of the specified type and providing contract maintenance service as a regular part of their business.
- B. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.

1.05 WARRANTY

- A. Provide installer's warranty that the installation is free from defects and will remain so for 1 year after date of Substantial Completion.

PART 2 PRODUCTS

2.01 FIRE ALARM SYSTEM

- A. Fire Alarm System: Provide modifications and extensions to the existing automatic fire detection and alarm system:
 - 1. Provide all components necessary, regardless of whether shown in Contract Documents or not.

2.02 EXISTING COMPONENTS

- A. Existing Fire Alarm System: Remove existing components indicated and incorporate remaining components into new system, under warranty as if they were new; do not take existing portions of system out of service until new portions are fully operational, tested, and connected to existing system.
- B. Clearly label components that are "Not In Service."

2.03 COMPONENTS

- A. General:
 - 1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
 - 2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.
- B. Fire Alarm Control Units: Analog, addressable type; listed, classified, and labeled as suitable for the purpose intended.
- C. Initiating Devices:
 - 1. Addressable Systems:
 - a. Addressable Devices: Individually identifiable by addressable fire alarm control unit.
 - b. Provide suitable addressable interface modules as indicated or as required for connection to conventional (non-addressable) devices and other components that provide a dry closure output.
- D. Notification Appliances:
 - 1. Strobes: See Drawing E-500.
- E. Circuit Conductors: Copper or optical fiber; provide 200 feet (60 m) extra; color code and label.
- F. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.
- G. Instruction Charts: Printed instruction chart for operators, showing steps to be taken when a signal is received (normal, alarm, supervisory, and trouble); easily readable from normal operator's station.
 - 1. Frame: Stainless steel or aluminum with polycarbonate or glass cover.
 - 2. Provide one for each control unit where operations are to be performed.
 - 3. Obtain approval of Owner prior to mounting; mount in location acceptable to Owner.
 - 4. Provide extra copy with operation and maintenance data submittal.
- H. CARBON MONOXIDE DETECTORS
 - 1. General: Carbon monoxide detector listed for connection to fire-alarm system.
 - a. Mounting: Adapter plate for outlet box mounting.
 - b. Testable by introducing test carbon monoxide into the sensing cell.
 - c. Detector shall provide alarm contacts and trouble contacts.
 - d. Detector shall send trouble alarm when nearing end-of-life, power supply problems, or internal faults.
 - e. Comply with UL 2075.
 - f. Locate, mount, and wire according to manufacturer's written instructions.
 - g. Provide means for addressable connection to fire-alarm system.
 - h. Test button simulates an alarm condition.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and Contract Documents.
- B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.

3.02 INSPECTION AND TESTING FOR COMPLETION

- A. Notify Owner 7 days prior to beginning completion inspections and tests.
- B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.
- D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.
- E. Provide all tools, software, and supplies required to accomplish inspection and testing.
- F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
- G. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.03 CLOSEOUT

- A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
 - 1. Be prepared to conduct any of the required tests.
 - 2. Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
 - 3. Have authorized technical representative of control unit manufacturer present during demonstration.
 - 4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
 - 5. Repeat demonstration until successful.

3.04 MAINTENANCE

- A. See Section 01 7000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.
- B. Comply with Owner's requirements for access to facility and security.

END OF SECTION