

SECTION 01 1000
SUMMARY AND SCOPE OF WORK

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: Yonkers YPS School 9
- B. Owner's Name: Yonkers Public Schools.
- C. Engineer's Name: Eisenbach & Ruhnke Engineering, P.C.

1.02 CONTRACT DESCRIPTION

- A. Contract Type: Single prime contract as follows:
 - 1. Contract 1 - General Construction - Site Work
 - 2. Contract 2 - General Construction – Interior Work
 - 3. Contract 3 - HVAC
 - 4. Contract 4 - Electric
 - 5. Contract 5 - Plumbing

1.03 DESCRIPTION OF ALTERATIONS WORK

- A. Scope of demolition and removal work is indicated on drawings and specified.
- B. The project has multiple prime contractors as follows:
 - 1. General Contractor – Site Work
 - a. The contractor is responsible for all site work indicated and specified.
 - b. The work will be done summer 2021.
 - 2. General Contractor – Interior Work
 - a. The contractor is responsible for the interior general construction, including the asbestos abatement and the moving of materials, furniture and equipment as specified and indicated.
 - b. Particular attention should be noted about the requirement to pack and move all materials, furniture and equipment in the building to accommodate the work, store in containers and return everything to the rooms when spaces available.
 - c. Work in the basement to create the new bathroom and to renovate the room next to it can be done starting April 1, 2021. The temporary egress from the adjacent classroom must be constructed before work starts in the adjacent spaces.
 - d. Work in the spring must be done after school hours.
 - 3. HVAC
 - a. The contractor is responsible for all HVAC work indicated and specified.
 - b. The work will be done summer 2021 with the exception of the work in the basement as indicated on the HVAC drawings for the spaces being renovated. The work in the basement will be coordinated with the General Contractor.
 - c. Work during the school year will be done after school hours.
 - 4. Electric
 - a. The contractor is responsible for all Electric work indicated and specified.
 - b. The work will be done summer 2021 with the exception of the work in the basement as indicated on the HVAC drawings for the spaces being renovated. The work in the basement will be coordinated with the General Contractor.
 - c. Work during the school year will be done after school hours.
 - 4. Plumbing
 - a. The contractor is responsible for all Plumbing work indicated and specified.

- b. The work will be done summer 2021 with the exception of the work in the basement as indicated on the HVAC drawings for the spaces being renovated. The work in the basement will be coordinated with the General Contractor.
- c. Work during the school year will be done after school hours.

1.04 OWNER OCCUPANCY

- A. Owner intends to vacate the building during the summer until August 20, 2021. Custodial personnel will be working in the building. Classroom spaces must be completed in accordance with the phasing plans.
- B. Work during the school year to be done after school hours or on weekends and holidays unless specifically authorized by the Owner.
- C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- D. Schedule the Work to accommodate Owner.

1.05 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.

1.06 WORK SEQUENCE

- A. Coordinate construction schedule and operations with Engineer and Construction Manager.

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:

Building Renovations and Sitework School 9

NAME OF OWNER:

Yonkers Public School District

DATE:

A/E PROJECT NO:

Y170901

ARCHITECT/ENGINEER:

Eisenbach & Ruhnke Engineering, P.C.

291 Genesee Street

Utica, New York 13501

315.735.1916 Fax: 315.735.6365

j Eisenbach@erengpc.com

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 2200

UNIT PRICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. List of unit prices, for use in preparing Bids.

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 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.
- B. Payment will not be made for any of the following:
 - 1. Products wasted or disposed of in a manner that is not acceptable.
 - 2. Products determined as unacceptable before or after placement.
 - 3. Products placed beyond the lines and levels of the required Work.
 - 4. Products remaining on hand after completion of the Work.
 - 5. Loading, hauling, and disposing of rejected Products.

1.05 DEFECT ASSESSMENT

- A. Replace Work, or portions of the Work, not conforming to specified requirements.
- B. The authority of Engineer to assess the defect and identify payment adjustment is final.
- C. The authority of Yonkers Public School District to assess the defect and identify payment adjustment is final.

1.06 SCHEDULE OF UNIT PRICES

A. Unit Price No. GC Site-1 – Repair Asphalt Pavement.

- 1. The bid is to include repair of asphalt pavement damaged by the dumpster being located on the asphalt so propane tank can be housed on the existing concrete pad. Include 400 Square Feet in the Base Bid.
- 2. Include all labor, equipment, and material to complete the work.
- 3. The repairs will include cutting out any damaged pavement and providing new asphalt pavement.
- 4. Unit of Measure - Per square foot area.

B. Unit Price No. GC Interior -1 – Remove damaged plaster associated with wood/vinyl cove base replacement.

- 1. The bid is to include removal of damaged plaster associated with wood/vinyl cove base replacement. Include 200 Square Feet in the Base Bid.
- 2. Include all labor, equipment, and material to complete the work.
- 3. The repairs will include priming and painting the surface after the repairs are complete.
- 4. Unit of Measure - Per square foot area.

C. Unit Price No. GC Interior-2 – Repair damaged plaster associated with wood/vinyl cove base replacement.

1. The bid is to include repair of damaged plaster, where removal is not necessary, associated with wood/vinyl cove base replacement. Include 200 Square Feet in the Base Bid.
2. Include all labor, equipment, and material to complete the work.
3. The repairs will include priming and painting the surface after the repairs are complete.
4. Unit of Measure - Per square foot area.

D. Unit Price No. P-1 – Dispose of oil from fuel oil tank.

1. The bid is to include disposal of heating fuel and any sludge in the bottom of the tank. Include 500 gallons of heating fuel and sludge in the Base Bid. The unit price will be used to adjust the value up or down based upon the actual quantity found.
2. Include all labor, equipment, and material to complete the work.
3. Unit of Measure - Per Gallon.

E. Unit Price No. P-2 – Dispose of contaminated water from Excavation.

1. The bid is to include disposal of contaminated water from excavation. Include 250 gallons in the Base Bid. The unit price will be used to adjust the value up or down based upon the actual quantity found.
2. Include all labor, equipment, and material to complete the work.
3. Unit of Measure - Per Gallon.

F. Unit Price No. P-3 – Dispose of contaminated soil.

1. The bid is to include disposal of contaminated soil. Include 30 tons in the Base Bid. The unit price will be used to adjust the value up or down based upon the actual quantity found.
2. Include all labor, equipment, and material to complete the work.
3. Unit price includes all testing, waste classification and landfill acceptance.
4. Unit price includes excavation, stockpiling, loading, transporting and disposal.
5. Unit of Measure - Per Ton.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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 do 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 32 16
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 and schedule provided in the documents.

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, each contractor will submit a preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work. The General Contractor - Interior will be responsible to incorporate all the individual schedules into an overall schedule.
- 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
Building Renovations and Sitework

Contractor:

E&R Project No.: Y170901

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

YPS#10816

-
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 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Quality assurance submittals.
- B. Mock-ups.
- C. Control of installation.
- D. Tolerances.
- E. Testing and inspection services.
- F. Manufacturers' field services.

1.03 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Submittal procedures.
- B. Section 01 4216 - Definitions.
- C. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.04 REFERENCE STANDARDS

- A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008.
- B. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 2013a.
- C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2012.
- D. 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.
- E. ASTM E329 - Standard Specification for Agencies Engaged Construction Inspection and/or Testing; 2011.
- F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2009.

1.05 SUBMITTALS

- A. Testing Agency Qualifications:
 - 1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
 - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
- B. Design Data: Submit for Engineer's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Yonkers Public School District's information.
- 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.
- 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 Yonkers Public School District'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 Yonkers Public School District.
 - 1. Submit report in duplicate within 30 days of observation to Engineer for information.
 - 2. 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 Yonkers Public School District.
 - 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 Yonkers Public School District.

1.06 TESTING AND INSPECTION AGENCIES

- A. Yonkers Public School District will employ and pay for services of an independent testing agency to perform specified Project Monitoring/Air Sampling during Hazardous Abatement Work.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- C. 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. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
 - 4. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

1.06A. 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.

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 MOCK-UPS

- A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be a comparison standard for the remaining Work.
- D. Where mock-up has been accepted by Engineer and is specified in product specification sections to be removed, remove mock-up and clear area when directed to do so.

3.03 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

- A. See individual specification sections for testing required.
- B. 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.
- C. Limits on Testing/Inspection Agency Authority:
 - 1. Agency may not assume any duties of Contractor.
- D. 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 Yonkers Public School District's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Engineer.
- F. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.
- G. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Eisenbach & Ruhnke Engineering, P.C.

3.05 CONTRACTOR'S TESTING AND INSPECTION

- A. Testing and Inspections shall be conducted by a qualified testing agency or special inspector as required by authorities having jurisdiction and as indicated in individual Specification Sections as the contractor's responsibility including:
 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Owner's Representative, Contractor, Engineer, or Construction Manager promptly of irregularities and deficiencies observed in the work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Engineer, through Owner's Representative, with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, this includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 6. Retesting and re-inspecting corrected work.
 7. Testing as required by individual specification sections.

3.06 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 of equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Engineer 30 days in advance of required observations.
 1. Observer subject to approval of Yonkers Public School District.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.07 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not conforming to specified requirements.
- B. If, in the opinion of Engineer, it is not practical to remove and replace the Work, Engineer will direct an appropriate remedy or adjust payment.

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 4219
REFERENCE STANDARDS**

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 SECTION INCLUDES

- A. Requirements relating to referenced standards.

1.3 RELATED REQUIREMENTS

- A. General Conditions.

1.4 QUALITY ASSURANCE

- A. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue current on date for receiving bids, except where a specific date is established by applicable code.
- C. Obtain copies of standards when required by the Contract Documents.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Date of Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from the engineer before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the engineer shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

1.5 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract and Section 01422 Definitions

1.6 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents, including reference standards in codes having jurisdiction, include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- 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 the requirements. Refer uncertainties to Engineer for a decision before proceeding.
- C. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
- D. Where copies of standards are needed to perform a required construction activity, obtain copies directly from the publication source and make them available on request.

PART 2 - CONSTRUCTION INDUSTRY ORGANIZATION DOCUMENTS

2.1 ABBREVIATIONS AND NAMES:

- A. Abbreviations and acronyms are frequently used in the Specifications and other Contract Documents to represent the name of a trade association, standards-developing organization, authorities having jurisdiction, or other entity in the context of referencing a standard or publication. Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of these entities. Refer to Gale Research's "Encyclopedia of Associations" or Columbia Books' "National Trade & Professional Associations of the U.S.," which are available in most libraries or the internet.

END OF SECTION

SECTION 01 4533
CODE REQUIRED SPECIAL INSPECTIONS

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 GENERAL REQUIREMENTS

- A. Special Inspections and Structural Testing shall be in accordance with Chapter 17 of the New York State Uniform Code (NYSUC).

1.3 DEFINITIONS

- A. Registered Design Professional: Licensed Professional Engineer or Registered Architect whose seal appears in the Construction Drawings.
- B. Special Inspector (SI): Professional Engineer licensed in the State of New York, acting on behalf of the Owner, that implements the Special Inspection Program for the project.
- C. Testing/Inspecting Agency: Agent retained by Special Inspector or Owner and coordinated by Special Inspector to perform some inspection services on behalf of Special Inspector.
- D. Testing/Inspecting Agency (Agent 1): Professional Engineer licensed in the State of New York that is qualified to perform structural inspections. The Special Inspector shall have a minimum of three years of experience performing inspections for similar projects.
- E. Testing/Inspecting Agency (Agent 2): Professional Geotechnical Engineer licensed in the state of New York that is qualified to perform inspections for preparation of building subgrades and foundations.
- F. Testing/Inspecting Agency (Agents 3 or 4): Agency or firm qualified to inspect certain structural elements and perform field and laboratory tests to determine the characteristics and quality of building materials and workmanship.
- G. Schedule of Special Inspections: An itemized list of inspections, verifications, and tests (including frequency) required for the project and individuals, agencies, or firms who will be retained to perform these services. The Schedule of Special Inspections is located in in this specification.
- H. Inspect and Inspection: Visual observation of materials, equipment, or construction work as defined in the Statement of Special Inspections, to determine that the work is in substantial conformance with the requirements of the Contract Documents.
- I. Continuous Special Inspection: Full-time observation of work by the Special Inspector or Testing Agency while the work is being performed.
- J. Periodic Special Inspections: Part-time or intermittent observation of work by the Special Inspector or Testing Agency for work that has been or is being performed and at completion of work.

1.4 SECTION INCLUDES

- A. Code-required special inspections.
- B. Testing services incidental to special inspections.
- C. Submittals.
- D. Manufacturers' field services.
- E. Fabricators' field services.

1.5 RESPONSIBILITY

- A. All Code required testing will be performed and paid for by the Owner.

1.6 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Submittal procedures.
- B. Section 01 4000 - Quality Requirements.
- C. Section 01 4219 - Reference Standards.
- D. Section 01 6000 - Product Requirements.

1.7 GENERAL REQUIREMENTS

- A. Special Inspections and Structural Testing shall be in accordance with Chapter 17 of the Building Code of New York State (BCNYS).
- B. Owner's Representative will schedule a Special Inspections preconstruction meeting at least 7 days prior to initial planned date for start of construction.
 - 1. Discussions shall include the following:
 - a. Review of specifications and Schedule of Special Inspections for work requiring Special Inspections.
 - b. Responsibilities of the Prime Contractors, Owner, Testing Agency, Special Inspector, and Registered Design Professional.
 - c. Notification and reporting procedures.
 - 2. Attendees shall include Owner's Representative, Contractor, Testing Agency, and Special Inspector.

1.8 DEFINITIONS

- A. Code or Building Code: ICC (IBC), 2015 Edition of the International Building Code and specifically, Chapter 17 - Special Inspections and Tests.
- B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.
 - 1. Including New York State Department of Education (SED).
- C. International Accreditation Service, Inc. (IAS).
- D. Registered Design Professional (RDP):
 - 1. Architect or Engineer: Licensed Professional Engineer or Registered Architect whose seal appears in the Construction Drawings. Unless noted otherwise, references to the Registered Design Professional (RDP) in this section refer to Eisenbach & Ruhnke for building design.
 - 2. Geotechnical Engineering: Licensed Professional Engineer whose seal appears on the Geotechnical Investigation. The Geotechnical Engineering shall perform and oversee Agent 2 services as indicated in the Schedule of Special Inspections. If a Geotechnical Investigation was not performed or if the Geotechnical Engineering is not retained to perform Agent 2 services, a licensed Geotechnical Engineer shall be retained to perform these duties.
- E. Owner's Representative: The term Owner's Representative shall mean: Owner selected representative.
- F. Special Inspection:
 - 1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the State Building Code that also require special expertise to ensure compliance with the approved contract documents and the referenced standards.
 - 2. Special inspections are separate from and independent of tests and inspections conducted by Contractor and Special Inspector for the purposes of quality assurance and contract administration.

- G. Special Inspector: A Professional Engineer registered in the State of New York that has a minimum of four years of structural design experience with buildings and qualified to perform inspections assigned including structural, geotechnical, and HVAC.
- H. Testing/Inspecting Agency: Agent retained by Owner and coordinated by Construction Manager to perform some inspection services on behalf of Owner.
- I. Statement of Special Inspections: Documents prepared by the Registered Design Professional and filed with and approved by the Architect and Construction Manager, listing materials and work requiring Special Inspections. These documents include this specification and the Schedule of Special Inspections.
- J. Schedule of Special Inspections: An itemized list of inspections, verifications, and tests (including frequency) required for the project and individuals, agencies, or firms who will be retained to perform these services. The Schedule of Special Inspections is located in this section
- K. Seismic/Wind-Force-Resisting System: Components of the structural system that provide resistance to seismic/wind forces. These components are identified in the Schedule of Special Inspections.
- L. Continuous Special Inspection: Testing Agency and Special Inspector to perform full-time observation of work while the work is being performed.
- M. Periodic Special Inspections: Part-time or intermittent observation of work by the Special Inspector or Testing Agency for work that has been or is being performed and at completion of work.

1.9 REFERENCE STANDARDS (Current Approved Editions)

- A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.
- B. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures.
- C. AISC 341 - Seismic Provisions for Structural Steel Buildings.
- D. AISC 360 - Specification for Structural Steel Buildings.
- E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
- F. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- G. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete.
- H. 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.
- I. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
- J. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing.
- K. ASTM E605/E605M - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.
- L. ASTM E736/E736M - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
- M. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestops.
- N. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.
- O. ASTM E2570/E2570M - Standard Test Methods for Evaluating Water-Resistive Barrier (WRB) Coatings Used under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage.
- P. AWCI 117 - Technical Manual 12-B; Standard Practice for the Testing and Inspection of Field Applied Thin Film Intumescent Fire-Resistive Materials; an Annotated Guide.
- Q. AWS D1.1/D1.1M - Structural Welding Code - Steel.
- R. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel.
- S. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel.

- T. IAS AC89 - Accreditation Criteria for Testing Laboratories.
- U. IAS AC291 - Accreditation Criteria for Special Inspection Agencies.
- V. ICC (IBC) - International Building Code; 2018.

1.10 QUALIFICATIONS

- A. Testing Agency shall be accepted by the Architect and Construction Manager.
- B. Special Inspections shall be performed by agents who have relevant experience for each category of inspections indicated in the drawings.

1.11 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Manufacturer's Qualification Statement: Manufacturer shall submit documentation of manufacturing capability and quality control procedures.
- C. Fabricator's Qualification Statement: Fabricator shall submit documentation of fabrication facilities and methods as well as quality control procedures.
- D. Special Inspection Reports: After each special inspection, Special Inspector shall promptly submit one electronic copy of report, in PDF format, to Owner's Representative, Architect, and Contractor.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of Special Inspector.
 - d. Date and time of special inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of special inspection.
 - h. Date of special inspection.
 - i. Results of special inspection.
 - j. Compliance with Contract Documents.
 - 2. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.
- E. Fabricator Special Inspection Reports: After each special inspection of fabricated items at the Fabricator's facility, Special Inspector shall promptly submit one electronic copy of report, in PDF format to Owner's Representative, Architect, and Contractor.
 - 1. Include:
 - a. Date issued.
 - b. Name of Special Inspector.
 - c. Date and time of special inspection.
 - d. Identification of fabricated item and specification section.
 - e. Location in the Project.
 - f. Results of special inspection.
 - g. Verification of fabrication and quality control procedures.
 - h. Compliance with Contract Documents.
 - i. Compliance with referenced standard(s).
- F. Test Reports: After each test or inspection, promptly submit one electronic copy, in PDF format, to Owner's Representative, Architect, and 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 or inspection.
 - h. Date of test or inspection.
 - i. Results of test or inspection.
 - j. Compliance with Contract Documents.
2. Compliance with referenced standard(s).
- G. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to Owner's Representative, Architect, and Contractor, in quantities specified for Product Data.
 1. Indicate material or product complies with 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 Owner's Representative and Architect.
- H. Manufacturer's Field Reports: Submit reports to Owner's Representative and Architect
 1. Submit report in, electronic copy, in PDF format, within 30 days of observation to Owner's Representative and Architect for information.
 2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the contract documents.
- I. Fabricator's Field Reports: Submit reports to Owner's Representative and Architect
 1. Submit report, in PDF format, within 30 days of observation to Owner's Representative and Architect for information.
 2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the contract documents.

1.12 TESTING AND INSPECTION AGENCIES

- A. Owner's Representative will employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code or specification.
- B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.13 QUALITY ASSURANCE

- A. Special Inspection Agency Qualifications:
 1. Independent firm specializing in performing testing and inspections of the type specified in this section.
 2. Accredited by IAS according to IAS AC291.
- B. Testing Agency Qualifications:
 1. Independent firm specializing in performing testing and inspections of the type specified in this section.
 2. Accredited by IAS according to IAS AC89.

PART 2 - PRODUCTS - NOT USED

PART 3 - PART 3 EXECUTION

3.1 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL

- A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.

1. Continuous Special Inspection: Special Inspection Agency shall be present in the area where the work is being performed and observe the work at all times the work is in progress.

3.2 SPECIAL INSPECTIONS FOR STEEL CONSTRUCTION (INCLUDING METAL DECK)

- A. Testing Agency shall perform the following:
 1. Verify Fabricator maintains detailed fabrication and Quality Control procedures:
 - a. Review procedures for completeness and adequacy relative to code requirements.
 - b. If Fabricator is designated as AISC-Certified Fabricator, Special Inspection for shop-fabricated members and assemblies is not required.
 - c. If Fabricator is not designated as AISC-Certified Fabricator, Contractor shall reimburse Owner via execution of credit change order for cost of Special Inspections and testing in Fabricator's shop.
 2. Review manufacturer's Certificates of Compliance for high-strength bolts and weld filler material.
 3. Review certified mill test reports.
 4. Inspect steel frame joint details for compliance with approved Construction Documents.
- B. High-Strength Bolt, Nut and Washer Material:
 1. Verify identification markings comply with ASTM standards specified in the approved contract and to AISC 360, Section A3.3; periodic.
 2. Submit manufacturer's certificates of compliance; periodic.
- C. High-Strength Bolting Installation: Verify items listed below comply with AISC 360, Section M2.5.
 1. Snug tight joints; periodic.
 2. Pretensioned and slip-critical joints without matchmarking or calibrated wrench method of installation; continuous.
- D. Structural Steel and Cold Formed Steel Deck Material:
 1. Structural Steel: Verify identification markings comply with AISC 360, Section M3.5; periodic.
 2. Other Steel: Verify identification markings comply with ASTM standards specified in the approved contract documents; periodic.
 3. Submit manufacturer's certificates of compliance and test reports; periodic.
- E. Weld Filler Material:
 1. Verify identification markings comply with AWS standards specified in the approved contract documents and to AISC 360, Section A3.5; periodic.
 2. Submit manufacturer's certificates of compliance; periodic.
- F. Welding:
 1. Structural Steel and Cold Formed Steel Deck:
 - a. Complete and Partial Joint Penetration Groove Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
 - b. Multipass Fillet Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
 - c. Single Pass Fillet Welds Less than 5/16 inch Wide: Verify compliance with AWS D1.1/D1.1M; periodic.
 - d. Plug and Slot Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
 - e. Single Pass Fillet Welds 5/16 inch or Greater: Verify compliance with AWS D1.1/D1.1M; continuous.
 - f. Floor and Roof Deck Welds: Verify compliance with AWS D1.3/D1.3M; continuous.

2. Reinforcing Steel: Verify items listed below comply with AWS D1.4/D1.4M and ACI 318, Section 3.5.2.
 - a. Verification of weldability; periodic.
 - b. Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames as well as boundary elements of special structural walls of concrete and shear reinforcement; continuous.
 - c. Shear reinforcement; continuous. d. Other reinforcing steel; periodic.
- G. Steel Frame Joint Details: Verify compliance with approved contract documents.
 1. Details, bracing and stiffening; periodic.
 2. Member locations; periodic.
 3. Application of joint details at each connection; periodic.
- H. Cold formed steel trusses spanning 60 feet or more; periodic.

3.3 COLD FORMED STEEL LIGHT FRAME CONSTRUCTION:

- A. Stud spacing.
- B. Field welding;
- C. Screw attachment, bolting, anchoring and other fastening of components.
- D. Screw attachment of sheathing,

3.4 SPECIAL INSPECTIONS FOR CONCRETE CONSTRUCTION

- A. Reinforcing Steel, Including Placement: Verify compliance with approved contract documents and ACI 318, Sections 3.5 and 7.1 through 7.7; periodic.
- B. Reinforcing Steel Welding: Verify compliance with AWS D1.4/D1.4M and ACI 318, Section 3.5.2; periodic.
- C. Bolts Installed in Concrete: Where allowable loads have been increased or where strength design is used, verify compliance with approved contract documents and ACI 318, Sections 8.1.3 and 21.2.8 prior to and during placement of concrete; continuous.
- D. Anchors Installed in Hardened Concrete: Verify compliance with ACI 318, Sections 3.8.6, 8.1.3, and 21.2.8; periodic.
- E. Design Mix: Verify plastic concrete complies with the design mix in approved contract documents and with ACI 318, Chapter 4 and 5.2; periodic.
- F. Concrete Sampling Concurrent with Strength Test Sampling: Each time fresh concrete is sampled for strength tests, verify compliance with ASTM C172/C172M, ASTM C31/C31M and ACI 318, Sections 5.6 and 5.8 and record the following, continuous:
 1. Slump.
 2. Air content.
 3. Temperature of concrete.
 4. Verify use of required design mix.
 5. Sample and test concrete during placement as follows. Test shall be taken at point of discharge into structure:
 - a. Record specific locations where concrete was placed. Refer to column lines where possible.
 - b. For each truck, record time concrete is batched as shown in truck ticket, time placement begins/sample time, and time truck is emptied.
 - c. For each truck, sample fresh concrete in accordance with ASTM C 172, except modified for slump to comply with ASTM C 94.
 - d. For each truck, perform slump test in accordance with ASTM C 143. Perform two slump tests for pumped concrete; one at truck and one at point of discharge.
 - e. For each truck for self-consolidating concrete, measure slump flow and record visibility stability index in accordance with ASTM C 1611/C 1611M. Slump cone

- may be in the upright or inverted position. Use same cone position for the entire project for consistency.
- f. For normal-weight concrete, measure air content in accordance with ASTM C 231, pressure method. For lightweight concrete, measure air content in accordance with ASTM C 173, volumetric method. Perform one test for each truck for air-entrained and non-air-entrained concrete.
 - g. Record temperature of concrete for each truck. Test in-place concrete temperature hourly when ambient temperature is 40 degrees F and below and when 80 degrees F and above.
 - h. Record air temperature and general weather conditions (cloudy, windy, sunny, etc.).
 - i. Record unit weight of fresh normal-weight concrete in accordance with ASTM C 138. Record unit weight of lightweight concrete in accordance with ASTM C 567. Perform one test for each 50 cubic yard of concrete.
 - j. Perform concrete compressive tests as follows:
 - 1) Prepare compressive test specimens in accordance with ASTM C 31. Take a set of four - 6" x 12" cylinders for each 50 cubic yards of concrete or each 5,000 square feet of slab area for each type of concrete. Store undisturbed in insulated box during cold weather. Deliver to laboratory between 16 and 32 hours after making. Perform compressive tests in accordance with ASTM C 39: one 6 x 12 specimens tested at 7 days, two 6 x 12 specimens tested at 28 days, and one 6 x 12 specimens retained for later testing if required.
 - 2) In cold weather or whenever steel erection is scheduled to commence less than 14 days after placement of supporting foundation concrete, cast additional set of four 6" x 12" cylinders for each 50 cubic yard or fraction thereof of supporting foundation concrete. Field-cure cylinders, and test two 6 x 12 specimens at 7 days, retaining two 6 x 12 specimens for later testing if required. Steel erection may not begin until supporting concrete obtains 75 percent of its design strength. Contractor, at their cost, may perform additional tests to determine concrete strength.
 - k. If concrete will be placed in separate buildings on a given project, make individual compressive strength test cylinders for each building.
 - l. Perform additional testing as follows if required:
 - 1) If total time period between batching and completing placement has exceeded ACI-recommended, 90-minute-maximum time limit the batch shall be rejected..
 - 6. Inspect concrete placement for proper application techniques.
 - 7. Inspect for maintenance of specified curing temperature and techniques.
 - 8. Perform moisture vapor emission and alkalinity testing in accordance with ASTM F 1869 and ASTM F 710, respectively, as follows:
 - a. Perform testing after building is enclosed, prior to installation of adhered floor finishes, and once HVAC systems are operational.
 - b. Test results must be reviewed and accepted by floor finish installer.
 - G. Concrete: Verify application techniques comply with approved contract documents and ACI 318, Sections 5.9 and 5.10; continuous.
 - H. Specified Curing Temperature and Techniques: Verify compliance with approved contract documents and ACI 318, Sections 5.11 through 5.13; periodic.
 - I. Concrete Strength in Situ: Verify concrete strength complies with approved contract documents and ACI 318, Section 6.2, for the following.

- J. Formwork Shape, Location and Dimensions: Verify compliance with approved contract documents and ACI 318, Section 6.1.1; periodic.
- K. Materials: If the Contractor cannot provide sufficient data or documentary evidence that concrete materials conform to the quality standards of ACI 318, the AHJ will require that the Special Inspector verify compliance with the appropriate standards and criteria in ACI 318, Chapter 3.

3.5 SPECIAL INSPECTIONS FOR MASONRY CONSTRUCTION

- A. Masonry Structures Subject to Special Inspection:
 - 1. Empirically designed masonry, glass unit masonry and masonry veneer in structures designated as "essential facilities".
- B. Verify each item below complies with approved contract documents and the applicable articles of TMS 402/602.
 - 1. Inspections and Approvals:
 - a. Verify compliance with the required inspection provisions of the approved contract documents; periodic.
 - b. Verify approval of submittals required by contract documents; periodic.
 - c. Verify Proportions of site-prepared mortar.
 - d. Verify Proportions of site-prepared grout.
 - e. Observe preparation of required mortar specimens, grout specimens, or prisms in accordance with ASTM C 780, ASTM C 1019, and ASTM C 1314 Rev B.
 - f. Field Quality Control Testing: Perform tests and evaluations listed below during construction for each 5,000 square feet of wall area or portion thereof.
 - 1) Sample and evaluate mortar composition and properties in accordance with ASTM C 780.
 - 2) Sample and test grout compressive strength in accordance with ASTM C 1019.
 - 2. Compressive Strength of Masonry: Verify compressive strength of masonry units prior to start of construction unless specifically exempted by code; periodic.
 - 3. Slump Flow and Visual Stability Index (VSI): Verify compliance as self-consolidating grout arrives on site; continuous.
 - 4. Joints and Accessories: When masonry construction begins, verify:
 - a. Proportions of site prepared mortar; periodic.
 - b. Construction of mortar joints; periodic.
 - c. Location of reinforcement, connectors, and anchorages, etc; periodic.
 - 5. Structural Elements, Joints, Anchors, Protection: During masonry construction, verify:
 - a. Size and location of structural elements; periodic.
 - b. Type, size and location of anchors, including anchorage of masonry to structural members, frames or other construction; periodic.
 - c. Size, grade and type of reinforcement, anchorages, and anchor bolts; periodic.
 - d. Welding of reinforcing bars; continuous.
 - e. Preparation, construction and protection of masonry against hot weather above 90 degrees F and cold weather below 40 degrees F; periodic.
 - 6. Grouting Preparation: Prior to grouting, verify:
 - a. Grout space is clean; periodic.
 - b. Correct placement of reinforcing, connectors, prestressing tendons and anchorages; periodic.
 - c. Correctly proportioned site prepared grouts; periodic.
 - d. Correctly constructed mortar joints; periodic.

7. Preparation of Grout Specimens, Mortar Specimens and Prisms: Observe preparation of specimens; periodic.

3.6 SPECIAL INSPECTIONS FOR SOILS

- A. Materials and Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
 1. Design bearing capacity of material below shallow foundations; periodic.
 2. Identify soils requiring undercutting and replacing while observing proof rolling and when subgrade is exposed.
 3. Verify footing bearing strata.
 4. Review and accept materials proposed by Contractor for use as compacted fill based on test data and information submitted by Testing Agency. Material approval shall be based on requirements and recommendations stated in Project Geotechnical and Subsurface Investigation.
 5. Design depth of suitability of material at bottom of footings; continuous.
 6. Design depth of excavations and suitability of material at bottom of excavations; periodic.
 7. Materials, densities, lift thicknesses; placement and compaction of backfill: Continuous.
 8. Subgrade, prior to placement of compacted fill; periodic.
 9. Observe and accept preparation of slab-on-grade subgrade and subbase.
- B. Testing Agency shall perform field density tests for building subgrades and for fill materials including slab subbase within building area in accordance with ASTM D 6938 as follows:
 1. Testing: Classify and test excavated material; periodic.
 2. Footing subgrade and each stratum of soil on which footings will be placed.
 3. Building subgrade including slab subbase and each lift of compacted material.
 4. Inspect each subgrade and fill layer before further backfill or construction work is performed. Approval shall be based on satisfactory achievement of compaction criteria.
 5. Verify use of fill material and lift thicknesses in field.
 6. Perform moisture content testing of slab subbase in accordance with ASTM D 6938.

3.7 SPECIAL INSPECTIONS FOR FIRE RESISTANT PENETRATIONS AND JOINTS

- A. Verify penetration firestops in accordance with ASTM E2174.
- B. Verify fire resistant joints in accordance with ASTM E2393.

3.8 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

- A. Special Inspector shall:
 1. Provide qualified personnel at site. Cooperate with Owner's Representative and Contractor in performance of services.
 2. Perform specified sampling and testing of products in accordance with specified reference standards.
 3. Ascertain compliance of materials and products with requirements of Contract Documents.
 4. Promptly notify Owner's Representative, Architect, and Contractor of observed irregularities or non-conformance of work or products.
 5. Perform additional tests and inspections required by Owner's Representative and Architect.
 6. Submit reports of all tests or inspections specified.
- B. Limits on Special 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. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Owner's Representative and Architect.
- D. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.9 TESTING AGENCY DUTIES AND RESPONSIBILITIES

- A. Testing Agency Duties:
 1. Provide qualified personnel at site. Cooperate with Owner's Representative, Architect, and Construction Manager 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 Owner's Representative, Architect, and Contractor of observed irregularities or non-conformance of work or products.
 5. Perform additional tests and inspections required by Architect and Construction Manager.
 6. Attend preconstruction meetings and progress meetings.
 7. Submit reports of all tests or inspections specified within maximum of one (1) week.
- B. Limits on Testing or 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. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Owner's Representative and Architect.
- D. Contractor will pay for re-testing required because of non-compliance with specified requirements.

3.10 CONTRACTOR DUTIES AND RESPONSIBILITIES

- A. Contractor Responsibilities, General:
 1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
 2. Cooperate with agency and laboratory personnel; provide access to the work, to manufacturers' facilities, and to fabricators' facilities.
 3. Provide incidental labor and facilities:
 - a. To provide access to work to be tested or inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
 - c. To facilitate tests or inspections.
 - d. To provide storage and curing of test samples.
 4. Notify Owner's Representative and laboratory 24 hours prior to expected time for operations requiring testing or inspection services.
 5. Arrange with Owner's Representative pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- B. Contractor Responsibilities, Seismic Force-Resisting Systems: Submit written statement of responsibility for each item listed to Owner's Representative prior to starting work. Statement of responsibility shall acknowledge awareness of special construction requirements and other requirements listed.

3.11 MANUFACTURERS' AND FABRICATORS' FIELD SERVICES

- A. When specified in individual specification sections, require material suppliers, assembly fabricators, or product manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, to test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Owner's Representative and Architect 30 days in advance of required observations.
 - 1. Observer subject to approval of Owner's Representative and Architect.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

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.
- B. General Construction – Site Work contractor responsible to control storm water during work on site drainage to prevent damage to building.

1.04 TEMPORARY SANITARY FACILITIES

- A. General Construction – Interior: to 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. On-site parking will not be available during the school year until after school hours and no parking on site will be available during the summer.

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 5713
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Prevention of erosion due to construction activities.
- B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.
- C. Restoration of areas eroded due to insufficient preventive measures.
- D. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Erosion and Sedimentation Control Plan:
 - 1. Include:
 - a. Site plan identifying soils and vegetation, existing erosion problems, and areas vulnerable to erosion due to topography, soils, vegetation, or drainage.
 - b. Site plan showing grading; new improvements; temporary roads, traffic accesses, and other temporary construction; and proposed preventive measures.
 - c. Schedule of temporary preventive measures, in relation to ground disturbing activities.
 - d. Other information required by law.
 - e. Format required by law is acceptable, provided any additional information specified is also included.
 - 2. Obtain the approval of the Plan by authorities having jurisdiction.
 - 3. Obtain the approval of the Plan by Owner.
- C. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Bales: Air dry, rectangular straw bales.
 - 1. Cross Section: 14 by 18 inches, minimum.
 - 2. Bindings: Wire or string, around long dimension.
- B. Bale Stakes: One of the following, minimum 3 feet long:
 - 1. Steel U- or T-section, with minimum mass of 1.33 lb per linear foot.
 - 2. Wood, 2 by 2 inches in cross section.
- C. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
 - 1. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D4751.
 - 2. Permittivity: 0.05 sec^{-1} , minimum, when tested in accordance with ASTM D4491.
 - 3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355 after 500 hours exposure.
 - 4. Tensile Strength: 100 lb-f, minimum, in cross-machine direction; 124 lb-f, minimum, in machine direction; when tested in accordance with ASTM D4632.
 - 5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632.
 - 6. Tear Strength: 55 lb-f, minimum, when tested in accordance with ASTM D4533.
 - 7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.
- D. Silt Fence Posts: One of the following, minimum 5 feet long:

1. Steel U- or T-section, with minimum mass of 1.33 lb per linear foot.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

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

3.03 SCOPE OF PREVENTIVE MEASURES

- A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.
- B. Construction Entrances: Traffic-bearing aggregate surface.
 1. Width: As required; 20 feet, minimum.
 2. Length: 50 feet, minimum.
 3. Provide at each construction entrance from public right-of-way.
 4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.
- C. Linear Sediment Barriers: Made of silt fences.
 1. Provide linear sediment barriers:
 - a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
 2. Space sediment barriers with the following maximum slope length upslope from barrier:
 - a. Slope of Less Than 2 Percent: 100 feet..
 - b. Slope Between 2 and 5 Percent: 75 feet.
 - c. Slope Between 5 and 10 Percent: 50 feet.
 - d. Slope Between 10 and 20 Percent: 25 feet.
 - e. Slope Over 20 Percent: 15 feet.
- D. Storm Drain Curb Inlet Sediment Trap: Protect each curb inlet using one of the following measures:
 1. Filter fabric wrapped around hollow concrete blocks blocking entire inlet face area; use one piece of fabric wrapped at least 1-1/2 times around concrete blocks and secured to prevent dislodging; orient cores of blocks so runoff passes into inlet.
 2. Straw bale row blocking entire inlet face area; anchor into pavement.
- E. Storm Drain Drop Inlet Sediment Traps: Cover inlet with drainage fabric and 1x1"light gage, metal wire fabric, or as detailed on drawings.
- F. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.
- G. Soil Stockpiles: Protect using one of the following measures:
 1. Cover with polyethylene film, secured by placing soil on outer edges.
 2. Cover with mulch at least 4 inches thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches of straw or hay.
- H. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
- I. Temporary Seeding: Use where temporary vegetated cover is required.

3.04 INSTALLATION

- A. Traffic-Bearing Aggregate Surface:
 1. Excavate minimum of 6 inches.
 2. Place geotextile fabric full width and length, with minimum 12 inch overlap at joints.
 3. Place and compact at least 6 inches of 1.5 to 3.5 inch diameter stone.
- B. Silt Fences:
 1. Store and handle fabric in accordance with ASTM D4873.

2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch high barriers with minimum 36 inch long posts spaced at 6 feet maximum, with fabric embedded at least 4 inches in ground.
 3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 28 inch high barriers, minimum 48 inch long posts spaced at 6 feet maximum, with fabric embedded at least 6 inches in ground.
 4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20 feet, use nominal 32 inch high barriers with woven wire reinforcement and steel posts spaced at 4 feet maximum, with fabric embedded at least 6 inches in ground.
 5. Install with top of fabric at nominal height and embedment as specified.
 6. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches, with extra post.
 7. Fasten fabric to steel posts using wire, nylon cord, or integral pockets.
 8. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches high with post spacing not more than 4 feet.
- C. Straw Bale Rows:
1. Install bales in continuous rows with ends butting tightly, with one bale at each end of row turned uphill.
 2. Install bales so that bindings are not in contact with the ground.
 3. Embed bales at least 4 inches in the ground.
 4. Anchor bales with at least two stakes per bale, driven at least 18 inches into the ground; drive first stake in each bale toward the previously placed bale to force bales together.
 5. Fill gaps between ends of bales with loose straw wedged tightly.
 6. Place soil excavated for trench against bales on the upslope side of the row, compacted.

3.05 MAINTENANCE

- A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall.
- B. Repair deficiencies immediately.
- C. Silt Fences:
1. Promptly replace fabric that deteriorates unless need for fence has passed.
 2. Remove silt deposits that exceed one-third of the height of the fence.
 3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- D. Straw Bale Rows:
1. Promptly replace bales that fall apart or otherwise deteriorate unless need has passed.
 2. Remove silt deposits that exceed one-half of the height of the bales.
 3. Repair bale rows that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- E. Place sediment in appropriate locations on site; do not remove from site.

3.06 CLEAN UP

- A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Engineer.
- B. Clean out temporary sediment control structures that are to remain as permanent measures.
- C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Section, apply to this Section.

1.2 SUMMARY

- A. Manufacturers: Provide products from one manufacturer for each type or kind as applicable. Provide secondary materials as acceptable to manufacturers of primary materials.
- B. Product Selection: Provide products selected or equal approved by Architect. Products submitted for substitution shall be submitted with complete documentation, and include construction costs of substitution including related work.
- C. Substitutions: Request for substitution must be in writing. Conditions for substitution include:
 - 1. An "or equal" phrase in the specifications.
 - 2. Specified material cannot be coordinated with other work.
 - 3. Specified material is not acceptable to authorities having jurisdiction.
 - 4. Substantial advantage is offered to the Owner in terms of cost, time, or other valuable consideration.
- D. Substitution Requests: Substitutions shall be submitted prior to award of contract, unless otherwise acceptable. Approval of shop drawings, product data, or samples containing substitutions is not an approval of a substitution unless an item is clearly presented as a substitution at the time of submittal.

PART 2 - PRODUCTS - NOT APPLICABLE TO THIS SECTION

PART 3 - EXECUTION - NOT APPLICABLE TO THIS SECTION

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. East Ramapo CSD 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 East Ramapo CSD.
- 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 7310

MOVING

1. The work of this section covers packing and moving all materials in the classrooms scheduled for renovations. This work is part of the General Construction contract.
2. The work consists of furnishing: supervision, all labor, trucking, hand trucks, rubber tire dollies, cartons, blankets, insulation, tags, labels and other equipment and materials necessary for the move. All furniture, equipment, apparatus, cases, cartons and other property of the School shall be removed and relocated to a location within the school and put back in the rooms after the renovations are complete.
3. The Contractor will be required to disassemble and reassemble as necessary.
4. The School will pack and unpack only the contents of personal offices and/or desks including general office supplies. The contractor will provide 600 cartons, packing tape and one dispenser per classroom for the school personnel to pack the desk materials by May 1, 2020.

All appliances which are fastened to desks or other office fixtures are to be removed by the Contractor prior to the move and re-fastened by the Contractor after the move, as may be directed by representatives of the School.

Certain preparatory work, such as the positioning of cartons and other materials and equipment and the dismantling and re-erection of shelving may be accomplished prior to the commencement time provided, however, that arrangements to that effect are agreed upon with the School representative.

5. The Contractor shall be required to be familiar with prevailing market conditions and shall take all reasonable steps to avoid or settle labor disputes which may tend to delay or adversely affect the performance of the contract.
6. The successful bidder agrees to comply with and does hereby agree to accept the following conditions:
 - A. Each bidder must inform him/herself by personal examination of the specifications and location of the proposed services and such other means as may be selected of the character, quality and extent of service to be performed and the conditions under which the work is to be executed, including a definite understanding of all requirements relating to building facilities, elevator service and such other services as may be required in all buildings connected with the moving operation.
 - B. The School will make no allowance or concession to a bidder for any alleged misunderstanding or misinformation relating to quantity, character, location, or extent of service to be performed, or other conditions.
 - C. The Base Bid shall cover the cost of furnishing all services, materials and equipment required for the proper and efficient conduct of the move, to the satisfaction of the School's representatives, in strict accordance with the specifications and pursuant to the contract therefore.
7. The successful bidder shall be responsible for all damages to floors, walls, and other property and shall use all necessary precautions to save the same from damage. All equipment and personnel used for moving purposes shall be subject to the approval of the School and the School reserves the right to bar and deny the use of any equipment for or bar any personnel from performance of the contract within its judgment that may cause damage to the buildings or their facilities.

If any School owned or School-controlled property is lost or damaged during the performance of the contract, the Contractor shall be responsible to the School for the full amount of such loss or damage and

the School, at its option, may in lieu of payment therefore, require the Contractor to replace at his/her expense all property lost or damaged.

The Contractor in company with a representative of the School shall inspect all property prior to the start of the move to satisfy him/herself as to its condition and at the same time shall record any existing damage, which must be certified to by the representative.

The Contractor shall, prior to the start of the move, inspect the building at both origin and destination and call to the attention of the representative or his/her designee any existing damage to the premises.

8. No oral statements of any personnel shall modify or otherwise effect the terms, conditions or specifications noted herein or in the contract for the service.
9. The School reserves the right to stop the services under the contract at any time upon determination of the School at its sole discretion that the Contractor is unable or incapable of performing the service to the satisfaction of the School, and in the event of such stoppage, the School shall have the right to arrange for completion of the service in such manner as it may deem advisable.
10. The successful bidder agrees that without expense to the School he/she will procure and maintain in effect, until completion of the work covered by this proposal, insurance of the kinds and in the amounts hereinafter provided by insurance companies authorized to do business in the School of New York, covering all operations under this proposal whether performed by the bidder or by a subcontractor. Before commencing work the successful bidder shall furnish the School a certificate or certificates in form satisfactory to the School showing that he/she has complied with the requirements of this section, which certificate or certificates shall state that the policies shall not be changed or canceled until ten days written notice has been given by the Contractor to the School. The kinds and amounts of insurance required as a condition to performance are as follows:
 - A. Worker's Compensation - Statutory
 - B. Contractor's Comprehensive General Liability & Property Damage Insurance
 - Bodily Injury Liability
\$ 500,000 each person
\$1,000,000 each occurrence
\$1,000,000 aggregate
 - Property Damage Liability
\$ 500,000 each occurrence
\$1,000,000 aggregate
 - C. Automobile Liability & Property Damage Insurance
 - Bodily Injury
\$ 250,000 each person
\$ 500,000 each accident
 - Property Damage
\$ 100,000 each accident
 - D. Contractor's Liability Insurance policies shall specify full replacement value.
 - E. Contractor's Liability Insurance issued to and covering the liability of the successful bidder with respect to all work performed under the contract.

- F. Contractor's Liability Insurance issued to and covering the liability of each subcontractor with respect to all work under the contract performed by said Contractor under the contract.
 - G. Contractor's Liability Insurance issued to and covering the liability of the successful bidder with respect to all work under the contract performed for the successful bidder by subcontractors.
 - H. Protective Liability Insurance issued to and covering the liability of the People of the School of New York, its officers and employees, with respect to all operations under the contract by the successful bidder and his/her subcontractors, including omissions and supervisory acts of the School, its officers and employees.
- 11. Contractor must provide sufficient labels so each box and piece of furniture can be labeled with the room location it is to be moved to. Labeling scheme will be by mutual agreement (i.e. location of labels, color coding etc.) Labels will be of such type to be removed without causing damage to items labeled.
 - 12. All items will be placed in containers and the containers stored in a location off site designated by the District. Each container will have an inventory of the materials in the container and a list of what space where the materials in the container were located.
 - 13. Full files that are moved will not be tipped, etc. so that the contents will not be spilled from file folders inside the cabinet. The School will have the final determination as to the proper method of moving files so as to not disturb the contents.
 - 14. All packing of boxes (with the exception of the contents of personal offices and/or desks including general office supplies) and labeling of furniture, etc. will be done by Contractor personnel.
 - 15. Bidder certifies that sufficient personnel and equipment will be available to conduct the move as described by the specifications without interruption or delay and is prepared to submit a statement of available personnel and equipment upon request of the School.
 - 16. Bidder's attention is drawn to the full replacement insurance requirements. All School property including but not limited to electronic equipment, computers, lab equipment, etc. must be insured for full replacement cost.

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 7330
SELECTIVE REMOVALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF WORK:

- A. Location of selective removal work is indicated on drawings only in a general manner and it is not all inclusive in the overall scope of removal work. The Contractor shall provide all inclusive removals required for new and renovated work.
 - 1. The Contractor will be responsible for all related removals and re-work of the existing systems, as required for new work.

1.03 SUMMARY

- A. This Section includes but is not limited to the following:
 - 1. Demolition and removals of trees, the fuel tank and related equipment and site finishes.

1.04 RELATED SECTIONS

- A. Section 01 4000 - Quality Requirements: Testing and inspection procedures
- B. Section 01 5000 - Temporary Facilities and Controls
- C. Section 01 7419 - Construction Waste Management and Disposal
- D. Section 01 7329 - Cutting and Patching

1.05 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvages, or removed and reinstalled.
 - 1. Protect construction indicated to remain against damage and soiling during selective removals.
- C. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished shall become Contractor's property and shall be removed from the Project site.
- D. Removal and Reinstall: Each items from existing construction, prepare them for reuse, and reinstall them where indicated.

1.06 SUBMITTALS

- A. Schedule of selective removals Activities: Indicate the following:
 - 1. Detailed sequence of selective removals and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.07 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective removals. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI A10.6 and NFPA 241.
- C. Pre demolition Conference: Conduct conference at Project site to comply with requirements in Section 01 3000 "Administrative Requirements". Review methods and procedures related to selective removals, including, but not limited to the following:
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective removals schedule and verify availability of materials, demolitions, personnel equipment and facilities needed to make progress and avoid delays.

1.08 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective removals area. Conduct selective removals so Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
 - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
 - 2. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.
- B. Owner assumes no responsibility for condition of areas to be selectively demolished.

1.09 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective removals, by methods and with materials so as not to void existing warranties.
 - 1. Existing roofing is under warranty. Remove material by sub-contractors authorized and approved by manufacturer.

PART 2 - PRODUCTS

2.01 REPAIR MATERIALS

- A. Use repair materials identical to existing materials.
 - 1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 2. Use materials whose installed performance equals or surpasses that of existing materials.
 - 3. Comply with material and installation requirements specified in individual Specification Sections.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Survey existing conditions and correlate with requirements indicated to determine extent of selective removals required.
- B. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Engineer.

3.02 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective removals and debris removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- B. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- C. Protect existing site improvements, appurtenances, and landscaping to remain.
- D. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- E. Provide protection to ensure safe passage of people around selective removals area and to and from occupied portions of building.
- F. Provide temporary weather protection, during interval between selective removals of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

3.03 POLLUTION CONTROLS

- A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
- B. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- C. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.

- D. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- E. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective removals operations. Return adjacent areas to condition existing before selective removals operations began.

3.04 SELECTIVE REMOVALS

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Locate selective removals equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 2. Dispose of demolished items and materials promptly.
 - 3. Existing Facilities: Comply with Owner's requirements for using and protecting elevators, stairs, walkways, loading docks, building entries, and other building facilities during selective removals operations.
 - 4. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective removals. When permitted by Architect, items may be removed to a suitable, protected storage location during selective removals, cleaned, and reinstalled in their original locations after selective removals operations are complete.
 - 5. Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to applicable Division 7 Section for roofing requirements.

3.05 PATCHING AND REPAIRS

- A. General: Promptly repair damage to adjacent construction caused by selective removals operations.
 - 1. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
 - 2. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to manufacturer's written recommendations.
 - 3. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.
 - 4. Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.

3.06 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.07 CLEANING

- A. Sweep the building broom clean on completion of selective removals operation.

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 78 00
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.
- C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
 - 1. Finishes, including flooring, wall finishes, ceiling finishes.
 - 2. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

- A. Section 01 7800 - Closeout Submittals: Operation and maintenance manuals.
- B. Other Specification Sections: Additional requirements for demonstration and 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.
 - 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 as 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 the 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 the 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 7800 - Closeout Submittals: Scope and procedures for operation and maintenance manuals and project record documents.

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 Engineer; in that case, submit to Engineer 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 Engineer are approved, submit copy of approved submittal to the Commissioning Authority.
- B. Manufacturers' Instructions: Submit copies of all manufacturer-provided instructions that are shipped with the equipment as soon as the equipment is delivered.
- C. Product Data: If submittals to Engineer 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. Factory test reports.
 - 5. Warranty information, including details of Owner's responsibilities in regard to keeping warranties in force.
- 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 and resolution of plus/minus 0.1 degree F.
 - 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 will prepare 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 his 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 the 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 the 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 the 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 the Contract Documents; where Functional Test procedures are not included in the Contract Documents, test procedures will be determined by the Commissioning Authority with input by and coordination with Contractor.
- 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 pressure sensors and gages, and all actuators (dampers and valves).
- B. 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 pressure difference, make sure they are equal to 2 percent of the reading, of each other.
 4. Tolerances for critical applications may be tighter.

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 78 00 - Closeout Submittals for additional requirements.
- B. Add design intent documentation furnished by Engineer 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 02 4100
DEMOLITION AND SELECT REMOVALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary and Scope of Work: Limitations on Contractor's use of site and premises.
- B. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 02 6500 - Underground Storage Tank Removal.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

PART 3 EXECUTION

2.01 SCOPE

- A. Remove underground tanks that contain or once contained petroleum products.
- B. Remove boilers indicated on plans.
- C. Remove HVAC equipment indicated on plans.
- D. Remove plumbing equipment indicated on plans.
- E. Remove electrical equipment indicated on plans.

2.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 3. Provide, erect, and maintain temporary barriers and security devices.
 - 4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 6. Do not close or obstruct roadways or sidewalks without permit.
 - 7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Protect existing structures and other elements that are not to be removed.
 - 1. Provide bracing and shoring.
 - 2. Prevent movement or settlement of adjacent structures.
 - 3. Stop work immediately if adjacent structures appear to be in danger.
- D. Underground Storage Tanks: Remove and dispose of as specified in Section 02 6500.

2.03 EXISTING UTILITIES

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

2.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from other areas that are still occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction indicated on drawings 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.
- D. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on drawings.
- E. Services (Including but not limited to HVAC, Plumbing, and Electrical): Remove existing systems and equipment as indicated.
 - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
 - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - 3. Verify that abandoned services serve only abandoned facilities before removal.
 - 4. 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.
- 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.
 - 4. Patch as specified for patching new work.

2.05 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Remove from site all materials not to be reused on site.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 02 8070
SUMMARY OF WORK ASBESTOS ABATEMENT

PART 1 - GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Scope of Work is as defined on the HM Series Drawing(s).
- B. Asbestos containing materials to be removed include the following:
 - 1. Gypsum/Joint Compound
 - 2. Thermal Insulation (In wall chases)
 - 3. Concrete Slab under Wood Flooring
 - 4. Floor Tile
 - 5. Chalkboard/Tackboard Mastic
- C. In addition, the Boiler(s) are to be demolished and disposed of by the Abatement Contractor. The Abatement work is part of the Mechanical Contract.

1.02 CONTRACTS

- A. Division of Work
 - 1. Asbestos Abatement Contractor
 - a. Perform Work required and as specified in the following specification sections and divisions: Divisions 00 through 02.
 - b. Perform Work required and indicated on the following drawings: HM Series Drawings
 - 2. The above listing of drawings and specifications is intended as a guide and does not relieve the Contractors of the responsibility of reviewing all drawings and specifications for bidding and coordinating with others during the construction period. Review Contract Documents before submitting proposals.

1.03 WORK BY OTHERS

- A. Work on the project site which will be executed prior to the start of the Work of this Contract, and which is excluded from this Contract, is as follows:
 - 1. None
- B. Work on the project site which will be executed after completion of the Work of this Contract, and which is excluded from this Contract, is as follows:
 - 1. None

1.04 DESCRIPTION OF WORK

- A. The Work specified herein shall be the removal of asbestos containing materials by competent persons trained, knowledgeable, and qualified in the techniques of abatement, handling, and disposal of asbestos containing and asbestos contaminated materials and the subsequent cleaning of contaminated areas, who comply with all applicable federal, state, and local regulations and are capable of and willing to perform the Work of this Contract.
- B. The Contractor shall supply labor, materials, services, insurance, permits, and equipment necessary to carry out the Work in accordance with all applicable federal, state, and local regulations and these specifications.
- C. The Contractor is responsible for restoring the Work area and auxiliary areas utilized during the abatement to conditions equal to or better than original. Damages caused during the performance of abatement activities shall be repaired by the Contractor (e.g., paint peeled off by barrier tape, nail holes, water damage, broken glass) at no additional expense to the Owner.

1.05 WORK SEQUENCE

- A. Construct Work in stages to accommodate the Owner's use of the premises during the construction period. Coordinate construction schedule with the Engineer.
- B. Construct Work in stages to provide for public convenience.

1.06 PARTIAL OWNER OCCUPANCY

- A. The Owner will occupy the existing building during the construction period and will maintain normal operations. The Owner will cooperate with the Contractor to facilitate the continuity and the progress of the Work. Cooperate with the Owner by minimizing the disturbance of the Owner's activities in spaces adjacent to the construction Work.
- B. Protect the occupants against hazards of the asbestos abatement and other construction operations and also provide access to Owner-occupied spaces. If elimination of access to any occupied space becomes necessary, it shall occur only after advance notice and special arrangements with the Owner.
- C. Provide necessary barricades, temporary partitions, other separations, and closures to protect the occupants of the building from harm or injury due to the construction operations, to restrict occupancy of construction areas to construction workers, and to prevent dust and debris caused by construction activities from entering Owner-occupied spaces.

1.07 COORDINATION

- A. The Contractor shall work with the others at the job site to maintain continuity of Work in accordance with the project schedule. The Contractor must cooperate to the maximum extent with the other Contractors to facilitate the execution of their Work. Timely notice of change in the Contractor's schedule shall be given to the others and to the Engineer so that all operations may be rescheduled or modified as required.
- B. In case of conflicts occurring because of failure to abide by the requirements of the above paragraph, the Engineer's decision will be final, and no extra compensation will be awarded for extra work caused by failure to follow the above requirements.
- C. The Owner or his representative shall have the right to stop the work immediately if the Contractor does not adhere to the specifications contained herein. Such notice can be verbal or in writing. If a verbal order is given, a written order must follow.

1.08 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

- A. The lists of equipment, tabulations of data measurements, and schedules appearing in the specifications or drawings are included only for the assistance and guidance of the Contractor in arriving at a more complete understanding of the intended installation. They are not intended, or to be construed, as relieving the responsibility of the Contractor in making his own takeoff.

1.09 ABBREVIATIONS AND SYMBOLS

- A. Contractor is expected to be familiar with the standard abbreviation symbols used in the Contract Documents. Inform the Engineer, in writing, of any unclear or unknown abbreviation or symbol prior to the Bid Date. Unless notified, the Engineer will assume that the Contractor is fully familiar with all such items and can execute his Work accordingly.

1.10 PROTECTION OF EXISTING BUILDING AND GROUNDS

- A. Provide protection to prevent damage to building, both interior and exterior, during construction operations.
- B. Repair damage to building and grounds to satisfaction of the Owner.

1.11 PROTECTION OF EQUIPMENT AND MATERIALS

- A. Assume full and complete responsibility for protection and safe-keeping of his products and equipment stored at project location.

1.12 PROTECTION OF UTILITIES

- A. Provide and maintain adequate protection for existing utilities. Repair such Work damaged during construction to the satisfaction of the Engineer.

1.13 ASBESTOS PROJECT MONITOR

- A. Perform work only when the Asbestos Project Monitor is on site unless otherwise instructed in writing by the Engineer.

- B. Perform work only during the hours of work established at the Pre-Construction Meeting or as approved in writing by the Engineer at least 24 hours in advance of the change. This will allow the Asbestos Project Monitor to monitor the Work in progress.

NOTE: THE CONTRACTORS ARE HEREBY NOTIFIED THAT IN THE EVENT THE CONTRACTORS, THEIR EMPLOYEES OR SUBCONTRACTORS ENCOUNTER A MATERIAL OR CONDITION WHICH IS UNKNOWN OR WHICH MAY BE SUSPECTED TO CONTAIN ASBESTOS OR OTHER HAZARDOUS MATERIAL, THE CONTRACTOR WILL NOT DISTURB THE MATERIAL, BUT SHALL STOP WORK IN THAT AREA AND NOTIFY THE OWNER IN WRITING IMMEDIATELY OF THE CONDITION OR MATERIAL.

END OF SECTION

SECTION 02 8071
ASBESTOS REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. All Work under this Contract shall be done in strict accordance with all applicable federal, state, and local regulations, standards, and codes governing asbestos abatement and any other trade work done in conjunction with the abatement.
- B. The most recent edition of any relevant regulation, standard, document, or code shall be applicable to the Work. Where conflict among the requirements or with these specifications exists, the most stringent requirements are applicable.
- C. Copies of all standards, regulations, codes, and other applicable documents and subsequent amendments thereto, listed in this section and including this specification, shall be available at the work site in the clean change area of the worker decontamination system.

PART 2 - SPECIFIC REQUIREMENTS

2.01 OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

- A. OSHA regulations governing asbestos abatement include, but are not limited to:
 - 1. Title 29 CFR 1926.1101, Occupational Exposure to Asbestos Construction Standard.
 - 2. Title 29 CFR 1910.1001, General Industry Standard for Asbestos.
 - 3. Title 29 CFR Section 1910.134, General Industry Standard for Respiratory Protection.
 - 4. Title 29 CFR Section 1910.20, Access to Employee Exposure and Medical Records.
 - 5. Title 29 CFR Section 1910.1200, Hazard Communication.
 - 6. Title 29 CFR Section 1910.145, Specifications for Accident Prevention Signs and Tags.
 - 7. Title 29 CFR Section 1910.95, Noise Regulation.

2.02 ENVIRONMENTAL PROTECTION AGENCY (EPA)

- A. EPA regulations governing asbestos abatement include, but are not limited to:
 - 1. Title 40 CFR Part 61, Subparts A and M, National Emission Standard for Asbestos.
 - 2. Title 40 CFR Part 763, Subpart G, Asbestos Abatement Project.
 - 3. Title 40 CFR Part 763, Asbestos-Containing Materials in Schools, Final Rule and Notice.

2.03 AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- A. ANSI standards governing asbestos abatement include, but are not limited to:
 - 1. Fundamentals Governing the Design and Operation of Local Exhaust Systems, Publication 29.2-79.
 - 2. Practices for Respiratory Protection, Publication Z88.2-80.

2.04 COMPRESSED GAS ASSOCIATION (CGA)

- A. Pamphlet G-7, "Compressed Air for Human Respiration" and Specification G-7.1, "Commodity Specification for Air."

2.05 MINE SAFETY AND HEALTH ADMINISTRATION (MSHA)

- A. Certification of respirators as per 30 CFR Part 11.

2.06 NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

- A. NIOSH regulations governing asbestos abatement include, but are not limited to:
 - 1. A guide to respiratory protection for the asbestos abatement industry.
 - 2. Approval of respirators as per 30 CFR Part 11.
 - 3. Standards for analysis of air samples.

2.07 CANADIAN STANDARD ASSOCIATION

- A. Standard Z180.1-1978, "Compressed Breathing Air."

2.08 AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- A. Standard Guide for Visual Inspection of Asbestos Abatement Projects.

2.09 NEW YORK STATE REQUIREMENTS

- A. State regulations governing asbestos abatement include, but are not limited to:
 - 1. New York State Department of Environmental Conservation (NYSDEC), Title 6 NYCRR, Part 360 and 364, The New York State Hazardous Waste Management Regulations.
- B. Part 56 of Title 12 of the Official Compilation of Codes, Rules and Regulations.
- C. Chapter II: Title 10, Part 73 of the New York Code of Rules and Regulations: Asbestos Safety Program Requirements.
- D. New York State Education Department regulations effective September 30, 1999.

2.10 LICENSES

- A. Maintain current licenses as required by applicable state or local jurisdictions for the removal, transportation, disposal, or other regulated activity relative to the Work of this Contract.

2.11 NEW AND AMENDED REGULATIONS

- A. Any and all new or amended federal, state, or local regulations becoming effective during this project and not listed are to be considered as part of this specification.

2.12 NOTICES

- A. USEPA: Send written notification in accordance with 40 CFR Part 61.146 to the Regional Asbestos Contact responsible for the enforcement of the National Emission Standard for Asbestos at least ten (10) days prior to the commencement of any on-site project activity. Send notification to the following address:

Region 2
Asbestos NESHAPS Contact
Air and Waste Management Division
USEPA
26 Federal Plaza
New York, New York 10007

- B. NYS Department of Labor: Send written notification in accordance with Part 56 of Title 12 to the Asbestos Control Bureau of the NYS Department of Labor's Division of Safety and Health. Use forms provided by the Department of Labor.

END OF SECTION

SECTION 02 8073

ASBESTOS ABATEMENT SUBMITTALS

PART I - GENERAL

1.01 DESCRIPTION

- A. Related Requirements Specified Elsewhere
 - 1. Testing Laboratory Services: Section 02 8074
- B. Schedule submittals to be presented at the pre-construction meeting. Indicate items where additional time is needed and on what dates they will be submitted. The dates indicated for each submittal shall take into account the lead time required for ordering and fabricating of the various items.

1.02 SUBMISSION REQUIREMENTS

- A. Pre-contract Submittals. Within three days after bids are opened, the three apparent low bidders shall be required to submit the following documentation:
 - 1. Resume: Shall include the following:
 - a. Contractor license issued by New York State Department of Labor.
 - b. The number of years engaged in asbestos removal.
 - c. Provide a list of projects performed within the past two years and include the dollar value of all projects. Provide project references to include owner, consultant, and air monitoring firms' name, contact person, address, and phone number.
 - d. A list of owned equipment available to be used in the performance of the project.
 - e. An outline of the worker training course and medical surveillance program conducted by the contractor.
 - f. A standard operating procedures manual describing work practices and procedures, equipment, type of decontamination facilities, respirator program, special removal techniques, etc.
 - g. Documentation to the satisfaction of the Owner attesting to the contractor's financial resources available to perform the project. Such data shall minimally include the firm's balance sheet for the last fiscal year.
 - 2. Citations/Violations/Legal Proceedings
 - a. Submit a notarized statement describing any citations, violations, criminal charges, or legal proceedings undertaken or issued by any law enforcement, regulatory agency, or consultant concerning performance on previous abatement contracts. Briefly describe the circumstances citing the project and involved persons and agencies as well as the outcome of any actions.
 - b. Answer the question: "Has your firm or its agents been issued a Stop Work Order on any project within the last two years?" If "Yes", provide details as discussed above.
 - c. Answer the question: "Are you now, or have you been in the past, a party to any litigation or arbitration arising out of your performance on asbestos abatement contracts?" If "Yes", provide details as discussed above.
 - d. Describe any liquidated damages assessed within the last two years.
 - 3. Preliminary Schedule
 - a. Provide an estimate of manpower to be utilized and the time required for completion of each major work area. Include the size and number of crews and work shifts.
- B. Prior to Commencement of Work, Owner will:
 - 1. Submit to the Contractor results of pre-abatement air sampling (if conducted) including location of samples, names of the Air Sampling Professional, equipment utilized, and method of analysis.
 - 2. Document that Owner's employees who will be required to enter the work area during abatement have received required training.
- C. Prior to Commencement of Work, Contractor shall:
 - 1. US EPA: Provide Owner with a copy of the notice to the Asbestos NESHAPS Contact of the EPA as per Section 02 8071.
 - 2. 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.

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. Provide Owner with a copy of the notice to the Asbestos Enforcement Division of the NYSDEC.
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.
5. Submit to the Owner shop drawings for layout and construction of decontamination enclosure systems and barriers for isolation of the work area as detailed in Section 028081 of this specification and required by applicable regulations.
6. 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.
7. Submit manufacturer's certification that HEPA vacuums, negative pressure ventilation units, and other local exhaust ventilation equipment conform to ANSI Z9.2-79.
8. When rental equipment is to be used in abatement areas or to transport asbestos-contaminated waste, a written notification concerning intended use of the rental equipment must be provided to the rental agency with a copy submitted to the Owner.
9. Provide a copy of the respiratory program required in 29 CFR 1910.134 (b), (d), (e), and (f). Include manufacturer certification of HEPA filtration capabilities for all cartridges and filters.
10. Submit a copy of the firm's asbestos handling license.
11. Submit the name, address, contact person and the ELAP approval number for the laboratory utilized for the analysis of the Contractor's OSHA monitoring.
12. Progress Schedule:
 - a. Show the complete sequence of construction by activity and the sequencing of work within each building or section of the work.
 - b. Show the dates for the beginning and completion of each major element of work including substantial completion dates for each work area, building, or phase.
 - c. Show projected percentage of completion for each item, as of the first day of each month.
 - d. Show final inspection dates.
13. Abatement Work Plan: Provide plans which clearly indicate all work areas (numbered sequentially) including the locations and types of all decontamination chambers, entrances and exits to the work area, type of abatement activity/technique, number and location of negative air units and exhaust including calculations, and the proposed location and construction of storage facilities and field office.
14. Samples: Submit samples of warning notices to be posted, catalog descriptions of protective clothing, replacement materials, etc.
15. Worker Training and Medical Surveillance: The Contractor shall submit a list of the persons who will be employed by him and his subcontractors in the removal work. Present evidence that workers have received proper training required by the regulations and the medical examinations required by OSHA 29 CFR 1926.1101.
16. Logs: Specimen copies of daily progress log, visitor's log, and disposal log.
17. Material List: A complete materials list of all items proposed to be furnished and used under this contract.
18. Subcontractors List: The prime contractor shall submit a list of all subcontractors to be used on the project.
19. Material Safety Data Sheets (MSDS): Submit copies of MSDS for each chemical or material used for the project (encapsulant, surfactant, mastic remover, etc.)
20. Project Supervisor: Submit the resume of the proposed Project Supervisor.
21. Worker's Acknowledgments: Submit statements signed by each employee that the employee has received training in the proper handling of asbestos containing materials; understands the health

implications and risks involved; and understands the use and limitations of the respiratory equipment to be used.

- D. During abatement activities, Contractor shall:
1. 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.
 2. The Contractor will maintain worksite entry log books with information on worker and visitor access. The Asbestos Handling Certificates for all workers will be kept at the entrance to the work site or the certificates will be checked upon each entry by the Contractor. Copies will be provided to the Owner, Engineer, and Contractor.
 3. Submit logs documenting filter changes on respirators, HEPA vacuums, negative pressure ventilation units, and other engineering controls.
 4. Submit results of bulk material analysis and air sampling data collected during the course of the abatement including OSHA compliance air monitoring results.
 5. Submit results of materials testing conducted during the abatement for purposes of utilization during abatement activities (e.g., testing of encapsulant for depth of penetration and testing of substitute materials for adherence to encapsulated surfaces).
 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).
- E. Project Closeout Submissions:
1. Submit copies of all waste disposal manifests, seals, and disposal logs.
 2. Submit OSHA compliance air monitoring records conducted during the work.
 3. Submit copies of the daily progress log.
 4. Submit copies of the Visitor's log.
 5. Submit Certificate of Visual Inspection.
 6. Submit copies of any required Employee Statements such as Medical Examination Statement, Certificate of Worker's Release, or Employee Training Statement.

END OF SECTION

SECTION 02 8074

ASBESTOS TESTING QUALITY CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Related Requirements Specified Elsewhere
 - 1. Asbestos Abatement Submittals: Section 02 8073
 - 2. The Owner will obtain the services of a Project Monitor and analysis laboratory to constantly monitor airborne concentrations of asbestos throughout the course of the abatement project.
 - 3. Laboratory services, obtained by the Owner for bulk sampling, area air sampling, and clearance sampling, are to ensure that Contract provisions are met.
 - a. Results of Owner-procured tests will be made available to the Contractor. This act shall not be construed as relieving the Contractor of his obligations to provide materials and workmanship in accordance with pertinent regulations.
 - 4. Laboratory services obtained by the Contractor for personnel sampling shall comply with all pertinent regulations.
 - a. Forward copies of test results to the Owner as indicated in Section 02 8073.
 - 5. The air sampling to be done will be in accordance with an air sampling plan to be prepared by the Project Monitor and this specification. The plan will be approved by the Owner.

1.02 QUALITY ASSURANCE

- A. Pre-Work Airborne Fiber Counts
 - 1. The Owner will monitor the baseline fiber counts or those prevalent in the area before work begins using the NIOSH 7400 analytical procedure.
- B. Work Area Airborne Fiber Counts
 - 1. The Owner will monitor airborne fiber counts in the work area during the progress of the work through reviewing the personnel monitoring done by the contractor. The purpose of this air sampling will be to detect airborne fiber counts which may significantly challenge the ability of the work area isolation procedures to protect the balance of the building or outside of the building from contamination by airborne fibers.
- C. Work Area Clearance
 - 1. To determine if the elevated airborne fiber counts encountered during abatement operations have been reduced to an acceptable level, the Owner will sample and analyze air as per this Section using either Phase Contrast Microscopy (PCM) and/or Transmission Electron Microscopy (TEM).
- D. The Owner will be conducting air sampling throughout the course of the project.
- E. Fibers Counted
 - 1. PCM: "Airborne Fibers" referred to above include all fibers regardless of composition as counted in the NIOSH 7400 procedure.
 - 2. TEM: "Airborne Fibers" referred to above and to be analyzed using the method defined in 40 CFR Part 763.
- F. The laboratory utilized for analyzing air samples shall be satisfactory participants in the AIHA Proficiency Analytical Testing (PAT) program for asbestos analysis and shall be NYSDOH (New York State Department of Health) ELAP accredited.
- G. Laboratories used for bulk material identification shall be satisfactory participants in the EPA quality assurance program for bulk asbestos analysis and shall be NYSDOH ELAP accredited.
- H. The Project Monitor shall have a current Project Monitor certificate.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 TESTING LABORATORY SERVICES

- A. The Owner will obtain air and bulk sampling laboratory services by separate Contract. The laboratory will be independent of the abatement contractor.
- B. Personal Air Monitoring

1. In addition to the requirements of OSHA 1926.1101, the contractor shall be required to perform personal air monitoring every work shift, in each work area, during which abatement activities occur, in order to determine that appropriate respiratory protection is being utilized.
2. Results of the air monitoring shall be returned to the site, at least verbally, and posted no later than 24 hours following the time the sample was collected. Written results shall be returned to the site and posted no more than five days after the monitoring was performed.
3. Personal air samples shall be analyzed by a laboratory which holds certification by the New York State Department of Health's Environmental Laboratory Approval Program. The asbestos consultant must approve the laboratory the contractor intends to use.

3.02 RESPONSIBILITIES AND DUTIES OF CONTRACTOR

- A. To facilitate testing services, the Contractor shall:
1. Furnish to the laboratory such samples of materials as may be necessary for testing purposes.
 2. Advise the testing agency sufficiently in advance of operations to allow for completion of tests and for the assignment of personnel.
 3. Ensure the cooperation of the employees and superintendent with the Project Monitor.

3.03 ANALYTICAL METHODS

- A. The following methods may be used by the testing laboratory in analyzing filters used to collect air samples:
1. Cellulose ester filters will be analyzed using the NIOSH 7400 Method accounting rules.
 2. OR
 3. Polycarbonate filters with a pore size less than or equal to 0.4 microns or mixed cellulose ester having a pore size less than or equal to 0.45 microns will be analyzed using the method defined in 40 CFR Part 763, Appendix A to Subpart E.

3.04 SAMPLE VOLUMES

- A. General: The number and volume of air samples taken by the Owner will be in accordance with the following schedule. Sample volumes given may vary depending upon the analytical method used.
- B. Before the Start of Work
1. The Owner will secure the following air samples to establish a base line before the start of work.

LOCATION SAMPLED	MINIMUM NUMBER OF SAMPLES	FILTER MEDIA	DETECTION LIMIT (FIBERS/C.C.)	MINIMUM VOLUME (LITERS)	RATE LPM
EACH WORK AREA	5	CELLULOSE ESTER	0.01	1500	2-10
OUTSIDE EACH WORK AREA	5	CELLULOSE ESTER	0.01	1500	2-10
OUTSIDE BUILDING	2	CELLULOSE ESTER	0.01	1500	2-10
AT JOB SITE	2	CELLULOSE ESTER	0.01	0	0

- A. Base line is an action level by sample location and expressed in fibers per cubic centimeter which is the largest of the following:
1. Actual fiber concentration of the samples collected on cellulose ester filters for each work area.
 2. 0.01 fibers per cubic centimeter.
- B. Daily During Preparation

LOCATION SAMPLED	MINIMUM NUMBER OF SAMPLES	FILTER MEDIA	DETECTION LIMIT (FIBERS/C.C.)	MINIMUM VOLUME (LITERS)	RATE LPM
EACH WORK AREA	5	CELLULOSE ESTER	0.01	1500	2-10
OUTSIDE EACH WORK AREA	5	CELLULOSE ESTER	0.01	1500	2-10
OUTSIDE BUILDING	2	CELLULOSE ESTER	0.01	1500	2-10
AT JOB SITE	2	CELLULOSE ESTER	0.01	0	0

A. Daily During Abatement

- From the start of work building temporary enclosures until ready for clearance air monitoring, the laboratory will take the following samples on a daily basis.

LOCATION SAMPLED	MINIMUM NUMBER OF SAMPLES	FILTER MEDIA	DETECTION LIMIT (FIBERS/C.C.)	MINIMUM VOLUME (LITERS)	RATE LPM
OUTSIDE EACH WORK AREA *	4	CELLULOSE ESTER	0.01	1500	2-10
OUTSIDE BUILDING	1	CELLULOSE ESTER	0.01	1500	2-10
OUTPUT NEGATIVE PRESSURE SYSTEM		CELLULOSE ESTER	0.01	1500	2-10
AT JOB SITE		CELLULOSE ESTER	0.01	0	0

*** TWO (2) SAMPLES OUTSIDE THE WORK AREA BUT WITHIN TEN (10) FEET OF ISOLATION BARRIERS. TWO (2) SAMPLES AT LOCATION WITHIN TEN (10) FEET OF AND WITHIN THE ACTUAL ENVIRONMENT OF THE ENTRANCE EXIT OF THE PERSONNEL AND WASTE DECONTAMINATION ENCLOSURES.**

- If airborne fiber counts exceed allowed limits additional samples will be taken as necessary to monitor fiber levels.
- Clearance Air Monitoring
 - Air sample locations shall be the same as the locations of the samples collected before the start of work.
 - All air samples will be taken using aggressive sampling techniques as follows:
 - There are no standards available for flow rate of leaf blowers or large fans. However, this information is not critical to the success of the procedure.
 - Before sampling pumps are started, the exhaust from forced air equipment (leaf blower with at least 1 horsepower electric motor) will be swept against all walls, ceilings, floors, ledges and other surfaces in the room. This procedure will be continued for five minutes per 1,000 cubic feet of floor.
 - One 20 inch diameter fan per 10,000 cubic feet of room volume will be mounted in a central location at approximately 2 meters above floor, directed toward ceiling, and operated at low speed for the entire period of sample collection.
 - Air samples will be collected in areas subject to normal air circulation away from room corners, obstructed locations, and sites near windows, door, or vents.
 - After air sampling pumps have been shut off, fans will be shut off.

3. Schedule of Air Samples
 - a. General: The number and volume of air samples taken and analytical methods used by the Owner will be in accordance with the following schedule. Sample volumes given may vary depending upon the analytical instruments used.
4. Phase/Contrast Microscopy
 - a. In each homogeneous work area after completion of all cleaning work, a minimum of 13 samples will be taken and analyzed as follows:

LOCATION SAMPLED	MINIMUM NUMBER OF SAMPLES	FILTER MEDIA	DETECTION LIMIT (FIBERS/C.C.)	MINIMUM VOLUME (LITERS)	RATE LPM
Each Work Area	5	CELLULOSE ESTER	0.01	1500	2-10
Outside Work Area	5	CELLULOSE ESTER	0.01	1500	2-10
At Job Site	2	CELLULOSE ESTER	0.01	0	0
At Laboratory	1	CELLULOSE ESTER	0.01	0	0

- a. Analysis: Fibers on each filter will be measured using the NIOSH 7400 procedure accounting rules.
 - b. Split Sample: One work area sample will be split and both halves analyzed separately for duplicate analysis.
 - c. Satisfactory Clearance Air Monitoring Results: PCM clearance air monitoring is considered to be satisfactory only when every sample is <.01 f/cc unless otherwise directed by the Engineer.
5. Transmission Electron Microscopy
 - a. In each homogeneous work area after completion of all cleaning work, a minimum of 13 samples will be taken and analyzed as follows:

LOCATION SAMPLED	MINIMUM NUMBER OF SAMPLES	FILTER MEDIA	DETECTION LIMIT (FIBERS/C.C.)	MINIMUM VOLUME (LITERS)	RATE LPM
EACH WORK AREA	5	POLYCARBONATE (0.4 MICRONS) (37 MM) MIXED CELLULOSE ESTER (0.45 MICRONS) (25 MM)	0.05	2799 1199	2-10
OUTSIDE WORK AREA	5	POLYCARBONATE (0.4 MICRONS) (37 MM) MIXED CELLULOSE ESTER (0.45 MICRONS) (25 MM)	0.005	2799 1199	2-10
AT JOB SITE	3*	POLYCARBONATE (0.4 MICRONS) (37 MM) MIXED CELLULOSE ESTER (0.45 MICRONS) (25 MM)	0.005	0	0

3.05 LABORATORY TESTING

- A. Phase Contrast Microscopy
 - 1. The services of a testing laboratory will be employed by the Owner to perform laboratory analysis of the air samples. Samples will be sent daily by overnight mail so that verbal reports on air samples can be obtained within 24 hours. A complete record, certified by the testing laboratory, of all air monitoring tests and results, will be furnished to the Owner's Representative, the Owner, and the Contractor.
 - a. Written reports of all monitoring tests will be posted at the job site on a daily basis.
 - 2. The personnel monitoring done by the Contractor will be conducted in accordance with the standards outline in sub-paragraph 1 above.
- B. Transmission Electron Microscopy
 - 1. Samples will be sent by overnight courier for analysis by transmission electron microscopy. Verbal results will be available within one working day after receipt of sample by the laboratory. The laboratory must be capable of analyzing 13 such samples from this project at any one time. A complete record, certified by the testing laboratory, of all transmission electron microscopy results will be furnished to the Owner's Representative, the Owner, and the Contractor.

3.06 ADDITIONAL TESTING

- A. The Contractor may conduct his own air monitoring and laboratory testing. If he elects to do this, the cost shall be included in the Contract sum.
- B. If it is necessary to resample work areas for clearance testing because the area does not meet the release criteria, the Abatement Contractor will bear all costs for this additional sampling.
- C. If the Contractor does not adhere to the schedule and the Owner incurs additional air monitoring costs as a result, the additional costs will be paid by the Contractor. This will not apply if the project is delayed because of an Owner caused delay.

3.07 DATA SUBMITTAL

- A. The Project Monitor will submit all clearance air monitoring data to the NYSDOL in accordance with Industrial Code Rule 56.

END OF SECTION

SECTION 02 8075

ASBESTOS ABATEMENT TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall:
 - 1. Provide temporary facilities throughout the construction period, unless otherwise indicated.
 - 2. Pay costs for providing, maintaining, moving, and removing temporary facilities, unless otherwise indicated.

PART 2 - FACILITIES

2.01 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain sanitary facilities for all personnel on the project.
 - 1. The number of sanitary facilities required shall be based on the total number of workmen employed on the project and shall be in accordance with the provisions of the applicable codes.
- B. Maintain in a sanitary and clean condition at all times.

2.02 TEMPORARY WATER

- A. The Owner will provide water.
 - 1. Contractor is to provide and maintain temporary connections to the designated outlet for construction water. Provide and maintain hoses, piping, and valves as required for obtaining construction water.
 - 2. Provide and maintain temporary connections to the designated outlet for cold shower water in the decontamination unit. Provide and maintain a hot water heater of sufficient capacity to provide hot water for showers for all workers.
 - 3. Provide anti-siphon prevention valves on each connection to Owner's outlet.
- B. All care must be exercised in the use of water furnished by the Owner.

2.03 FIRE PROTECTION

- A. Provide and maintain portable fire extinguishers on each floor level and building area. Number to conform to applicable codes.
- B. Fire Extinguishers: Multipurpose (ABC) dry chemical both inside and outside the work area.
- C. UL labeled.

2.04 STORAGE

- A. Storage space is limited and will be permitted in areas designated by the Engineer.

2.05 TEMPORARY POWER

- A. Electrical service will be provided by the Owner at no cost.
- B. Contractor shall be responsible for extending the service to provide lighting and power required to complete the Work of this Contract.
- C. Comply with the National Electrical Code, OSHA requirements, and applicable local codes and utility regulations.
- D. Maintain continuous service and provide safe working conditions.
- E. Do not overload circuits. Verify capacity of circuit prior to use.
- F. Provide ground fault protection for all temporary power sources.
- G. Temporary power and lighting cords will be elevated to keep them away from water on the floor and damage from foot traffic and scaffolds.

2.06 TEMPORARY PHONE

- A. Provide a phone and service at the job site.

PART 3 - EXECUTION

3.01 GENERAL

- A. Install temporary facilities in accordance with applicable codes.
- B. Maintain temporary facilities throughout the construction period.
- C. Remove temporary facilities when they are no longer required or when directed by the Engineer.
- D. Repair damage to the project site caused by the installation of temporary facilities.

END OF SECTION

SECTION 02 8078

ASBESTOS ABATEMENT SITE SECURITY

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Related Requirements Specified Elsewhere
 - 1. Submittals: Section 02 8073
- B. The Contractor shall provide all controls required to comply with all pertinent regulations and the Contract Documents including, but not limited to, those described in this section.

PART 2 - CONTROLS

2.01 SITE SECURITY

- A. The Work area is to be restricted to authorized, trained, and protected personnel. These may include the Contractor's employees, employees of subcontractors, Owner employees and representatives, state and local inspectors, and any other designated individuals. A list of authorized personnel shall be established prior to job start and posted in the clean room of the worker decontamination facility.
- B. Entry into the Work area by unauthorized individuals shall be reported immediately to the Owner by the Contractor.
- C. A log book shall be maintained by the Contractor in the clean room area of the worker decontamination system. Anyone who enters the Work area must record name, affiliation, time in, and time out for each entry. The asbestos handlers shall show their certification card or have a copy on file at the entrance upon their first entry of the day.
- D. Access to the Work area shall be through a single worker decontamination system. All other means of access (doors, windows, hallways, etc.) shall be blocked or locked so as to prevent entry to or exit from the Work area. The only exceptions for this rule are the waste pass-out air-lock which shall be sealed except during the removal of containerized asbestos waste from the Work area, and emergency exits in case of fire or accident. Emergency exits shall not be locked from the inside; however, they shall be sealed with polyethylene sheeting and tape until needed.
- E. The Project Monitor should have control of site security during abatement operations whenever possible, in order to protect Work efforts and equipment.
- F. Contractor will have Owner's assistance in notifying building occupants of impending activity and enforcement of restricted access by Owner's employees.
- G. If the decontamination chamber or the waste pass-out chamber is located outside the building, provide a security guard 24 hours a day and a fence around the site.

END OF SECTION

SECTION 02 8079

ASBESTOS EMERGENCY PLANNING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Related Requirements Specified Elsewhere
 - 1. Submittals: Section 02 8073
- B. The Contractor shall prepare an emergency preparedness plan detailing at least the information required in this section and in any pertinent federal, state, or local regulations.

PART 2 - DETAILS OF PLAN

2.01 EMERGENCY PLANNING

- A. Emergency planning shall be developed prior to abatement initiation and agreed to by Contractor and Owner.
- B. Emergency procedures shall be in written form and prominently posted in the clean change area and equipment room of the worker decontamination area. Everyone, prior to entering the work area, must read and sign these procedures to acknowledge receipt and understanding of work site layout, location of emergency exits, and emergency procedures.
- C. Emergency planning shall include written notification of police, fire and emergency medical personnel of planned abatement activities, work schedule and layout of work area, particularly barriers that may affect response capabilities.
- D. Emergency planning shall include considerations of fire, power failure, explosion, toxic atmospheres, electrical hazards, slips, trips and falls, confined spaces, and heat related injury. Written procedures shall be developed and employee training in procedures shall be provided.
- E. Employees shall be trained in evacuation procedures in the event of workplace emergencies.
 - 1. For Non-Life-Threatening Situations: Employees injured or other wise incapacitated shall decontaminate following normal procedures with assistance from fellow workers, if necessary, before exiting the workplace to obtain proper medical treatment.
 - 2. For Life-Threatening Injury or Illness: Worker decontamination shall take least priority. After measures to stabilize the injured worker, remove him from the workplace and secure proper medical treatment.
- F. Telephone numbers of all emergency response personnel shall be prominently posted in the clean change area and equipment room, along with the location of the nearest telephone.

END OF SECTION

SECTION 02 8084

ASBESTOS MAINTENANCE OF RECORDS

PART 1 - GENERAL

1.01 DESCRIPTION

- 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 three (3) electronic (Disks) and two (2) hard copies of all records.
- C. Related Requirements Specified Elsewhere
 - 1. Submittals: Section 02 8073

END OF SECTION

SECTION 02 8086

ASBESTOS WASTE DISPOSAL PROCEDURES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. As the work progresses, to prevent exceeding available storage capacity on site, sealed and labeled containers of asbestos-containing waste shall be removed and transported to the pre-arranged disposal location.
- B. All containers of asbestos-containing waste shall be labeled with the name of the waste generator and the location at which the waste was generated.
- C. Disposal of all regulated asbestos-containing material must occur at an authorized site in accordance with regulatory requirements of NESHAP 40 CFR 61.156, NYSDEC 6NYCRR364, and local guidelines and regulations.
- D. All dump receipts; trip tickets, transportation manifests, or other documentation of disposal shall be delivered to the Owner for his records.
 - 1. A record keeping format utilizing a chain of custody form which includes the names and addresses of the Generator (Owner), Contractor, pickup site, disposal site, the estimated quantity of the asbestos waste, and the type of containers used.
 - 2. The form should be signed by the Generator, the Contractor, the truck drivers, and the disposal site operator, as the responsibility for the material changes hands.
 - 3. If a separate hauler is employed, his name, address, telephone number, and signature should also appear on the form.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 TRANSPORTATION TO THE LANDFILL - (REGULATED ASBESTOS CONTAINING MATERIAL)

- A. Once drums, bags, and wrapped components have been removed from the work area, they shall be loaded into an enclosed, hardbody, lockable truck for transportation.
- B. When moving containers, utilize hand trucks, carts, and proper lifting techniques to avoid back injuries. Trucks with lift gates are helpful for raising drums during truck loading.
- C. The enclosed cargo area of the truck shall be free of debris and lined with 2 layers of 6 mil polyethylene sheeting to prevent contamination from leaking or spilled containers. Floor sheeting shall be installed first and extend up the sidewalls. Ceiling and wall sheeting shall be overlapped and taped into place.
- D. Drums shall be placed on level surfaces in the cargo area and packed tightly together to prevent shifting and tipping. Large structural components shall be secured to prevent shifting and have bags placed on top. Do not throw containers into truck cargo area.
- E. Personnel loading asbestos-containing waste shall be protected by disposable clothing including head, body, and foot protection, and at a minimum, half-face piece, air-purifying, dual cartridge respirators equipped with high efficiency filters.
- F. Any debris or residue observed on containers or surfaces outside of the work area resulting from clean-up or disposal activities shall be immediately cleaned up using HEPA filtered vacuum equipment and/or wet methods as appropriate.
- G. Large metal dumpsters are sometimes used for asbestos waste disposal. These should have doors or tops that can be closed and locked to prevent vandalism or other disturbance of the bagged asbestos debris and wind dispersion of asbestos fibers. Unbagged material shall not be placed in these containers, nor shall they be used for non-asbestos waste. Bags shall be placed, not thrown, into these containers to avoid splitting.
- H. The waste hauler shall provide a copy of his "Industrial Waste Hauler Permit" specifically for asbestos-containing material required pursuant to NYSDEC regulation 6 NYCRR364.

3.02 DISPOSAL AT THE LANDFILL - (REGULATED ASBESTOS CONTAINING MATERIA)

- A. Upon reaching the landfill, trucks are to approach the dump location as closely as possible for unloading of the asbestos-containing waste.
- B. Bags, drums, and components shall be inspected as they are off-loaded at the disposal site. Material in damaged containers shall be repacked in empty drums or bags as necessary. (Local requirements may not allow the disposal of asbestos waste in drums. Check with appropriate agency and institute appropriate alternative procedures.)
- C. Waste containers shall be placed on the ground at the disposal site, not pushed or thrown out of trucks (weight of wet material could rupture containers).
- D. Personnel off-loading containers at the disposal site shall wear protective equipment consisting of disposable head, body, and foot protection and, at a minimum, half-face piece, air-purifying, dual cartridge respirators equipped with high efficiency filters.
- E. Following the removal of all containerized waste, the truck cargo area shall be decontaminated using HEPA vacuums and/or wet methods to meet the no-visible residue criteria. Polyethylene sheeting shall be removed and discarded along with contaminated cleaning materials and protective clothing, in bags or drums at the disposal site.
- F. If landfill personnel have not been provided with personal protective equipment for the compaction operation by the land-fill operator, Contractor shall supply protective clothing and respiratory protection for the duration of this operation.

END OF SECTION

SECTION 02 8087

ASBESTOS RESTORING THE WORK AREA

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Related Requirements Specified Elsewhere
 - 1. Cleaning Up: Section 02 8090
- B. Restoring of the work area to pre-abatement condition shall only occur following the completion of clean-up procedures and after clearance air monitoring has been performed and documented to the satisfaction of the Owner.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 REESTABLISHMENT PROCEDURES

- A. The Contractor and Owner shall visually inspect the work area for any remaining visible residue. Evidence of contamination will necessitate additional cleaning.
- B. Additional air monitoring shall be performed if additional clean-up is necessary.
- C. Following satisfactory clearance of the work area, remaining polyethylene barriers may be removed and disposed of as asbestos-contaminated waste.
- D. At the discretion of the Owner, mandatory requirements for personal protective equipment may be waived following the removal of all barriers.
- E. Re-secure mounted objects removed from their former positions during area preparation activities.
- F. Relocate objects that were removed to temporary locations back to their original positions.
- G. Repair areas of damage that occurred as a result of abatement activities and as indicated.

END OF SECTION

SECTION 02 8090
ASBESTOS ABATEMENT CLEANING UP

PART L - GENERAL

1.01 DESCRIPTION

- A. Related Requirements Specified Elsewhere
 - 1. Regulatory Requirements: Section 02 8071
 - 2. Restoring the Work Area and Systems: Section 02 8087
 - 3. Cleaning for Specific Products or Work: The respective sections of the specifications.
- B. Maintain premises and public properties free from accumulations of waste, debris, and rubbish caused by operations.
- C. At completion of Work, remove waste materials, rubbish, tools, equipment, machinery, and surplus materials, and clean all sight-exposed surfaces; leave project clean and ready for occupancy.

1.02 SAFETY REQUIREMENTS

- A. Standards: Maintain project in accordance with safety and insurance standards and the specifications contained herein.
- B. Hazards Control
 - 1. Remove asbestos waste from premises daily.
 - 2. Prevent accumulation of wastes which create hazardous conditions.
 - 3. Provide adequate ventilation.
- C. Conduct cleaning and disposal operations to comply with federal, state, and local ordinances.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 DURING CONSTRUCTION

- A. Clean the Worker Decontamination Unit at least once each shift.
- B. Clean the area near the Waste Decontamination Unit and the Worker Decontamination Unit at least once each shift.

3.02 FINAL CLEANING

- A. Employ experienced workmen or professional cleaners for final cleaning.
- B. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
- C. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces; polish surfaces so designated to shine finish.
- D. Repair, patch, and touch up marred surfaces to specified finish, to match adjacent surfaces.
- E. Broom clean paved surfaces; rake clean other surfaces of grounds.
- F. Maintain cleaning until project, or portion thereof, is occupied by Owner.

END OF SECTION

**SECTION 03 3000
CAST-IN-PLACE CONCRETE**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Concrete formwork.
- B. Concrete footings.
- C. Concrete retaining walls
- D. Concrete reinforcement.
- E. Concrete curing.
- F. Floors and slabs on grade.
- G. Exterior stairs.
- H. Finishes.
- I. Concrete for steel bollards.
- J. Joint devices associated with concrete work.
- K. Miscellaneous concrete elements, including equipment pads.
- L. Mix design.
- M. Concrete Admixtures.
- N. Vapor Retarder.
- O. Concrete materials.
- P. Placement procedure.

1.3 RELATED REQUIREMENTS

- A. Section 05 5213 - Pipe and Tube Railings.
- B. Section 31 2316 - Excavation.
- C. Section 32 1216 - Asphalt Paving.

1.4 REFERENCE STANDARDS (Current approved editions)

- A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
- B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
- C. ACI 301 - Specifications for Structural Concrete.
- D. ACI 302.1R - Guide to Concrete Floor and Slab Construction
- E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
- F. ACI 305R - Hot Weather Concreting.
- G. ACI 308R - Guide to Curing Concrete.
- H. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.
- I. ACI 347R - Guide to Formwork for Concrete.
- J. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- K. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
- L. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
- M. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.

- N. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- O. ASTM C33/C33M - Standard Specification for Concrete Aggregates.
- P. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- Q. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
- R. ASTM C150/C150M - Standard Specification for Portland Cement.
- S. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
- T. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete.
- U. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- V. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
- W. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars.
- X. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
- Y. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.5 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
 - 1. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions for each product indicated.
 - 2. Mix Design: Submit proposed concrete mix design.
 - a. Indicate proposed mix design complies with requirements of ACI 301, Section 4 – Concrete Mixtures.
 - b. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 – Concrete Quality, Mixing and Placing.
 - c. Indicate amounts of mixing water to be withheld for later addition at Project site.
 - 3. Samples for Pigment Color Selection: Submit manufacturer's complete sample chip set, including pigment number and required dosage rate for each color.
- B. Product Data: For each type of product indicated.
- C. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- D. Samples: Submit samples of underslab vapor retarder to be used.
- E. Qualification Data: For installer and concrete supplier.
- F. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
- G. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Curing compounds.
 - 6. Joint-filler strips.

1.6 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.
- D. Installer Qualifications: The work of this section shall be performed by a qualified installer, with a minimum of five (5) years' experience, approved by the Architect. The term "installer" used herein, shall mean a firm of established reputation which is regularly engaged in and which maintains a regular force of workmen skilled in the installation of the type of work specified in this section.
- E. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- F. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- G. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code-Reinforcing Steel."
- H. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- I. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Section 01 3000 - Administrative Requirements
 - 1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Concrete subcontractor.
 - 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold and hot weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, concrete repair procedures, and concrete protection.
- J. Delivery Records: Each delivery to the site of concrete shall be accompanied by weigh master's certification. Retain all copies for inspection by the Architect.
 - 1. Indicate water added to mix a job site on each delivery ticket. Show quantity of water added. Site water tempered mixes exceeding specified slump range will be rejected as not complying with specification requirements
- K. WARRANTY
 - 1. See Section 01 7800 - Closeout Submittals, for warranty requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.8 PROJECT CONDITIONS

- A. Coordinate with the work of all other sections and separate contracts.

PART 2 - PRODUCTS

2.1 FORMWORK

- A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.
- B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
 - 1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
 - 2. Earth Cuts: Do not use earth cuts as forms for vertical surfaces. Natural rock formations that maintain a stable vertical edge may be used as side forms.
 - 3. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
 - 4. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

2.2 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 - 1. Finish: Epoxy coated in accordance with ASTM A775/A775M, unless otherwise indicated.
- B. Steel Welded Wire Reinforcement (WWR): Class A epoxy coated, deformed type, ASTM A884/A884M.
 - 1. Form: Flat Sheets.
 - 2. Mesh Size: 6 x 6.
 - 3. Wire Gage: W 6 x W 6.
- C. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Epoxy coated, sized and shaped for adequate support of reinforcement during concrete placement
 - 3. Provide stainless steel components for placement within 1-1/2 inches of weathering surfaces.

2.3 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
 - 1. Acquire cement for entire project from same source.
- B. Fine and Coarse Aggregates: ASTM C 33.
- C. Fly Ash: ASTM C618, Class C or F.
- D. Water: Clean and not detrimental to concrete.

2.4 ADMIXTURES

- A. Air Entrainment Admixture: ASTM C260/C260M.
- B. Waterproofing Admixture: Admixture formulated to reduce permeability to liquid water, with no adverse effect on concrete properties.
 - 1. Admixture Composition: Crystalline, functioning by growth of crystals in capillary pores.
 - 2. Permeability of Cured Concrete: No measurable leakage when tested in accordance with COE CRD-C 48 at 350 feet of head; provide test reports.
 - 3. Potable Water Contact Approval: NSF certification for use on structures holding potable water, based on testing in accordance with NSF 61 and NSF 372.
 - 4. Manufacturers:

- a. "Hycrete W1002" as manufactured by Hycrete, Inc., 462 Barell Avenue, Carlstadt, New Jersey, 07072, telephone (201) 386-8110, website www.hycrete.com.

2.5 ACCESSORY MATERIALS

- A. Non-Shrink Epoxy Grout: Moisture-insensitive, two-part; consisting of epoxy resin, non-metallic aggregate, and activator.
 1. Composition: High solids content material exhibiting positive expansion when tested in accordance with ASTM C827/C827M.
 - a. Maximum Height Change: Plus 4 percent.
 - b. Minimum Height Change: Plus 1 percent.
- B. Liquid Curing Compound: ASTM C 309, Type 1, clear or translucent.
 1. Acceptable Products:
 - a. Klear-Kote Cure-Sealer-Hardener, 30 percent solids; Burke Group, LLC (The).
 - b. Vocomp-30; W. R. Meadows, Inc
- C. Underslab Vapor Retarder: (Applies to interior work only) Sheet material complying with ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. The use of single ply polyethylene is prohibited.
 1. Installation: Comply with ASTM E1643.
 2. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.

2.6 BONDING AND JOINTING PRODUCTS

- A. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.
 1. Manufacturers:
 - a. Kaufman Products Inc; SureBond: www.kaufmanproducts.net/#sle.
 - b. SpecChem, LLC; Strong Bond Acrylic Bonder: www.specchemllc.com/#sle.
 - c. W. R. Meadows, Inc; ACRY-LOK-: www.wrmeadows.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.

2.7 CURING MATERIALS

- A. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.
 1. Manufacturers:
 - a. Dayton Superior Corporation; Clear Cure VOC J7WB: www.daytonsuperior.com/#sle.
 - b. SpecChem, LLC; SpecRez: www.specchemllc.com/#sle.
 - c. W. R. Meadows, Inc; 1100-Clear: www.wrmeadows.com/#sle.
- B. Moisture-Retaining Sheet: ASTM C171.
 1. Polyethylene film, clear, minimum nominal thickness of 0.0040 inch.
- C. Water: Potable, not detrimental to concrete.

2.8 CONCRETE MIX DESIGN

- A. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.
- B. Normal Weight Concrete – Exterior, Weather Exposed Concrete Surfaces:
 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 5,000 pounds per square inch.
 2. Water-Cement Ratio: Maximum 0.45.
 3. Comply with the Waterproof Concrete Admixture Manufacturer's instructions and recommendations.

4. Total Waterproofing Admixture:
5. Total Air Content: 6 percent, determined in accordance with ASTM C173/C173M.
6. Maximum Slump: 4 inches.
7. Maximum Aggregate Size: 3/4 inch.
- C. Normal Weight Concrete – Interior Concrete Surfaces:
 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch (20.7 MPa).
 2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
 3. Water-Cement Ratio: Maximum 40 percent by weight.
 4. Total Air Content: 4 percent, determined in accordance with ASTM C173/C173M.
 5. Maximum Slump: 3 inches (75 mm).
 6. Maximum Aggregate Size: 5/8 inch (16 mm).

2.9 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.2 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
 1. Use latex bonding agent only for non-load-bearing applications.
- E. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

3.3 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Fabricate and handle epoxy-coated reinforcing in accordance with ASTM D3963/D3963M.
- B. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- C. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.
- D. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.4 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Notify Owner's Representative not less than 24 hours prior to commencement of placement operations.
- C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- D. Ensure reinforcement, inserts, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

- E. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

3.5 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. A.Maximum Variation of Surface Flatness:
 - 1. Exposed Concrete Floors: 1/4 inch (6 mm) in 10 feet (3 m).
- B. Correct the slab surface if tolerances are less than specified.
- C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.6 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.
- C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
 - 1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
 - 2. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.
 - 3. Cork Floated Finish: Immediately after form removal, apply grout with trowel or firm rubber float; compress grout with low-speed grinder, and apply final texture with cork float.
- D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 - 1. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.
- E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:100 nominal.
- F. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.7 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
 - 1. Normal concrete: Not less than 7 days.
- C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.
- D. Surfaces Not in Contact with Forms:
 - 1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water-fog spray or saturated burlap.
 - a. Spraying: Spray water over floor slab areas and maintain wet.
 - b. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.
 - 2. Final Curing: Begin after initial curing but before surface is dry.

3.8 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Submit proposed mix design to inspection and testing firm for review prior to commencement of concrete operations.
- D. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.
- E. Compressive Strength Tests: ASTM C39/C39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.
- F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- G. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.9 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Owner's Representative and Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of the architect for each individual area.

3.10 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

SECTION 03 54 00
CAST UNDERLAYMENT

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. Liquid-applied self-leveling floor underlayment.
 - 1. Use cementitious type at all locations.

1.3 RELATED REQUIREMENTS

- A. Section 01 7000 – Execution: Alteration project procedures; selective demolition for remodeling.
- B. Section 09 6500 – Resilient Tile Flooring.
- C. Section 09 6813 – Tile Carpeting.
- D. Section 03 3000 – Cast in Place Concrete for slabs-on-grade concrete construction and finish.

1.4 REFERENCE STANDARDS

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); Current Edition.
- B. ASTM C348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars; 2014.
- C. ASTM C 580 Flexural Strength
- D. ASTM D 3931 Bond Strength (concrete).
- E. ASTM F-2170 Relative Humidity in Concrete
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

1.5 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data sheets documenting physical characteristics and product limitations of underlayment materials. Include information on surface preparation, environmental limitations, and installation instructions.
- C. Certificate: Certify that products meet or exceed specified requirements.
- D. Material Test Reports: From a qualified testing agency indicating and interpreting test results of underlayments for compliance with requirements indicated.
- E. Minutes of pre-installation conference

1.6 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years of experience who has completed work similar in material, design, and extent to that indicated for this Project.
- B. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
- C. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1, Section 01300 Administrative Requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.

- B. Keep dry and protect from direct sun exposure, freezing, and ambient temperature greater than 105 degrees F.

1.8 REGULATORY REQUIREMENTS

- A. Conform to New York State Building Codes for combustibility or flame spread requirements.

1.9 MOCK-UP

- A. Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Prepare mock-up in location designated by Eisenbach & Ruhnke. .
 - 2. Area: 10 ft x 10 ft.
 - 3. Do not proceed with underlayment work until workmanship of mock-up has been approved by Architect.
 - 4. If Architect determines that mockups do not meet requirements, demolish and remove them from the site and cast others until mockups are approved.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Demolish and remove mockups when directed.
 - 7. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- B. Mock-up may remain as part of the Work.

1.10 FIELD CONDITIONS

- A. Do not install underlayment until floor penetrations and peripheral work are complete.
- B. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting underlayments performance.
- C. Maintain minimum ambient temperatures of 50 degrees F 24 hours before, during and 72 hours after installation of underlayment.
- D. During the curing process, ventilate spaces to remove excess moisture.
- E. Close areas to traffic during underlayments application and, after application, for time period recommended in writing by manufacturer

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Cementitious Underlayment:
 - 1. ARDEX Engineered Cements; ARDEX K 15: www.ardexamericas.com.
 - a. Locations where finish flooring is specified.
 - 2. ARDEX Engineered Cements; ARDEX SD-T.
 - a. Locations where painted finish flooring is specified.
 - 3. ARDEX Engineered Cements; ARDEX ERM Exterior Ramp Mortar
 - a. Locations at exterior horizontal surfaces. See drawings.
 - 4. ARDEX Engineered Cements; ARDEX B20 Vertical Repair
 - a. Locations at exterior vertical surfaces. See drawings.

2.2 MATERIALS

- A. Cementitious Underlayment: Blended cement mix, that when mixed with water in accordance with manufacturer's directions will produce self-leveling underlayment with the following properties:
 - 1. Compressive Strength: Minimum 4000 psi after 28 days, tested per ASTM C109/C109M.

2. Flexural Strength: Minimum 1000 psi after 28 days, tested per ASTM C348.
 3. Bond Strength: 350-400 psi when tested in conformance with ASTM D 3931
 4. Thickness: Capable of thicknesses from feather edge to maximum 3-1/2 inch.
 5. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.
- B. Aggregate: Dry, well graded, washed silica aggregate, approximately 1/8 inch in size and acceptable to underlayment manufacturer.
- C. Reinforcement: Galvanized metal lath complying with recommendations of underlayment manufacturer for specific project circumstances.
- D. Water: Potable and not detrimental to underlayment mix materials.
- E. Primer: Manufacturer's recommended type.
- F. Epoxy Joint Filler: Two-component, semi-rigid, 100 percent solids, epoxy resin with a Shore A hardness of 80 per ASTM D 2240
- G. Acrylic-Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- H. Joint and Crack Filler: Latex based filler, as recommended by manufacturer.

2.3 MIXING

- A. Site mix materials in accordance with manufacturer's instructions.
- B. Add aggregate for areas where thickness will exceed 1-1/2 inch. Mix underlayment and water for at least two minutes before adding aggregate, and continue mixing to assure that aggregate has been thoroughly coated.
- C. Mix to self-leveling consistency without over-watering.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that substrate surfaces are clean, dry, unfrozen, do not contain petroleum byproducts, or other compounds detrimental to underlayment material bond to substrate.

3.2 PREPARATION

- A. Concrete: Mechanically prepare steel troweled concrete to create a textured surface necessary to achieve the best bond; acceptable methods include bead blasting and scarifying. Do not use acid etching.
- B. Existing Concrete: Remove existing surface treatments and deteriorated and unsound concrete. Mechanically abrade base slabs to produce a heavily scarified surface profile with an amplitude of 1/4 inch
1. Mechanically remove contaminants from existing concrete that might impair bond of topping.
- C. Install joint-filler strips where topping abuts vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
- D. Remove substrate surface irregularities. Fill voids and deck joints with filler. Finish smooth.
- E. Vacuum clean surfaces.
- F. Prime substrate in accordance with manufacturer's instructions. Allow to dry.
- G. Close floor openings.

3.3 APPLICATION

- A. Start topping application in presence of manufacturer's technical representative.
- B. Existing Concrete: Apply epoxy-bonding adhesive, mixed according to manufacturer's written instructions, and scrub into dry base slabs to a thickness of 1/16 to 1/8 inch, without puddling. Place topping while adhesive is still tacky

- C. Install underlayment in accordance with manufacturer's instructions.
- D. Pump or pour material onto substrate. Do not re-temper or add water.
 - 1. Pump, move, and screed while the material is still highly flowable.
 - 2. Be careful not to create cold joints.
 - 3. Wear spiked shoes while working in the wet material to avoid leaving marks.
- E. Place to indicated thickness, with top surface level to 1/8 inch in 10 ft.
- F. For final thickness over 1-1/2 inches, place underlayment in layers. Allow initial layer to harden to the point where the material has lost its evaporative moisture. Immediately prime and begin application of the subsequent layer within 24 hours.
- G. Place before partition installation.
- H. Where additional aggregate has been used in the mix, add a top layer of neat mix (without aggregate), if needed to level and smooth the surface.
- I. Construction Joints: Construct joints true to line with faces perpendicular to surface plane of topping, at locations indicated or as approved by Architect.
 - 1. Coat face of construction joint with epoxy adhesive at locations where topping is placed against hardened or partially hardened topping.
- J. Contraction Joints: Form weakened-plane contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before topping develops random contraction cracks.
 - 1. Form joints in topping over contraction joints in base slabs, unless otherwise indicated.
 - 2. Construct contraction joints for a combined depth equal to topping thickness and not less than one-fourth of base-slab thickness.
 - 3. Construct contraction joints for a depth equal to one-half of topping thickness, but not less than 1/2 inch deep
- K. If a fine, feathered edge is desired, steel trowel the edge after initial set, but before it is completely hard.

3.4 CURING

- A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.
- B. Air cure in accordance with manufacturer's instructions.
- C. Begin curing immediately after finishing topping. Cure by one or a combination of the following methods, according to topping manufacturer's written instructions:
 - 1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3.5 JOINT FILLING

- A. Prepare and clean contraction joints and install epoxy joint filler, according to manufacturer's written instructions, once topping has fully cured.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install epoxy joint filler full depth of contraction joints. Overfill joint and trim joint filler flush with top of joint after hardening

3.6 FIELD QUALITY CONTROL

- A. Placed Material: Agency will inspect and test for conformance to specification requirements.

3.7 REPAIRS

- A. Defective Topping: Repair and patch defective topping areas, including areas that have not bonded to concrete substrate

3.8 PROTECTION

- A. Do not permit traffic over unprotected floor underlayment surfaces

END OF SECTION

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SECTION 04 0100 MASONRY MAINTENANCE

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. All plant, labor, materials, equipment, testing and services necessary to complete the work shown on the schedules, keynotes, drawings, as specified herein, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:
 - 1. Prepare and repoint mortar joints.
 - 2. Install clear water repellant on masonry where repointing work was performed.
 - 3. Prepare the joints and install new backer rod & sealant in all masonry facade control joints and expansion joints.
 - 4. Prepare the joints, and install new backer rod and sealant in joints between the masonry facades and windows, louvers and door frames where indicated.
 - 5. Remove and reset loose and cracked bricks and concrete masonry units in the exterior facades.
- B. Related Requirements
 - 1. Section 06 1000 Rough Carpentry

1.3 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. A firm (Installer) with at least 5 continuous years' experience performing masonry work similar to that required for this project, employing personnel skilled in the work specified.
 - a. The Installer shall directly employ the personnel performing the work of this section.
 - b. The Installer shall have a full time supervisor on the roof when work is in progress. The Supervisor shall have a minimum of 5 years' experience with work similar in nature and scope to this project, and speak fluent English.
 - 1) Provide the Supervisor's resume prior to award and upon request.
 - 2. The Installer shall provide a reference list of at least three previously completed projects of comparable size and similar design, within a fifty mile radius of this project, which may be observed by representatives of the Owner:
 - a. The reference list shall include at a minimum, the completion date, a description of the work performed, the Owner's name - contact person - phone number and address and the Architect's name - contact person and phone number.
 - b. Provide the reference list prior to contract award and upon request.
- B. Material Quality: Obtain each type of material from a single source to ensure consistent quality, color, pattern, and texture.
- C. Pre-Work Conference: Attend the pre-construction meeting and discuss the following:
 - 1. How and when masonry work will be performed and coordinated with other work.
 - 2. How roof & building surfaces will be protected, and how the building will be kept watertight as masonry work progresses.
 - 3. The construction schedule, forecast weather, availability of materials, personnel, equipment and facilities needed to proceed and complete the work on schedule.
 - 4. A schedule for Manufacturer and Architect inspections.

1.4 SUBMITTALS

- A. Submit the following items far enough in advance to obtain approval prior to performing any work on site:
 - 1. A pre-work site and building inspection report with photos, to document conditions before work starts.
 - 2. Manufacturer's literature for all materials. .
 - 3. Test reports and certifications substantiating compliance with the specification requirements if requested by the Architect.
 - 4. Samples to show sizes, grade and color, prior to mock-up erection, of each new exposed masonry material. Include the full range of colors and textures needed in the samples.
 - a. Bricks: 4 samples of solid colors, 12 samples of blended colors.
 - b. Mortar: 6 inch long 1/2 inch wide strips set in metal or plastic channels.
 - c. Anchors: each type of anchor.
- B. Simultaneously provide all technical submittals needed for this project, for all technical sections, collated by section. Incomplete submittals will not be reviewed.
 - 1. Submittals shall be prepared and made by the firm that will perform the actual work.
 - 2. Provide 6 copies of paper submittals, or provide electronic submittals on USB drives, in pdf format, organized in folders by Section.
- C. Safety Data Sheets: Simultaneously provide all Safety Data Sheets needed for this project, for all specification sections - collated by section, in three ring binders. Provide two binders for each building.

1.5 JOB MOCK UPS

- A. Prepare, in actual job locations, mock-ups of masonry work.
 - 1. For brick rebuilding - provide 4 foot long mockups.
 - 2. For repointing - provide 2 foot square mockups to show how the joints will be cut, and 2 foot square mockups to show new pointing.
 - 3. For sealant joints - provide 4 foot long mockups.
- B. Construct each mock up with its associated roof and wall flashings, to show the following:
 - 1. The color, size and type of each masonry unit and mortar used to set it.
 - 2. Workmanship quality.
 - 3. The size and spacing of weep holes.
 - 4. Flashings that are built into the masonry.
 - 5. Other related materials and their installation techniques to fully establish a quality standard for the work.
- C. Mock-ups shall be constructed to establish the minimum acceptable standard of materials and workmanship, and to assure that completed work which matches the mock ups will be fully functional and serve the purpose for which it was designed.
- D. Approved mock-ups may be left in place and incorporated into the permanent installation. Rejected mock-ups shall be removed and replaced until an acceptable mock up is approved.
- E. Do not proceed with masonry work until mock-ups are installed, inspected and approved in writing.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Carefully pack, handle, and ship masonry units and accessories strapped together in suitable packs or pallets or in heavy cartons.
- B. Deliver material to the site in the Manufacturer's original and unopened containers and packaging, bearing labels which identify the type and names of the products and Manufacturers. Unload and handle to prevent chipping and breakage.

- C. Protect masonry materials and aggregates during storage and construction from excess wetting by rain, snow or ground water, and from staining or intermixture with earth or other types of materials.
- D. Protect grout, mortar and cement products from deterioration by moisture and temperature. Store in a dry location or in waterproof containers. Protect liquid components from freezing.
- E. Do not overload the structure when storing materials on roofs (where applicable). Material stored on the roof shall be placed on 2 by 10 wooden planks, placed over 1-1/2 inch foam insulation that is laid on a layer of 6 mil fire retardant polyethylene.

1.7 GUARANTEE

- A. Provide a written Contractor's Guarantee which guarantees that all work will remain free of material and workmanship defects and in a watertight condition for a five year period beginning upon Final Completion:
 - 1. Defects include but are not limited to the following: leakage, delamination, lifting, loosening, splitting, cracking, joint separation and movement.
 - 2. The Contractor shall make the repairs and modifications necessary to enable the work to perform as guaranteed at his own expense:
 - 3. Guarantee coverage shall include removing and replacing materials installed as part of the original work, if removal is needed to perform guaranteed repairs.
 - 4. Guarantee coverage shall have no dollar limit.
- B. Provide one Contractor's Guarantee that covers "all work performed" when a single contractor is awarded work specified in multiple Sections.
- C. Guarantee coverage shall take effect no more than 30 days before the completion of all punch list work.

1.8 JOB CONDITIONS

- A. Coordinate masonry removal and restoration with the installation of new flashings (where applicable), and maintain the buildings watertight at all times.
- B. Perform masonry work only when the air temperature is 40 degrees F and above and will remain so until the masonry has dried, but for not less than 72 hours after completion.
- C. Erect temporary covers over pedestrian walkways and at building entrances and exits which will remain active as the work progresses.
- D. Prevent mortar from staining the face of surrounding masonry and other building surfaces, immediately remove any which falls or spills. Protect sills, ledges and projections from mortar droppings.
- E. Protect roof surfaces wherever masonry work or related construction traffic occurs on them, with 2 by 10 wooden planks installed over 1-1/2 inch thick foam insulation, placed on a layer of 6 mil thick fire retardant polyethylene.

PART 2 - PRODUCTS

2.1 MASONRY MATERIALS

- A. Face Brick: Severe weather (SW) Grade face brick and accessories, including special bricks for lintels, arches, corners, and other special shapes, to match the color, surface texture, shape and size of existing adjacent brick.

2.2 MORTAR

- A. General Construction Mortar:
 - 1. Type S, custom colored, non-staining masonry cement containing Type I Portland cement meeting ASTM C150 and Type S hydrated lime meeting ASTM C207.

2. Natural or manufactured sand aggregate selected to match the size, texture, gradation and color of the existing mortar aggregate, meeting ASTM C 144.
 3. Clean potable water, free of oils, acids, alkalis and organic matter.
- B. Pointing Mortar:
1. Factory blended Type N masonry cement, aggregate and custom coloring agents, ready to use when mixed with clean potable water, as supplied by Spec-Mix.

2.3 MISCELLANEOUS MATERIALS

- A. Anchors: Fabricated from Type 304 stainless steel to match existing.
- B. Reinforcement Bar: #4 epoxy coated steel rebar, with factory formed ridges.
- C. Sealant: High performance, solvent free, formulated and moisture curing silyl-terminated polyether sealant, ASTM C-920, Type S, Grade NS, Class 25, NovaLink construction sealant by ChemLink, color as selected.
- D. Backer Rod: Closed cell polyethylene foam, non-absorbent, compressible, chemically inert rod.
- E. Masonry Water Repellent: Cloudy odorless water-based penetrating liquid, UV stable, alkali resistant, translucent floural carbon emulsion, containing no volatile organic compounds: Cathedral Stone Products, Inc. R-97 Water Repellent.
- F. Weeps: Full height head joint inserts formed of a polypropylene honey comb, three-eighths inch thick, Hohmann & Barnard, Inc. #QV Quadro-Vent.

PART 3 - EXECUTION

3.1 GENERAL

- A. Carefully perform work so the structural integrity of adjoining masonry is preserved. Simultaneously remove only limited sections of existing masonry; support and protect masonry remaining next to and above the removal areas.
- B. Completely remove and replace existing masonry that moves or if cracks form in the mortar joints between the masonry units, or within the masonry units, as the work is performed.
- C. Cure all mortar by misting it with water to maintain it in a damp condition for not less than 72 hours. Shield fresh mortar from direct sunlight with wet burlap, and prevent fresh mortar from prematurely drying during the curing period. Remove and replace mortar joints that dry prematurely.
- D. Cut and remove existing masonry using hand and machine methods. Equip each machine with a separate dedicated vacuum. Use each machine manufacturer's blade guard vacuum attachment and control the amount of dust produced so there are no visible plumes.
- E. Perform all masonry work to comply with OSHA silica regulations and guidelines.

3.2 MORTAR MIXES

- A. Measurement and Mixing:
 1. Measure general construction mortar materials when dry by volume. Do not measure with a shovel, use a pail or similar container.
 - a. Mix mortar using 1 part mortar cement and 3 parts sand aggregate.
 - b. Thoroughly mix cement and aggregate in a clean mechanical batch mixer before adding water; then continue mixing and add only enough water to produce a workable mix. Do not mix mortar by hand.
 2. Mix factory blended pointing mortar in a clean mechanical batch mixer, adding only enough water to produce a workable mix. Do not mix mortar by hand.
 3. Use mortar within 45 minutes of final mixing; do not re-temper or use partially hardened material.

- B. Mix and install mortar with the same ingredients used to produce the approved mock-up. Do not adjust the color or proportions without written approval. Do not use admixtures of any kind in the mortar unless specifically approved.

3.3 BRICK REMOVAL AND REPLACEMENT

- A. Carefully remove bricks on a piece-by-piece basis. Cut out full units from joint to joint and to permit replacement with full size units. Clean the edges of remaining bricks, to remove all mortar, dust, and loose debris in preparation for rebuilding.
- B. Simultaneously remove only limited sections of existing masonry; support and protect masonry remaining next to and above the removal areas.
- C. Wet bricks which have initial rates of absorption (suction) greater than 30 grams per 30 square inches per minute, (in accordance with ASTM C 67), to ensure the bricks are nearly saturated with water, but surface dry when laid.
- D. Install new bricks to replace removed bricks. Fit replacement bricks to match the original bond and course pattern. Use a motor driven diamond blade wet saw to cut bricks with clean, sharp unchipped edges.
- E. Lay replacement brick with completely filled bed, head and collar joints. Butter the ends with sufficient mortar to fill the head joints and shove the bricks into place.
- F. Install new bricks with mortar joints to match the width of the adjoining brick joints. Tool the new joints to match existing joints in surrounding brickwork.

3.4 REPOINTING EXISTING MASONRY

- A. Joint Preparation:
 - 1. Remove existing mortar and foreign material from the mortar joints to a minimum depth of 1 inch; and deeper where needed to expose sound unweathered mortar.
 - 2. Remove mortar from the sides of the joints to provide joints with square backs and to expose the masonry for contact with the pointing mortar. Brush or vacuum the joints to remove dirt and loose debris.
 - 3. Remove mortar and other foreign material from the surface of masonry adjacent to the joint.
 - 4. Do not spall the edges of adjacent masonry or widen the joints. Replace any masonry which is damaged.
- B. Joint Pointing:
 - 1. Rinse joint surfaces with water to remove dust and mortar particles just prior to repointing. Time the rinse, so when repointing occurs, excess water has evaporated and joint surfaces are damp but free of standing water.
 - 2. Apply pointing mortar in 1/2 inch thick layers, and thoroughly compact each layer before adding the next layer, to completely fill each joint.
 - 3. Slightly recess pointing mortar from the face of the adjacent masonry units. Do not spread mortar on the edges or faces of the masonry. Do not featheredge the mortar.
 - 4. Tool repointed joints when the mortar is thumbprint hard. Remove excess mortar from the edges of the joints with a soft bristle brush.
- C. Cleaning:
 - 1. Immediately after the mortar has fully hardened, thoroughly clean masonry surfaces of excess mortar and foreign matter using stiff nylon or bristle brushes and clean water.
 - 2. Do not use metal scrapers or brushes. Do not use acid or alkali cleaning agents. Do not pressure- wash the masonry or new pointing mortar.

3.5 SEALANT JOINTS

- A. Carefully remove existing sealant and back up material from within the joints to a minimum depth of 1-1/2 inches, and from the surface of adjoining masonry at the edges of the joints.

1. Use hand tools and work to avoid damage to adjoining masonry.
2. Replace adjoining masonry damaged during sealant removal work at no cost to the Owner.
- B. Install new backer rod without puncturing or tearing it, to snugly fill the joint at a depth to yield a sealant joint twice as wide as it is deep.
 1. Do not twist backer rods, or install multiple pieces of undersized rod, when the correct size rod is not onsite.
- C. Mask the edges of all joints prior to installing sealant.
 1. Push sealant into the joint to completely fill it, tool the sealant to produce a slightly concave, neat recessed joint, and remove joint masking before excess sealant sets.

3.6 WATER REPELLENT

- A. Prepare and clean masonry surfaces to receive water repellent utilizing hand, chemical and pressure water methods as needed to remove all dirt, dust, efflorescence, mold, salt, grease, oil, asphalt, laitance, paint and other foreign materials.
- B. Allow the surface to dry for a minimum of 48 hours at a temperature above 50° F.
- C. Mask and protect adjoining surfaces i.e., the roof, flashings, windows, side walls and site plantings from over spray.
- D. Apply water repellent using a low pressure (15-20 psi maximum) wet fan type nozzle or 1 inch nap roller in a "flooding" application starting at the bottom so the material runs 6 to 8 inches below the points of application.
- E. Sequentially apply two "flood" coats of water repellent to thoroughly saturate the masonry surface; apply the second coat as soon as the first coat has been absorbed by the masonry, and before the first coat dries.

3.7 CLEANING, PROTECTION AND WATERTIGHTNESS

- A. Inspect the interior and exterior of the building and grounds, and submit a written report with photos to document any leaks or damage, prior to performing any other work on site.
- B. The Owner will conduct a similar inspection at the completion of the work, and the Contractor will be charged for all leaks and damage which was not documented in the Contractor's report, or repaired to the Owners satisfaction at the Contractor's expense.
- C. Provide any equipment, material and labor necessary to protect the site, the building, its contents and occupants, pedestrians, and surrounding landscaped and paved areas from damage due to the construction work or from inclement weather during construction.
- D. Do not perform work during inclement weather. Protect incomplete work and the building from damage by inclement weather - which may occur unexpectedly. Make all work areas watertight at the end of each day's work.
- E. Clean up all litter, refuse, rubbish, scrap materials and debris at least twice a day; at noon and at the end of the work day, so the roof and site presents a neat, orderly and workmanlike appearance. Place the debris in a dumpster, and remove the dumpster from the site as soon as it is full or no longer being used.
- F. Carefully and thoroughly clean the entire roof to remove all residual debris when all work is complete. After cleaning the roof, thoroughly clean all drain sumps, drain lines, leader heads and leaders. Do not allow debris to enter the drainage system.

END OF SECTION

**SECTION 04 2000
UNIT MASONRY**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Concrete Block.
- B. Mortar and Grout.
- C. Reinforcement and Anchorage.
- D. Reinforced Unit Masonry Lintels.
- E. Steel Lintels.
- F. Accessories.

1.3 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.
- B. Section 04 0100 - Masonry Maintenance
- C. Section 05 5000 - Metal Fabrications: Loose steel lintels.
- D. Section 07 9200 - Joint Sealants.

1.4 REFERENCE STANDARDS (Current editions including all revisions shall apply):

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- C. ACI 530/530.1/ERTAC - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; American Concrete Institute International.
- D. ASTM A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
- E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- F. ASTM A580/A580M - Standard Specification for Stainless Steel Wire.
- G. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.
- H. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units.
- I. ASTM C91/C91M - Standard Specification for Masonry Cement.
- J. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units.
- K. ASTM C140/C140M - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units.
- L. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
- M. ASTM C150/C150M - Standard Specification for Portland Cement.
- N. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
- O. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
- P. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.

1.5 SUBMITTALS

- A. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, masonry accessories, and steel lintels.
- B. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

- C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable
 - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation. The engineer is to be licensed in the state where the project is being built.

1.6 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required

1.7 MOCK-UP

- A. Locate where directed.
- B. Mock-up may remain as part of the Work.
- C. Build mockup of typical wall area as directed by Architect.
- D. Build mockups for the following types of masonry in sizes approximately 96 inches long by 72 inches high by full thickness, including face and backup wythes and accessories. Include a sealant-filled joint at least 16 inches long in each mockup.
 - 1. Each type of exposed unit masonry construction.
 - 2. Typical interior unit masonry wall, where exposed.
- E. Clean exposed faces of mockups with masonry cleaner as indicated.
- F. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.
- G. Notify Architect seven days in advance of dates and times when mockups will be constructed.
- H. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
 - 1. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.

1.8 PROJECT CONDITIONS

- A. Field Measurements: For steel lintels installations verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings. Provide allowance for trimming and fitting at site.

1.9 COORDINATION

- A. Coordinate installation of anchorages into masonry work for metal fabrications (hollow metal door frames and steel lintels). Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

- B. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- E. Deliver pre blended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store pre blended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weather-proof cover.
- F. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil
- G. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
 - 2. Where one wythe of multi wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to un constructed wythe and hold cover in place.
- H. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
- I. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- J. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
- K. Under no circumstances shall masonry installation cease or delayed due to the weather conditions. Installation shall continue using procedures listed above.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depths as indicated on the drawings for all locations.
 - 2. Special Shapes: Provide non-standard blocks configured for corners, lintels, and control joint edges.
 - 3. Load-Bearing Units: ASTM C90, normal weight.
 - 4. Non-Loadbearing Units: ASTM C129.
 - a. Normal weight.

2.2 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: ASTM C91/C91M, Type N.
- B. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
 - 1. Hydrated Lime: ASTM C207, Type S.
 - 2. Grout Aggregate: ASTM C404.
- C. Water: Clean and potable.

2.3 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers of Joint Reinforcement and Anchors:
 - 1. Hohmann & Barnard, Inc (including Dur-O-Wal brand): www.h-b.com.
 - 2. Substitutions: See Section 01 3000 – Administrative Requirements.
- B. Reinforcing Steel: ASTM A615/A615M, Grade 40 - 40,000 psi, deformed billet bars; galvanized.
- C. Single Wythe Joint Reinforcement: Truss type; stainless steel conforming to ASTM A 580/ A 580M Type 304; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure. Flush weld all keys
 - 1. Hohmann & Barnard - #120.
- D. Strap Anchors: Bent steel shapes configured as required for specific situations, 1-1/4 in width, 0.105 in thick, lengths as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face, corrugated for embedment in masonry joint, stainless steel.
 - 1. Use Notched Column # 354 Hohmann & Barnard where indicated
- E. Corrugated Buck Anchor: Corrugated formed sheet metal, 1-1/4 inch wide, 4" long, by 0.06 inch thick (16 gauge) , hot dip galvanized to ASTM A153/A153M, Class B, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.
 - 1. Seismic veneer anchor #345 SV with continuous wire, Hohmann & Barnard

2.4 MATERIALS: STEEL

- A. Steel Sections: ASTM A36/A36M.

2.5 FABRICATED ITEMS

- A. Lintels: As detailed; Prime paint interior; hot-dip galvanized finish for exterior.
 - 1. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.
 - 2. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.

2.6 FINISHES: STEEL

- A. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.

2.7 FABRICATION TOLERANCES

- A. Maximum Offset Between Faces: 1/16 inch.
- B. Maximum Misalignment of Adjacent Members: 1/16 inch.
- C. Maximum Bow: 1/8 inch in 48 inches.
- D. Maximum Deviation From Plane: 1/16 inch in 48 inches.

2.8 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
 - 1. Manufacturers:
 - a. Hohmann & Barnard, Inc (including Dur-O-Wal brand): www.h-b.com.
 - b. Substitutions: See Section 01 3000 – Administrative Requirements.
- B. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed bars epoxy coated, with less than 2 percent damaged coating in each 12-inch (300-mm) bar length.
- C. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.
 - 1. Prepare 1 set of prisms for testing at 7 days and 1 set for testing at 28 days.
 - a. Dimensional Stability: 2.0 as per ASTM D-2126.
 - b. Linear Coefficient of thermal expansion: 2.7×10^{-5}
 - c. Flame Spread: 5 as per ASTM E-84.
 - d. Smoke Developed: 45-175 as per ASTM E-84. e. Oxygen Index: 24 Min. as per ASTM D-2863
- D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication.
 - 1. Provide units with either two loops or four loops as needed for number of bars indicated.
 - a. Hohmann & Barnard, Inc. #RB Rebar Positioner
 - b. Hohmann & Barnard, Inc. #RB-Twin Rebar Positioner

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry or steel work.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.
- C. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.3 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: Concave.

3.4 PLACING AND BONDING

- A. Lay hollow masonry units with face shell bedding on head and bed joints.
- B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- C. Remove excess mortar and mortar smears as work progresses.
- D. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

- E. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- F. Cut mortar joints flush where wall tile is scheduled, resilient base is scheduled, or bitumen damp-proofing is applied.
- G. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- H. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.5 REINFORCEMENT AND ANCHORAGE - GENERAL

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 24 inches vertically.

3.6 REINFORCEMENT AND ANCHORAGE - SINGLE WYTHE MASONRY

- A. Install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.

3.7 REINFORCEMENT AND ANCHORAGES - MULTIPLE WYTHE UNIT MASONRY

- A. Install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- F. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Space anchors at maximum of 24 inches horizontally and 16 inches vertically.

3.8 REINFORCED UNIT MASONRY LINTELS

- A. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.
 - 1. Openings to 42 inches: Place two, No. 3 reinforcing bars 1 inch from bottom web.
 - 2. Openings from 42 inches to 78 inches: Place two, No. 5 reinforcing bars 1 inch from bottom web.
 - 3. Openings over 78 inches: Reinforce openings as detailed.
 - 4. Do not splice reinforcing bars.
 - 5. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
 - 6. Place and consolidate grout fill without displacing reinforcing.
 - 7. Allow masonry lintels to attain specified strength before removing temporary supports.

- B. Maintain minimum 4 inch bearing on each side of opening.

3.9 STEEL LINTELS

- A. Installation:
 - 1. Install fabricated items as per manufacturer's instructions.
 - 2. Install items plumb and level, accurately fitted, free from distortion or defects.
 - 3. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- B. Tolerances:
 - 1. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative. B. Maximum Offset From True Alignment: 1/4 inch.
 - 2. Maximum Out-of-Position: 1/4 inch.

3.10 GROUTED COMPONENTS

- A. Reinforce bond beams with 2, No. 5 bars, 1 inch from bottom web.
- B. Lap splices minimum 24 bar diameters.
- C. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- D. Place and consolidate grout fill without displacing reinforcing.

3.11 CONTROL JOINTS

- A. Do not continue horizontal joint reinforcement through control joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- C. Size control joint in accordance with Section 07 9005 for sealant performance.
- D. Form expansion joint as detailed.

3.12 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames and anchor bolts and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.

3.13 MASONRY WORK TOLERANCES

- A. Maximum Variation from Alignment of Columns: 1/4 inch.
- B. Maximum Variation from Unit to Adjacent Unit: 1/16 inch.
- C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.
- G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.14 CUTTING AND FITTING

- A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.15 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000.
- B. Inspecting installation of anchors, joint reinforcing, cavity insulation, cavity mortar net, weep holes etc.
 - 1. Weep holes shall be tested by placing water (by bucket or hose) into cavity.

3.16 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.
- E. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- F. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application.
- G. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- H. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
 - 5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

3.17 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

3.18 MASONRY WASTE DISPOSAL

- A. Excess Masonry Waste: Remove excess, clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION

**SECTION 05 1200
STRUCTURAL STEEL FRAMING**

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. Structural steel framing members.
- B. Structural steel support members.
- C. Architecturally exposed structural steel and columns.
- D. Grouting under base plates.
- E. Anchor bolts, base and bearing plates.

1.3 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Steel fabrications affecting structural steel work.
- B. Section 01 4533 - Code-Required Special Inspections.

1.4 REFERENCE STANDARDS

- A. AISC (MAN) - Steel Construction Manual; 2017.
- B. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; 2016.
- C. ANSI/AISC 360, "Specification for Structural Steel Buildings."
- D. American Hot-Dip Galvanizers Association, Inc.; Zinc Institute Inc
- E. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- F. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- G. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished; 2013.
- H. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- I. ASTM A242/A242M - Standard Specification for High-Strength Low-Alloy Structural Steel; 2013.
- J. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- K. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts; 2015.
- L. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2011 (Reapproved 2015).
- M. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.
- N. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions; 2016.
- O. ASTM F959/F959M - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners, Inch and Metric Series; 2017a.
- P. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2015, with Editorial Revision (2017).
- Q. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- R. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).
- S. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections; 2014, with Errata (2015).

- T. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- U. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
- V. UL (FRD) - Fire Resistance Directory; current edition.

1.5 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, locations of structural members, attachments, and fasteners.
 - 2. Connections.
 - 3. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
 - 4. Include embedment drawings.
 - 5. Indicate type, size, and length of bolts. Identify Pretensioned and slip-critical high-strength bolted connections.
 - 6. Qualification Data: For Installer, fabricator and professional engineer.
- C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.
- D. Mill Test Reports: Indicate structural strength, destructive test analysis and non-destructive test analysis.
- E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.
- F. Designer's Qualification Statement.
- G. Fabricator's Qualification Statement.
- H. Submit non-shrink grout, primer, finish paint, and manual of high strength bolts.

1.6 PERFORMANCE REQUIREMENTS

- A. Comply with New York State Uniform Fire and Building Code Chapter 16 "Structural Design".
- B. Construction: Types 1, rigid frame; 2, simple framing.
- C. Construction: Type FR, fully restrained.
- D. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
 - 1. Select and complete connections using schematic details indicated and AISC's "Manual of Steel Construction, Allowable Stress Design," Part 4 and comply with connection details shown on structural drawings.
 - 2. Engineering Responsibility: Fabricator's responsibilities include using a qualified professional engineer, license to practice in the State of New York, to prepare structural design and analysis data for structural-steel connections, interior ramp structure, and including splices where required.

1.7 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC (MAN) "Steel Construction Manual." B.
- B. Fabricator: Company specializing in performing the work of this section with minimum 10 years of documented experience and is a designated an AISC-Certified Plant.
- C. Erector: Company specializing in performing the work of this section with minimum 10 years of documented.
- D. Design connections not detailed on the drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in New York. Where steel splices are required due site conditions, design splices for 100% of beam capacity.

- E. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the New York State and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for projects with structural steel framing that are similar to that indicated for this Project in material, design, and extent.
 - 1. Engineering Responsibility: Fabricator's responsibilities include using a qualified professional engineer to prepare structural design and analysis data for structural-steel connections, interior ramp structure, including splices where required.

1.8 COORDINATION

- A. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation

PART 2 - PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A. Refer to Section 01 4100 - Regulatory Requirements.

2.2 MATERIALS

- A. Steel Angles and Plates: ASTM A36/A36M.
- B. Steel W Shapes and Tees: ASTM A992/A992M.
- C. Rolled Steel Structural Shapes: ASTM A992/A992M.
- D. Steel Shapes, Plates, and Bars: ASTM A242/A242M high-strength, corrosion-resistant structural steel.
- E. Steel Shapes, Plates, and Bars: ASTM A529/A529M high-strength, carbon-manganese structural steel, Grade 50.
- F. Steel Plates and Bars: ASTM A572/A572M, Grade 50 (345) high-strength, columbium-vanadium steel.
- G. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade B.
- H. Pipe: ASTM A53/A53M, Grade B, Finish black.
- I. Shear Stud Connectors: Made from ASTM A108 Grade 1015 bars.
- J. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563 or ASTM A563M nuts and ASTM F436/F436M washers.
- K. Unheaded Anchor Rods: ASTM F1554, Grade 36, plain, with matching ASTM A563 or ASTM A563M nuts and ASTM F436/F436M Type 1 washers.
- L. Load Indicator Washers: Provide washers complying with ASTM F959/F959M at connections requiring high-strength bolts.
- M. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- N. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 - 1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
 - 2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.
- O. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.
- P. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.3 FABRICATION

- A. Shop fabricate to greatest extent possible.
- B. Space shear stud connectors at 12 inches on center, unless otherwise noted on plans.

- C. Fabricate connections for bolt, nut, and washer connectors.
- D. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work
 - 1. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
 - a. Grind butt welds flush.
 - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.
 - 2. All exposed welds shall be Type 1

2.4 FINISH

- A. Prepare structural component surfaces in accordance with SSPC SP6/NACE No. 3, "Commercial Blast Cleaning" for all exposed steel.
- B. SSPC-SP 3, "Power Tool Cleaning" for steel not exposed
- C. Galvanize structural steel members to comply with ASTM A123/A123M. Provide minimum 1.7 oz/sq ft galvanized coating.

2.5 SOURCE QUALITY CONTROL

- A. Provide shop testing of structural steel.
 - 1. Members to be Tested: welded, shop-welded shear connectors .
 - 2. Test Method: AWS D1.1.
- B. High-Strength Bolts: Provide testing and verification of shop-bolted connections in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts", testing at least 2 percent of bolts at each connection.
- C. Welded Connections: Visually inspect all shop-welded connections and test at least 10 percent of welds using one of the following:
 - 1. Radiographic testing performed in accordance with ASTM E94/E94M.
 - 2. Ultrasonic testing performed in accordance with ASTM E164.
 - 3. Liquid penetrant inspection performed in accordance with ASTM E165/E165M.
 - 4. Magnetic particle inspection performed in accordance with ASTM E709.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.
- B. Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.3 ERECTION

- A. Erect structural steel in compliance with AISC 303.

- B. Allow for erection loads, and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Field weld components indicated on shop drawings.
- D. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts".
- E. Do not field cut or alter structural members without approval of Architect .
- F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
- G. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.
- H. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates
 - 1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
 - a. Leveling plates will not be permitted.
 - 2. Weld plate washers to top of base plate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and base and bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts

3.4 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

3.5 FIELD QUALITY CONTROL

- A. Refer to Section 01 4533 - Code-Required Special Inspections for additional testing requirements.
- B. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports. All tests to be done under supervision of NY State Licensed P.E.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections
- C. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with RCSC "Specification for Structural Joints Using High-Strength Bolts", testing at least 25 percent of bolts at any given connection. If any bolt in a connection falls short of torque specified by bolt manufacturer, test all remaining bolts at connection.. Provide follow up reports.
- D. Welded Connections: Visually inspect all field-welded connections and test at least 20 percent of welds using one of the following:
 - 1. Ultrasonic testing performed in accordance with ASTM E164.
 - 2. Liquid penetrant inspection performed in accordance with ASTM E165/E165M.
 - 3. Magnetic particle inspection performed in accordance with ASTM E709.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:

1. Bend tests will be performed if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
 - a. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1

END OF SECTION

SECTION 05 5000
METAL FABRICATIONS

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. Shop fabricated steel items.
- B. Loose lintel where required for work under this section.
- C. Abrasive metal nosing for concrete stairs.
- D. Metal bollards.
- E. Angle frame at concrete pads.

1.3 RELATED REQUIREMENTS

- A. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.
- B. Section 05 5213 - Pipe and Tube Railings.
- C. Section 32 1313 - Concrete: Placement of metal fabrications in concrete.

1.4 REFERENCE STANDARDS (Current Approved Editions)

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; American Architectural Manufacturers Association.
- B. ANSI A14.3 - American National Standard for Ladders - Fixed - Safety Requirements.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
- D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- F. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- G. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
- H. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
- I. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- J. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- K. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- L. ASTM B211 - Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire.
- M. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- N. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society.
- O. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society.
- P. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings.
- Q. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings.

1.5 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Ladders: Provide ladders capable of withstanding the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
- B. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces

1.6 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: For the following:
 - 1. Lintels.
 - 2. Metal bollards.
 - 3. Angle framing.
 - 4. Paint products.
- C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer, licensed in the State of New York, responsible for their preparation
- D. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

1.7 QUALITY ASSURANCE

- A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of New York and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent
- B. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code-Steel."

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
 - 2. Provide allowance for trimming and fitting at site.

1.9 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor

bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

- B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A500/A500M, Grade B cold-formed structural tubing.
- C. Plates: ASTM A283.
- D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- E. Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, galvanized to ASTM A153/A153M where connecting galvanized components.
- F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.2 MATERIALS – ALUMINUM (Not Used)

2.3 FABRICATION

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work
- D. Fit and shop assemble items in largest practical sections, for delivery to site.
- E. Fabricate items with joints tightly fitted and secured.
- F. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Do not use ferrous material and equipment on stainless steel components.
 - 3. Obtain fusion without undercut or overlap.
 - 4. Remove welding flux immediately.
 - 5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate
- H. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- I. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 316L stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.
- B. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5
 - 2. Material for Anchors in Exterior Locations: Alloy Group 1 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594

2.5 FABRICATED ITEMS

- A. Fixed Bollards
 - 1. Diameter: 6 inches
 - 2. Material: Schedule 40 steel pipe galvanized
 - 3. Cap bollards with prefabricated 1/4-inch-thick steel cone cap.
 - 4. Sleeves steel pipe 1/4-inch-thick steel plate welded to bottom of sleeve. Make sleeves 3/4 inch larger than OD of bollard x full depth on footing.
 - 5. Concrete filled for fixed bollards.
- B. Lintels: As detailed; Prime paint interior; galvanized for exterior finish.
 - 1. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated
 - 2. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.
 - 3. Galvanize loose steel lintels located in exterior walls

2.6 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.

2.8 FINISHES - STEEL

- A. Prime paint all steel items.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
 - 1. Interior ferrous metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664
 - 2. Exterior ferrous metal: Organic zinc-rich primer, complying with SSPC-Paint 20 and compatible with topcoat.

- a. Finish shall be black.
- 3. Exterior Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat
- E. Finish: One Coat: Yellow.
- F. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
- G. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.9 FINISHES – ALUMINUM (Not Used)

2.10 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.3 INSTALLATION

- A. Install fabricated items as per manufacturer's instructions
- B. Install items plumb and level, accurately fitted, free from distortion or defects.
- C. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. Field weld components indicated.
- E. Perform field welding in accordance with AWS D1.1/D1.1M.
- F. Obtain approval prior to site cutting or making adjustments not scheduled.
- G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.4 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

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SECTION 05 5213 PIPE AND TUBE RAILINGS

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. Free-standing railings at steps.
- B. Wall mounted handrails.
- C. Stair/ramp railings and guardrails.

1.3 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Placement of anchors in concrete.
- B. Section 32 1313 – Waterproof Concrete

1.4 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2013.
- C. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).
- D. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Arrange for all railings and handrails specified in this Section to be fabricated and installed by the same firm.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of metal stairs (including handrails and railing systems) that are similar to those indicated for this Project in material, design, and extent.
- C. Fabricator Qualifications: A firm, with a minimum of five (5) years' experience in producing metal stairs & railings similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Source Limitations: Obtain each type of railing through one source from a single manufacturer.
- E. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code – Steel."
 - 2. AWS D1.2, "Structural Welding Code – Aluminum."

1.6 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding the allowable design working stress of materials for handrails, railings, anchors, and connections:
 - 1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:
 - a. Concentrated load of 200 lbf applied at any point and in any direction.
 - b. Uniform load of 50 lbf/ft. applied horizontally and concurrently with uniform load of 100 lbf/ft. applied vertically downward.
 - c. Concentrated and uniform loads above need not be assumed to act concurrently.

2. Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:
 - a. Concentrated load of 200 lbf applied at any point and in any direction.
 - b. Uniform load of 50 lbf/ft. applied in any direction.
 - c. Concentrated and uniform loads above need not be assumed to act concurrently.
3. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbf applied to 1 sq. ft. at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.
 - a. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guards.

1.7 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
- C. Samples: Submit one, 12 inch long samples of handrail. Submit one samples of elbow, end stop, wall bracket, and welded joint.

PART 2 - PRODUCTS

2.1 RAILINGS - GENERAL REQUIREMENTS

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.
- B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E 935.
- C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E 935.
- D. Allow for expansion and contraction of members and building movement without damage to connections or members.
- E. Thermal Movements: Provide exterior railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- F. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
- G. Dimensions: See drawings for configurations and heights.
 1. Top Rails and Wall Rails:
 - a. 1-1/2 inches diameter, round.
 - b. 2 inches diameter, round at exterior railings near traffic/ parking areas. See drawings.
 2. Intermediate Rails and Wall Rails:
 - a. 1-1/2 inches diameter, round.
 - b. 2 inches diameter, round at exterior railings near traffic/ parking areas. See drawings.
 3. Posts:
 - a. 1-1/2 inches diameter, round.

- b. 2 inches diameter, round at exterior railings near traffic/ parking areas. See drawings.
 - 4. Guard Rail:
 - a. 1-1/2 inches diameter, round.
 - b. 2 inches diameter, round at exterior railings near traffic/ parking areas. See drawings.
- H. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 - 1. For anchorage to concrete, provide inserts to be cast into concrete, for bolting anchors.
 - 2. For anchorage to stud walls, provide backing plates, for bolting anchors.
- I. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.2 STAINLESS STEEL

- A. Tubing: ASTM A 554, Grade MT 316L.
- B. Pipe: ASTM A 312/A 312M, Grade TP 316L.
- C. Castings: ASTM A 743/A 743M, Grade CF 8M or CF 3M.
- D. Plate and Sheet: ASTM A 666, Type 316L.

2.3 BRACKETS, CONECTORS AND MISCELLANEOUS ITEMS

- A. Wall Brackets: Provide wall brackets as follows:
 - 1. Universal Weld Bracket as manufactured by Wagner Company.
 - a. Model 1980ST for steel railings.
 - b. Model 1980SS for stainless steel railings.
- B. Expansion Connector: Model 3393 as manufactured by Wagner Company.
 - 1. Stainless steel for for stainless steel railings
- C. Wall Returns: Wagner steel wall return with two (2) holes.
- D. Base Flanges: Wagner heavy flush base flanges.
 - 1. Stainless steel with stainless steel railings.

2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Division 9 painting Sections.
 - 1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- C. Anchoring Cement: Factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

2.5 FABRICATION

- A. Provide complete assemblies including handrails, railings, clips, brackets other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding, unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces
- B. Shop Assembly: Pre-assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.

- C. Accurately form components to suit specific project conditions and for proper connection to building structure.
- D. Fit and shop assemble components in largest practical sizes for delivery to site.
- E. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
- F. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work
- G. Close exposed ends of railing members with prefabricated end fittings.
- H. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- I. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work
 - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide fillers made from crush-resistant material, or other means to transfer wall loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
 - 2. Connect railing posts to stair framing by direct welding.
 - 3. For ungalvanized handrails and railings, provide ungalvanized ferrous metal fittings, brackets, fasteners and sleeves.
 - 4. For all exterior applications and use stainless steel or aluminum anchors, including anchors embedded in exterior masonry and concrete construction.
- J. Fasteners: Provide hex set screws for all fasteners.
- K. Toe Boards: Provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated and if not indicated a minimum of 6" high..
- L. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with steel plate forming bottom closure.

2.6 STAINLESS-STEEL FINISHES

- A. Remove tool and die marks and stretch lines or blend into finish.
- B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- C. 180-Grit Polished Finish: Oil-ground, uniform, directionally textured finish.
- D. 320-Grit Polished Finish: Oil-ground, uniform, fine, directionally textured finish.
- E. Polished and Buffed Finish: Oil-ground, 180-grit finish followed by buffing.
- F. Directional Satin Finish: No. 4.
- G. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.7 STEEL AND IRON FINISHES

- A. Galvanized Railings:
 - 1. Hot-dip galvanize exterior steel and iron railings, including hardware, after fabrication.
 - 2. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
- B. For ungalvanized steel railings, provide ungalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.
- C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed railings:
 - 1. Interior Railings (SSPC Zone 1A): SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."

- D. Apply shop primer to prepared surfaces of railings, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete with setting templates, for installation as work of other sections.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Comply with fabricator's and galvanizer's requirements for installation of materials and fabrications, including use of nylon slings or padded cables for handling factory-coated materials
- C. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- D. Install railings in compliance with ADA Standards for accessible design at applicable locations.
- E. Anchor railings securely to structure.
- F. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- G. Field weld anchors as indicated on shop drawings. Touch-up welds with primer. Grind welds smooth.
- H. Touch-Up and Repair: For damaged and field-welded metal coated surfaces, clean welds, bolted connections and abraded areas.
 - 1. For galvanized surfaces, apply organic zinc repair paint complying with requirements of ASTM A 780, modified to 95 percent zinc in dry film.
 - a. Galvanizing repair paint shall have 85 percent zinc by weight. ZiRP by Duncan
 - a) Galvanizing or a Zinc Rich Organic coating may be used. Thickness of applied galvanizing repair paint shall be not less than coating thickness required by
 - b) ASTM A 123 or A 153 as applicable. Touch-up of galvanized surfaces with silver paint, brite paint, or aluminum paints is not acceptable.
 - 2. For factory-applied finish coatings, field-touch-up shall be performed by factory approved personnel for warranties to apply. Touch-up shall be such that repair is not visible from a distance of 6 feet. If non factory-approved technicians are used for field touch-up, no warranties shall exist.
 - 3. A touch-up repair kit or touchup instructions shall be provided to the Owner for each type of factory-applied finish.

3.4 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

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SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Structural dimension lumber framing.
- B. Underlayment.
- C. Preservative treated wood materials.
- D. Fire retardant treated wood materials.

1.02 REFERENCE STANDARDS

- A. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- D. AWPA U1 - Use Category System: User Specification for Treated Wood; 2017.
- E. PS 1 - Structural Plywood; 2009.
- F. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; 2010.
- G. PS 20 - American Softwood Lumber Standard; 2015.

1.03 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. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings.
- B. Moisture Content: S-dry or MC19.

2.03 CONSTRUCTION PANELS

- A. Subfloor/Underlayment Combination: Any PS 2 type, rated Single Floor.
 - 1. Bond Classification: Exterior.
 - 2. Span Rating: 48.
 - 3. Performance Category: 1-1/8 PERF CAT.
 - 4. Edges: Square.

2.04 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
- B. Subfloor Adhesives: Waterproof, air cure type, cartridge dispensed.

- C. Building Paper: Water resistant Kraft paper.

2.05 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWP A U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
 2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWP A standards.
- B. Fire Retardant Treatment:
1. Interior Type A: AWP A 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 as indicated .
 - c. Do not use treated wood in applications exposed to weather or where the wood may become wet.
- C. Preservative Treatment:
1. Preservative Pressure Treatment of Lumber Above Grade: AWP A U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber exposed to weather.
 - c. Treat lumber in contact with roofing, flashing, or waterproofing.
 - d. Treat lumber in contact with masonry or concrete.
 2. Preservative Pressure Treatment of Plywood Above Grade: AWP A U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
 - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
 - b. Treat plywood in contact with masonry or concrete.

PART 3 EXECUTION

3.01 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.

3.02 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

3.03 INSTALLATION OF CONSTRUCTION PANELS

- A. Subflooring/Underlayment Combination: Glue and nail to framing; staples are not permitted.
- B. Subflooring: Glue and nail to framing; staples are not permitted.
- C. Underlayment: Secure to subflooring with nails and glue.
1. At locations where resilient flooring will be installed, fill and sand splits, gaps, and rough areas.
 2. Place building paper between floor underlayment and subflooring.

3.04 TOLERANCES

- A. Surface Flatness of Floor: 1/8 inch in 10 feet (1 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.

- B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet (2 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.

3.05 CLEANING

- A. Waste Disposal: Comply with the requirements of Section 01 7419 - Construction Waste Management and Disposal.
 - 1. Comply with applicable regulations.
 - 2. Do not burn scrap on project site.
 - 3. Do not burn scraps that have been pressure treated.
 - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 1500
WOOD DECKING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glued laminated structural wood decking.

1.02 REFERENCE STANDARDS

- A. AITC 110 - Standard Appearance Grades for Structural Glued Laminated Timber; 2001.
- B. AITC 113 - Standard for Dimensions of Structural Glued Laminated Timber; 2010.
- C. AITC A190.1 - American National Standard for Wood Products - Structural Glued Laminated Timber; 2007.
- D. ASTM D2559 - Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions; 2012a, with Editorial revision (2016).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials.

PART 2 PRODUCTS

2.01 WOOD MATERIALS

- A. Wood fabricated from old growth timber is not permitted.
- B. Regulatory Requirements:
 - 1. Conform to applicable code for fire retardant requirements.
- C. Glued Laminated Decking: Softwood lumber of any species fabricated to comply with AITC A190.1 and AITC 113, laminated with adhesive tested according to ASTM D2559 for wet service; beveled edges, single tongue.
 - 1. Appearance: Fabricate to AITC 110 Industrial grade.
 - 2. After end trimming, seal with penetrating sealer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that support framing is ready to receive decking.

3.02 INSTALLATION - BOARD DECKING

- A. Install decking perpendicular to framing members, with ends staggered over firm bearing. On sloped surfaces, lay decking with tongue upward.
- B. Engage decking tongue and groove edges.
- C. Secure with fasteners. Side spike planks together, through pre-drilled holes.
- D. Maintain decking joint space of 1/16 inch (1.5 mm) maximum.

END OF SECTION

SECTION 06 2000
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.
- B. Wood casings and moldings.

1.02 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).
- C. PS 1 - Structural Plywood; 2009.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with installation of associated and adjacent components.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect work from moisture damage.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.
- B. Exterior Woodwork Items:
 - 1. Window Casings and Moldings: Softwood; prepare for paint finish.
- C. Interior Woodwork Items:
 - 1. Window Sills: Clear fir; prepare for transparent finish.

2.02 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.

2.03 SHEET MATERIALS

- A. Softwood Plywood, Not Exposed to View: Any face species, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.

2.04 FASTENINGS

- A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

2.05 ACCESSORIES

- A. Lumber for Shimming and Blocking: Softwood lumber of pine species.
- B. Wood Filler: Solvent base, tinted to match surface finish color.

2.06 FABRICATION

- A. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Set and secure materials and components in place, plumb and level.
- B. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim to conceal larger gaps.

3.02 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch (1.6 mm).
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.79 mm).

END OF SECTION

SECTION 07 8400

FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.
- B. Firestopping of all joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 REFERENCE STANDARDS

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2016a.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.
- C. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2015.
- D. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestops; 2014b.
- E. 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).
- F. ITS (DIR) - Directory of Listed Products; current edition.
- G. FM 4991 - Approval Standard for Firestop Contractors; 2013.
- H. FM (AG) - FM Approval Guide; current edition.
- I. SCAQMD 1168 - Adhesive and Sealant Applications; 1989 (Amended 2017).
- J. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.
- K. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.
- L. UL (FRD) - Fire Resistance Directory; Current Edition.

1.03 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. Sustainable Design Submittal: Submit VOC content documentation for all non-preformed materials.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.04 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with ASTM E119 and ASTM E814.
 - 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
- B. Installer Qualifications: Company specializing in performing the work of this section and:
 - 1. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:
 - 2. Verification of minimum three years documented experience installing work of this type.
 - 3. Verification of at least five satisfactorily completed projects of comparable size and type.
 - 4. Licensed by local authorities having jurisdiction (AHJ).

PART 2 PRODUCTS

2.01 MATERIALS

- A. Firestopping Materials: Any materials meeting requirements.

- B. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.
- C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

2.02 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.

2.03 FIRESTOPPING FOR FLOOR-TO-FLOOR, WALL-TO-FLOOR, AND WALL-TO-WALL JOINTS

- A. Concrete and Concrete Masonry Walls and Floors:
 - 1. Floor to Floor Joints:
 - a. 3 Hour Construction: UL System FF-D-1001; Specified Technologies Inc. SIL silicone sealant.
 - 2. Concrete/Concrete Masonry Wall to Wall Joint Systems That Have Not Been Tested For Movement Capabilities (Static):
 - a. 3 Hour Construction: UL System WW-S-0038; Specified Technologies Inc. SIL silicone sealant.
- B. Gypsum Board Walls:
 - 1. Wall to Wall Joints That Have Not Been Tested For Movement Capabilities (Static):
 - a. 2 Hour Construction: UL System WW-S-0063; Specified Technologies Inc. SpeedFlex TTG Track Top Gasket.

2.04 FIRESTOPPING PENETRATIONS THROUGH CONCRETE AND CONCRETE MASONRY CONSTRUCTION

- A. Penetrations Through Floors By:
 - 1. Uninsulated Metallic Pipe, Conduit, and Tubing:
 - a. 3 Hour Construction: UL System F-A-1017; Hilti CP 680-P/M Cast-In Device.
 - b. 2 Hour Construction: UL System F-A-1016; Hilti CP 680-P/M Cast-In Device.
 - 2. Electrical Cables Not In Conduit:
 - a. 3 Hour Construction: UL System F-A-3021; Specified Technologies Inc. EZ-Path Series 33 Fire-Rated Pathway.
 - b. 2 Hour Construction: UL System F-A-3033; Hilti CP 680-P/M Cast-In Device.
 - 3. Insulated Pipes:
 - a. 3 Hour Construction: UL System F-A-5016; Hilti CP 680-P Cast-In Device.
 - b. 2 Hour Construction: UL System F-A-5015; Hilti CP 680-P/M Cast-In Device.
- B. 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. 4 Hour Construction: UL System W-J-3142; Specified Technologies Inc. Ready-Sleeve.
 - b. 2 Hour Construction: UL System C-AJ-3095; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - c. 2 Hour Construction: UL System W-J-3090; Specified Technologies Inc. SSP Firestop Putty.
 - 3. Insulated Pipes:

- a. 2 Hour Construction: UL System C-AJ-5090; Hilti FS-ONE MAX Intumescent Firestop Sealant.
- b. 1 Hour Construction: UL System C-AJ-5090; Hilti FS-ONE MAX Intumescent Firestop Sealant.

2.05 FIRESTOPPING PENETRATIONS THROUGH GYPSUM BOARD WALLS

- A. Penetrations By:
 - 1. Uninsulated Metallic Pipe, Conduit, and Tubing:
 - a. 2 Hour Construction: UL System W-L-1033; Specified Technologies Inc. SIL silicone sealant.
 - b. 1 Hour Construction: UL System W-L-1049; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
 - 2. Electrical Cables Not In Conduit:
 - a. 2 Hour Construction: UL System W-L-3024; Specified Technologies Inc. SSP Firestop Putty.
 - b. 1 Hour Construction: UL System W-L-3076; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
 - c. 1 Hour Construction: UL System W-L-3135; Specified Technologies Inc. SSP Firestop Putty.
 - 3. Insulated Pipes:
 - a. 2 Hour Construction: UL System W-L-5014; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
 - b. 1 Hour Construction: UL System W-L-5014; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
 - c. 1 Hour Construction: UL System W-L-5028; Hilti FS-ONE MAX Intumescent Firestop Sealant.

2.06 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

3.02 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.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

3.04 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

END OF SECTION

SECTION 07 9200
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

1.03 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- D. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2013.

1.04 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.
- C. Field Quality Control Plan: Submit at least two weeks prior to start of installation.
- D. 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.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.
- B. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- C. 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.
- D. Non-Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.
 - 1. Record results on Field Quality Control Log.
 - 2. Repair failed portions of joints.

1.06 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

2.01 JOINT SEALANT APPLICATIONS

- A. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
 - 1. Floor Joints in Wet Areas: Non-sag polyurethane "non-traffic-grade" sealant suitable for continuous liquid immersion.
 - 2. Other Floor Joints: Self-leveling polyurethane "traffic-grade" sealant.

2.02 JOINT SEALANTS - GENERAL

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

2.03 NONSAG JOINT SEALANTS

- A. Silicone Sealant: ASTM C920, Uses S and T; single-component, explicitly approved by manufacturer for traffic exposure when recessed below traffic surface; not expected to withstand continuous water immersion.
 - 1. Movement Capability: Plus 500 percent, minimum.
- B. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 25 percent, minimum.
- C. Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface .
 - 1. Movement Capability: Plus and minus 35 percent, minimum.

2.04 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.
- B. Self-Leveling Polyurethane Sealant for Horizontal Expansion Joints: ASTM C920, Grade P, Uses T, M and O; multi-component; explicitly approved by manufacturer for horizontal expansion joints.
 - 1. Movement Capability: Plus and minus 25 percent, minimum.
 - 2. Hardness Range: 30 to 35, Shore A, when tested in accordance with ASTM C661.

2.05 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.
- 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.

PART 3 EXECUTION

3.01 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.

3.02 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.

3.03 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. Install bond breaker backing tape where backer rod cannot be used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- E. 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.
- F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.04 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 11 13
HOLLOW METAL DOORS & FRAMES**

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. Hollow metal doors and frames
- B. Accessories, including glazing and matching panels.
- C. Fire-rated steel doors and frames.
- D. Fire-rated steel doors in existing steel frames.
- E. Patching existing metal frames.
- F. Verification of existing rated doors and or frames.
- G. Thermally insulated steel doors.

1.3 RELATED REQUIREMENTS

- A. Section 08 71 00 – Door Hardware (see Section 01 21 00 – Allowances).
- B. Section 09 91 23 – Interior Painting.
- C. Section 09 9000 - Painting.

1.4 REFERENCED STANDARDS (Current editions including all revisions shall apply):

- A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council.
- B. ANSI A250.3 - Test Procedure and Acceptance Criteria for Factory-Applied Finish Painted Steel Surfaces for Steel Doors and Frames.
- C. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames.
- D. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames.
- E. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers.
- F. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.
- G. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
- H. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.
- I. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies.
- J. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.5 SUBMITTALS

- A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.
- B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, anchoring systems and identifying location of different finishes, if any.
- C. Samples: Submit two samples of metal, 2 x 2 inches in size showing factory finishes, colors, and surface texture.

- D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

- A. Maintain at the project site a copy of all reference standards dealing with installation.
- B. Installed Fire Rated Door Assembly: Conform to NFPA 80 for fire rated class as scheduled.
- C. Existing Frames: All existing frames in fire rated openings, which will receive fire rated doors without UL labels shall be certified as conforming to fire rating indicated on drawings by an independent testing agency approved by authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store in accordance with NAAMM HMMA 840.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Steel Doors and Frames from (or approved equal):
 - 1. Steelcraft (an Allegion brand); Product L-Series: full flush design door; www.allegion.com.
 - 2. Assa Abloy Ceco: www.assaabloydss.com.

2.2 DOORS AND FRAMES

- A. Requirements for all Doors and Frames:
 - 1. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 2. Door Top Closures: Flush with top of faces and edges.
 - 3. Door Edge Profile: Beveled.
 - 4. Door Texture: Flush
 - 5. Glazed Lights (where applicable; see drawings): Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
 - 6. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
 - a. Provide 14 gauge channels reinforcing for all door closers.
 - b. Provide preparation for all electrical hardware (where applicable).
 - 7. Galvanizing for Units in Wet Areas including toilets, etc.: All components hot-dipped zinc-iron alloy-coated (galvannealed), manufacturer's standard coating thickness.
 - 8. Finish: Completely factory finished.
- B. Existing Frames: All existing frames in rated opening, without UL labels shall be certified as conforming to rating indicated on drawings.
- C. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.3 STEEL DOORS

- A. Interior Doors, Non-Fire-Rated:
 - 1. Grade: ANSI A250.8 (16 gauge) Level 3, physical performance Level A, Model 2, seamless, continuous welded.

2. Core: Kraftpaper honeycomb.
 - a. STC Rating: 25
 3. Thickness: 1-3/4 inch.
 4. Texture: None.
 5. Finish: Completely factory finished.
- B. Interior Doors, Fire-Rated:
1. Grade: ANSI A250.8 (16 gauge) Level 3, physical performance Level A, Model 2, seamless continuous welded.
 2. Fire Rating: As indicated on Door and Frame Schedule, tested in accordance with UL 10C ("positive pressure").
 - a. Rate of Temperature Rise Across Door Thickness: 250 degrees F.
 - b. Provide units listed and labeled by UL (Underwriters Laboratories) - UL (BMD). Attach fire rating label to each fire rated unit.
 3. Core: Mineral board.
 4. Thickness: 1-3/4 inch.
 5. Texture: None
 6. Finish: Completely factory finished.
- C. Panels: Same construction, performance, and finish as doors.

2.4 STEEL FRAMES

- A. General:
1. Comply with the requirements of grade specified for corresponding door.
 - a. ANSI A250.8 Level 3 Doors: 16 gage frames.
 - b. ANSI A250.8 Level 4 Doors: 14 gage frames.
 2. Frames > 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.
- B. Interior Door Frames, Non-Fire-Rated: Knockdown type.
- C. Interior Door Frames, Fire-Rated: Fully welded type.
1. Fire Rating: Same as door, labeled.
 2. Finish: Factory primed, for field finishing.

2.5 ACCESSORY MATERIALS

- A. Transoms: Same material, rating and finish as doors.
- B. Glazing Trim: As per manufacturer's standard for flush doors and glass thickness.
- C. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners prepared for countersink style tamper proof screws.
- D. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.
- E. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.
- F. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.
- G. Frame Anchors: Minimum of six wall anchors and two base anchors.
1. T anchors for masonry.
 2. Clips angles for metal framing.
- H. 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".
- I. Foam door seal:
 1. Fill all exterior joint between windows and doors solid in accordance with manufacturer's instructions.
 2. Cut back to permit application of joint sealant.
 3. Insulating-Foam Sealant: Dow "Great Stuff Window & Door.
- J. Glazing: factory installed as required for door rating.

2.6 FINISH MATERIALS

- A. Factory Finish: manufacturer's standard coating.
- B. Color: To be selected by Architect from manufacturer's standard range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.

3.2 PREPARATION

- A. Patch existing frames as required to remove rust, dents, chips and fill holes.
 1. Apply body filler in accordance to manufacturer's instruction.
 2. Sand surfaces smooth.

3.3 INSTALLATION

- A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.
- B. In addition, install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Coordinate installation of hardware.
- E. Coordinate installation of glazing.
- F. Install perimeter foam seal:
 1. Fill all exterior spaces and joint between windows and doors solid with foam in accordance with manufacturer's instructions.
 2. Cut back to permit application of joint sealant.
- G. Touch up damaged factory finishes.

3.4 TOLERANCES

- A. Clearances between Door and Frame: As specified in ANSI A250.8 - SDI-100.
- B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.5 ADJUSTING

- A. Adjust for smooth and balanced door movement.
- B. Adjust sound control doors so that seals are fully engaged when door is closed.

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 General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Fiberglass reinforced polyester (FRP) doors.
- B. Aluminum Frames for fiberglass reinforced polyester doors.
- C. Factory installed Finish Hardware
- D. Foam door seal.
- E. Door hardware.

1.3 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants.

1.4 REFERENCE STANDARDS

- A. ASTM B 209 - Aluminum and Aluminum-Alloy Sheet and Plate.
- B. ASTM B 221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- C. ASTM D 543 - Evaluating the Resistance of Plastics to Chemical Reagents
- D. ASTM D 570 - Water Absorption of Plastics
- E. ASTM D 638 - Tensile Properties of Plastics
- F. ASTM D 790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
- G. ASTM D 1621 - Compressive Properties of Rigid Cellular Plastics
- H. ASTM D 1623 - Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
- I. ASTM D 2126 - Response of Rigid Cellular Plastics to Thermal and Humid Aging
- J. ASTM D 2583 - Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
- K. ASTM D 5420 - Impact Resistance of Flat Rigid Plastic Specimens by Means of a Falling Weight.
- L. ASTM D 6670-01 - Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products
- M. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- N. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2007(Reapproved 2016).
- O. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- P. NFPA 252 - Fire Tests of Door Assemblies.
- Q. UBC Std 7-2 - Fire Tests of Door Assemblies; 1997.
- R. ASTM E 283 - Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- S. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- T. ASTM F 476 - Security of Swinging Door Assemblies.
- U. ASTM F 1642-04 - Standard Test Method for Glazing Systems Subject to Air blast Loading.
- V. NWWDA T.M. 7-90 - Cycle Slam Test Method
- W. SFBC PA 201 - Impact Test Procedures.

- X. SFBC PA 203 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
- Y. SFBC 3603.2 (b)(5) - Forced Entry Resistance Test.

1.5 PERFORMANCE REQUIREMENTS

- A. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.
- B. Air Infiltration: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 283 at pressure differential of 6.27 psf. Door shall not exceed 0.58 cfm/ft².
- C. Water Resistance: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 331 at pressure differential of 7.50 psf. Door shall not have water leakage.
- D. Hurricane Test Standards, Single Door:
 - 1. Uniform Static Load, ASTM E 330: Plus or minus 195 pounds per square foot.
 - 2. Forced Entry Test, 300 Pound Load Applied, SFBC 3603.2 (b)(5): Passed.
 - 3. Cyclic Load Test, SFBC PA 203: Plus or minus 53 pounds per square foot.
 - 4. Large Missile Impact Test, SFBC PA 201: Passed.
- E. Hurricane Test Standards, Pair of Doors with single point latching:
 - 1. Uniform Static Load, ASTM E 330: Plus or minus 112.5 pounds per square foot.
 - 2. Forced Entry Test, 300 Pound Load Applied, AAMA 1304: Passed.
 - 3. Cyclic Load Test, ASTM E 1886: Plus or minus 75 pounds per square foot.
 - 4. Large Missile Impact Test, ASTM E 1886: Passed.
- F. Blast Test, Doors and Frames, ASTM F 1642-04, 6 psi / 41 psi-msec: Minimal Hazard.
- G. Swinging Door Cycle Test, Doors and Frames, ANSI A250.4: Minimum of 25,000,000 cycles.
- H. Cycle Slam Test Method, NWWDA T.M. 7-90: Minimum 5,000,000 Cycles.
- I. Swinging Security Door Assembly, Doors and Frames, ASTM F 476: Grade 40.
- J. Salt Spray, Exterior Doors and Frames, ASTM B 117: Minimum of 500 hours.
- K. Sound Transmission, Exterior Doors, STC, ASTM E 90: Minimum of 25.
- L. Thermal Transmission, Exterior Doors, U-Value, AAMA 1503-98: Maximum of 0.29 BTU/hr x sf x degrees F. Minimum of 55 CRF value.
- M. Surface Burning Characteristics, Class A Option On Interior Faces of FRP Exterior Panels and Both Faces of FRP Interior Panels, ASTM E 84:
 - 1. Flame Spread: Maximum of 25.
 - 2. Smoke Developed: Maximum of 450.
- N. Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 256: 14.0 foot-pounds per inch of notch.
- O. Tensile Strength, FRP Doors and Panels, Nominal Value, ASTM D 638: 13,000 psi.
- P. Flexural Strength, FRP Doors and Panels, Nominal Value, ASTM D 790: 21,000 psi.
- Q. Water Absorption, FRP Doors and Panels, Nominal Value, ASTM D 570: 0.20 percent after 24 hours.
- R. Indentation Hardness, FRP Doors and Panels, Nominal Value, ASTM D 2583: 55.
- S. Gardner Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 5420: 120 in-lb.
- T. Abrasion Resistance, Face Sheet, Taber Abrasion Test, 25 Cycles at 1,000 Gram Weight with CS-17 Wheel: Maximum of 0.029 average weight loss percentage.
- U. Stain Resistance, ASTM D 1308: Face sheet unaffected after exposure to red cabbage, tea, and tomato acid. Stain removed easily with mild abrasive or FRP cleaner when exposed to crayon and crankcase oil.
- V. Chemical Resistance, ASTM D 543. Excellent rating.
 - 1. Acetic acid, Concentrated.
 - 2. Ammonium Hydroxide, Concentrated.
 - 3. Citric Acid, 10%.

4. Formaldehyde.
 5. Hydrochloric Acid, 10%
 6. Sodium hypochlorite, 4 to 6 percent solution.
- W. Doors shall comply with fire resistance and flammability regulations as interpreted by governing authorities, and as follows:
1. Face sheets tested in accordance with ASTM E84 shall have the following ratings:
 - a. Smoke Developed:
 - 1) Not greater than 320 Interior Skins (Class A).
 - 2) Not greater than 345 Exterior Skins (Class C)
 - b. Flame Spread:
 - 1) Not greater than 10 Interior Skins (Class A)
 - 2) Not greater than 70 Exterior Skins (Class C)

1.6 SYSTEM PERFORMANCE:

- A. 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.
- B. Thermal Transmission (Exterior Doors): U-value of not more than 0.09 (BTU/Hr. x sf x degrees F.) per AAMA 1503.1.

1.7 ADMINISTRATIVE REQUIREMENTS

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

1.8 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. Shop Drawings: Indicate layout and profiles; include assembly methods.
 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
- D. 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.
- E. 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.
- F. Door Corner Sample: Submit corner cross sections, 10 inch by 10 inch in size, illustrating construction, finish, color, and texture.
- G. Manufacturer's Qualification Statement.
- H. Installer'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 Owner's name and registered with manufacturer; include detailed terms of warranty.

1.9 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than 20 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 and submit written report.

1.10 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.

1.11 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. 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 inch above grade, with minimum 1/4 inch space between doors.

1.12 SPECIAL PROJECT WARRANTY:

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.
- B. Provide a written warranty signed by Manufacturer, Installer and Contractor, agreeing to replace, at no cost to the Owner, 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.
- C. Warranty Time Period: Ten Years from substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 - 1. Reinforced Fiberglass Doors (FRP)
 - a. Special-Lite, Inc. Decatur, Michigan or approved equal by
 - b. Tubelite - Reed City, Michigan
 - 2. Substitutions: See Section 01 6000 - Product Requirements.

2.2 ALUMINUM DOOR FRAMES

- A. Materials and Accessories
 - 1. Aluminum Members: Provide 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".
 - 2. All materials shall be of the same manufacturer. No splitting of Door and Frame components will be permitted for aluminum frames.
 - 3. 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.
 - 4. 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.
 - 5. 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.
 - 6. Expansion Anchor Devices: Lead shield or toothed steel, drilling expansion bolt anchors.
 - 7. Bituminous Coating: Cold applied asphalt mastic complying with SSPC-PS 12, compounded for 30-mil thickness per coat.
 - 8. 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.
- B. Door Perimeter Framing
 - 1. Tubular Framing:
 - a. Heavy Wall Tube Aluminum Framing with Applied Door & Glass Stops. Size and Type: Model: SL-450T framing system.
 - b. Material: Aluminum Alloy 6063-T5, 0.125-inch minimum wall thickness tube.
 - c. Perimeter Frame Members:
 - 1) Box type with 4 enclosed sides.
 - 2) Size: 2" x 4", aluminum-framed thermally broken, storefront system c) Factory fabricated.
 - 3) Open-back framing is not acceptable.
 - 4) Applied Door Stops:
 - a) 0.625-inch high, with screws and weatherstripping.
 - b) Pressure gasketing for weathering seal.
 - c) Counterpunch fastener holes in door stop to preserve full-metal thickness under fastener head.

- d) Minimum ½" aluminum bar reinforcement under doorstep for required hardware attachments
- d. Caulking: Caulk joints before assembling frame members.
- e. Joints:
 - 1) Secure joints with fasteners.
 - 2) Provide hairline butt joint appearance.
 - 3) Shear block construction only, no screw spline allowed
- f. Hardware:
 - 1) Premachine and reinforce frame members for hardware in accordance with manufacturer's standards and door hardware schedule.
 - 2) Factory install door hardware.
 - 3) Refer to drawings for hardware requirements.
- g. Anchors:
 - 1) Anchors appropriate for wall conditions to anchor framing to wall materials.
 - 2) Door Jamb and Header Mounting Holes: Maximum of 24-inch centers.
 - 3) Secure head and sill members of transom, side lites, and similar conditions.

2.3 FIBERGLASS REINFORCED POLYESTER (FRP) DOORS:

- A. Doors are to be constructed as follows:
 - 1. Model S-17, 1 3/4" thick.
 - 2. Constructed of aluminum alloy rails and stiles, joined with steel tie rods.
 - 3. Stiles to be tubular shape to accept hardware as specified.
 - 4. Top and bottom rails to be extruded with legs for interlocking "rigidity weather bar."
 - 5. Joinery to be 3/8" tie rods, top and bottom, bolted through an extruded spline and 3/16" riveted reinforcing angles, and secured with aircraft type nuts. Doors with mid-panels are to have an additional tie rod at the mid-panel.
- B. All doors shall be pre-machined in accordance with templates from the hardware manufacturer. For surface applied hardware doors shall have necessary reinforcement, including the attachment of RIVNUT blind bolt fasteners. With the exception of door closures and holders, which require field applications, doors are to be shipped with hardware attached.
- C. Face sheets to be locked in with extruded interlocking edges. (No Snap-On trim will be accepted.)
- D. Core is to be of Urethane foam of 5 lb. per cubic foot density. All doors are to be properly reinforced for hardware prior to Urethane core foaming in door.
 - 1. Thermal barrier. Except as provided for in Sections 2603.4.1 and 2603.8, 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 will limit the average temperature rise of the unexposed surface to not more than 250°F (120°C) after 15 minutes of fire exposure, complying with the standard time-temperature curve of ASTM E 119. The thermal barrier shall be installed in such a manner that it will remain in place for 15 minutes based on FM 4880, UL 1040, NFPA 286 or UL 1715. Combustible concealed spaces shall comply with Section 717
 - 2. Submit evaluation report that the doors do not require thermal barrier for non-rated doors.
- E. Face sheets for FRP Doors are to be .120" thick with pebble-like finish.
 - 1. Class A for all interior doors and interior face of exterior doors.
- F. Color as selected by the Architect from Manufactures Standard or Classic Colors. Interior and exterior colors may be different.

2.4 FINISH HARDWARE:

- A. Provide and factory install finish hardware for each door leaf as specified on drawings.

1. Hardware shall be fire rated for fire rated doors.
2. Pre-machine doors in accordance with templates from specified hardware manufacturers and hardware schedule.
- B. Pull
 1. Special-Lite SL-82 Clear Anodized Class I Aluminum Recessed Pull Handles.
- C. Gaskets and Seals supplied by manufacturer:
 1. Gaskets: Pemko S88.
 2. Smoke Seals: Pemko HSS2000, 1/2-inch wide.
 3. Smoke Seals, Pair Doors, Meeting Stile: Pemko S77.
- D. 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.
- E. Install all Hardware, except surface mounted closers, holders, gaskets and sealant 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.
- F. Painting: All existing surfaces to remain exposed, and all disturbed areas shall be painted to match existing surfaces.

2.5 FABRICATION:

- A. Sizes and Profiles: The required sizes for door and frame units, and profiles requirements are shown on the drawings.
- B. The details shown are based upon standard details by one or more manufacturers. It is intended that similar details by other manufacturers will be accepted, provided they comply with size requirements, and with minimum/maximum profile requirements as shown.
- 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. Assembly
 1. Complete the cutting, fitting, forming, drilling and grinding of all metal work prior to the cleaning, finishing, treatment and application for coatings.
 2. 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.
- H. Provide secure attachments and support at mechanical joints, with hairline fit at contacting members.
- I. 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.

2.6 ACCESSORIES

- A. Foam window and door seal.
 1. Fill all exterior joint between windows and doors solid in accordance with manufacturer's instructions.
 2. Cut back to permit application of joint sealant.
 3. Insulating-Foam Sealant: Dow Great Stuff Window & Door.

- B. Door Stops (gasketing): Pemko 350CR.

2.7 FINISHES

- A. Class I Natural Finish or Anodized Plus Natural Anodized 2-step Finish:
 - 1. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick. for all Aluminum Extrusions including the Door Edge, Lite Kit, Continuous Hinge and Framing.

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. Ensure openings to receive frames are plumb, level, square, and in tolerance. D. 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. Install gaskets and seals to doors in accordance with manufacturer's instructions.
- D. Set units plumb, level, and true-to-line, without warping or racking doors, and with specified clearances; anchor in place. Anchor securely in place. Separate Aluminum, and other corrodible metal surfaces, from sources of corrosion or electrolytic action at points of contact with other materials, with bituminous coatings, or other means as approved by Architect.
- E. Set thresholds in continuous bed of sealant.
- F. Set units plumb, level and true to line, without warp or rack of doors or frames.
- G. In masonry walls, install frames prior to laying masonry; anchor frames into masonry mortar joints; fill jambs with grout as walls are laid up.
- H. In stud walls, install frames prior to building walls; anchor frames to studs using concealed anchors.
- I. Set saddles in a bed of compound.
- J. Separate aluminum and other metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials.
- K. Install perimeter foam seal in accordance with requirements specified in Section 07 9200 - Joint Sealants.
 - 1. Fill all exterior spaces and joint between windows and doors solid with foam in accordance with manufacturer's instructions.
 - 2. Cut back to permit application of joint sealant.
- L. Repair or replace damaged installed products.
- M. Remove and replace damaged components that cannot be successfully repaired as determined by Architect.

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

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SECTION 08 7100 DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes:
 - 1. Mechanical door hardware for:
 - a. Swinging doors.
 - 2. Field verification, preparation and modification of existing doors and frames to receive new door hardware.
- B. Related Sections:
 - 1. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
 - 2. Division 09 sections for touchup finishing or refinishing of existing openings modified by this section.

1.3 REFERENCES

- A. UL - Underwriters Laboratories
 - 1. UL 10B - Fire Test of Door Assemblies.
 - 2. UL 10C - Positive Pressure Test of Fire Door Assemblies.
 - 3. UL 1784 - Air Leakage Tests of Door Assemblies.
 - 4. UL 305 - Panic Hardware.
- B. DHI - Door and Hardware Institute
 - 1. Sequence and Format for the Hardware Schedule
 - 2. Recommended Locations for Builders Hardware
 - 3. Key Systems and Nomenclature
- C. ANSI - American National Standards Institute
 - 1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 Standards for Hardware and Specialties

1.4 SUBMITTALS

- A. General:
 - 1. Submit in accordance with Conditions of Contract and Division 01 requirements.
 - 2. Highlight, encircle, or otherwise specifically identify on submittals deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
 - 3. Prior to forwarding submittal, comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in "PART 3, EXAMINATION" article, herein.
- B. Action Submittals:
 - 1. Product Data: Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
 - 2. Samples for Verification: If requested by Architect, submit production sample or sample installations of each type of exposed hardware unit in finish indicated, and tagged with full description for coordination with schedule.

- a. Samples will be returned to supplier in like-new condition. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
 3. Door Hardware Schedule: Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by DHI. Indicate complete designations of each item required for each door or opening, include:
 - a. Door Index; include door number, heading number, and Architects hardware set number.
 - b. Opening Lock Function Spreadsheet: List locking device and function for each opening.
 - c. Type, style, function, size, and finish of each hardware item.
 - d. Name and manufacturer of each item.
 - e. Fastenings and other pertinent information.
 - f. Location of each hardware set cross-referenced to indications on Drawings.
 - g. Explanation of all abbreviations, symbols, and codes contained in schedule.
 - h. Mounting locations for hardware.
 - i. Door and frame sizes and materials.
 - j. Name and phone number for local manufacturer's representative for each product.
 4. Key Schedule:
 - a. After Keying Conference, provide keying schedule listing levels of keying as well as explanation of key system's function, key symbols used and door numbers controlled.
 - b. Use ANSI/ BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
 - c. Provide three (3) copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
 - d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
 - e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion.
 - 1) Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
 - f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.
 5. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory prepared for door hardware installation.
- C. Informational Submittals:
 1. Qualification Data: For Supplier, Installer and Architectural Hardware Consultant (AHC).
 2. Certificates of Compliance:
 - a. Certificates of compliance for fire-rated hardware and installation instructions if requested by Architect or Authority Having Jurisdiction.
 - b. Installer Training Meeting Certification: Letter of compliance, signed by Contractor, attesting to completion of installer training meeting specified in "QUALITY ASSURANCE" article, herein.
 3. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by qualified testing agency, for door hardware on doors located in accessible routes.

4. Warranty: Special warranty specified in this Section.
- D. Closeout Submittals:
 1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Name, address, and phone number of local representative for each manufacturer.
 - d. Parts list for each product.
 - e. Final approved hardware schedule, edited to reflect conditions as-installed.
 - f. Final keying schedule
 - g. Copies of floor plans with keying nomenclature
 - h. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

1.5 QUALITY ASSURANCE

- A. Product Substitutions: Comply with product requirements stated in Division 01 and as specified herein.
 1. Where specific manufacturer's product is named and accompanied by "No Substitute," including make or model number or other designation, provide product specified. (Note: Certain products have been selected for their unique characteristics and particular project suitability.)
 - a. Where no additional products or manufacturers are listed in product category, requirements for "No Substitute" govern product selection.
 2. Where products indicate "acceptable manufacturers" or "acceptable manufacturers and products", provide product from specified manufacturers, subject to compliance with specified requirements and "Single Source Responsibility" requirements stated herein.
- B. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that provides certified AHC available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
 1. Warehousing Facilities: In Project's vicinity.
 2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
- C. Installer Qualifications: Qualified tradesmen, skilled in application of commercial grade hardware with record of successful in-service performance for installing door hardware similar in quantity, type, and quality to that indicated for this Project.
- D. AHC Qualifications: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
 1. For door hardware, DHI-certified, AHC.
 2. Can provide installation and technical data to Architect and other related subcontractors.
 3. Can inspect and verify components are in working order upon completion of installation.
- E. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
- F. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

- G. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 - 1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. at tested pressure differential of 0.3-inch wg of water.
- H. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release latch. Locks do not require use of key, tool, or special knowledge for operation.
- I. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in "REFERENCES" article, herein.
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of wrist and that operate with force of not more than 5 lbf (22.2 N).
 - 2. Maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
 - b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
 - c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - 3. Bevel raised thresholds with slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
 - 4. Adjust door closer sweep periods so that, from open position of 70 degrees, door will take at least 3 seconds to move to 3 inches (75 mm) from latch, measured to leading edge of door.
- J. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01.
 - 1. Attendees: Owner, Contractor, Architect, Installer, and Supplier's AHC.
 - 2. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - b. Preliminary key system schematic diagram.
 - c. Requirements for key control system.
 - d. Requirements for access control.
 - e. Address for delivery of keys.
- K. Pre-installation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Inspect and discuss preparatory work performed by other trades.
 - 3. Review required testing, inspecting, and certifying procedures.
- L. Coordination Conferences:
 - 1. Installation Coordination Conference: Prior to hardware installation, schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.
 - a. Attendees: Door hardware supplier, door hardware installer, Contractor.
 - b. After meeting, provide letter of compliance to Architect, indicating when meeting was held and who was in attendance.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.

- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
 - 1. Deliver each article of hardware in manufacturer's original packaging.
- C. Project Conditions:
 - 1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
 - 2. Provide secure lock-up for door hardware delivered to Project, but not yet installed. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- D. Protection and Damage:
 - 1. Promptly replace products damaged during shipping.
 - 2. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work.
 - 3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- E. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.
- F. Deliver keys to Owner by registered mail or overnight package service.

1.7 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- C. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.
- D. Direct shipments are not permitted, unless approved by Contractor.
- E. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 03.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Years from date of Substantial Completion, for durations indicated.
 - a. Closers:
 - 1) Mechanical: 30 years.
 - b. Locksets:
 - 1) Mechanical: 3 years.
 - c. Key Blanks: Lifetime
 - d. Exit Devices:
 - 1) Mechanical: 3 years.
 - e. Continuous Hinges: Lifetime warranty.
 - 2. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

1.9 MAINTENANCE

A. Maintenance Tools:

1. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Approval of manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.
- B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- C. Hand of Door: Drawings show direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.
- D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.2 MATERIALS

A. Fasteners

1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
4. Install hardware with fasteners provided by hardware manufacturer.

B. Modification and Preparation of Existing Doors: Where existing door hardware is indicated to be removed and reinstalled.

1. Provide necessary fillers, Dutchmen, reinforcements, and fasteners, compatible with existing materials, as required for mounting new opening hardware and to cover existing door and frame preparations.
2. Use materials which match materials of adjacent modified areas.
3. When modifying existing fire-rated openings, provide materials permitted by NFPA 80 as required to maintain fire-rating.

C. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

2.3 HINGES

A. Provide five-knuckle, ball bearing hinges.

1. Manufacturers and Products:
 - a. Scheduled Manufacturer and Product: Ives 5BB series

- b. Acceptable Manufacturers and Products: Hager BB series, McKinney TAfT 4A series, Stanley FBB Series

B. Requirements:

1. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
 - b. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
2. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Interior: Heavyweight, steel, 5 inches (127 mm) high
 - b. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
3. 2 inches or thicker doors:
 - a. Interior: Heavy weight, steel, 5 inches (127 mm) high
 - b. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
4. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
5. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
6. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins
7. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.
8. Doors 36 inches (914 mm) wide or less furnish hinges 4-1/2 inches (114 mm) high; doors greater than 36 inches (914 mm) wide furnish hinges 5 inches (127 mm) high, heavy weight or standard weight as specified.
9. Provide spring hinges where specified. Provide two spring hinges and one bearing hinge per door leaf for doors 90 inches (2286 mm) or less in height. Provide one additional bearing hinge for each 30 inches (762 mm) of additional door height.

2.4 CONTINUOUS HINGES

A. Aluminum Geared

1. Manufacturers:
 - a. Scheduled Manufacturer: Ives.
 - b. Acceptable Manufacturers: Select, Rotan.
2. Requirements:
 - a. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.25, Grade 2.
 - b. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum, with 0.25-inch (6 mm) diameter Teflon coated stainless steel hinge pin.
 - c. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
 - d. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
 - e. On fire-rated doors, provide aluminum geared continuous hinges that are classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
 - f. Install hinges with fasteners supplied by manufacturer.

- g. Provide hinges with symmetrical hole pattern.

2.5 FLUSH BOLTS

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Ives
 - 2. Acceptable Manufacturers: Burns, Rockwood
- B. Requirements:
 - 1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.6 COORDINATORS

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Ives
 - 2. Acceptable Manufacturers: Burns, Rockwood
- B. Requirements:
 - 1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
 - 2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers and surface vertical rod exit device strikes. Factory-prep coordinators for vertical rod devices if required.

2.7 MORTISE LOCKS

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product: Schlage L9000 series
- B. Requirements:
 - 1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1 Operational, Grade 1 Security, and manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
 - 2. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latch bolt. Provide deadbolt with full 1 inch (25 mm) throw, constructed of stainless steel.
 - 3. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
 - 4. Lever Trim: Solid brass, bronze, or stainless steel cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
 - a. Lever Design: Schlage 12A.
 - b. Tactile Warning (Knurling): Where required by authority having jurisdiction. Provide on levers on exterior (secure side) of doors serving rooms considered to be hazardous.
 - 5. Indicators: Where specified, provide indicator window measuring a minimum 2 inch x 1/2 inch with 180 degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
 - a. Occupied Indicator: Provide indicator above cylinder for visibility while operating the lock that identifies the trim as occupied/unoccupied status of the door.

Indicator in unoccupied state has a white background with black text and icon.
Indicator in the occupied state has a red background with white text and icon.

2.8 EXIT DEVICES

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product: Von Duprin 99 series.
 - 2. Acceptable Manufacturers and Products: Falcon 25 Series, Precision Apex series
- B. Requirements:
 - 1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1, and UL listed for Panic Exit or Fire Exit Hardware. Cylinders: Refer to "KEYING" article, herein.
 - 2. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
 - 3. Touchpad: Extend minimum of one half of door width. Match exit device finish, stainless steel for US26, US26D, US28, US32, and US32D finishes; and for all other finishes, provide compatible finish to exit device. No plastic inserts are allowed in touchpads.
 - 4. Provide flush end caps for exit devices.
 - 5. Provide exit devices with manufacturer's approved strikes.
 - 6. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
 - 7. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where the glass trim or molding projects off face of door, provide glass bead kits.
 - 8. Provide hex-key dogging at non-fire-rated exit devices.
 - 9. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
 - 10. Where lever handles are specified as outside trim for exit devices, provide heavy-duty lever trims with forged or cast escutcheon plates. Provide vandal-resistant levers that will travel to 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set.
 - a. Lever Style: Match lever style of locksets.
 - b. Tactile Warning (Knurling): Where required by authority having jurisdiction.
 - 11. Provide UL labeled fire exit hardware for fire rated openings.
 - 12. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.

2.9 CYLINDERS

- A. Manufacturer and Product:
 - 1. Scheduled Manufacturer and Product:
 - a. Corbin Russwin D1 Keyway.
 - b. SCHLAGE EVEREST PRIMUS Schlage Everest Primus 29T.
 - 2. Approved Manufacturers and Products: No Substitute.
- B. Requirements:
 - 1. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision, Section 12, Grade 1; permanent cylinders; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.
 - 2. Provide cylinders in the following configuration, distributed throughout the Project as indicated.

- a. Security cylinder with interchangeable core (LFIC) with keyway compatible with existing system.
- b. SCHLAGE EVEREST PRIMUS High Security: Primus XP cylinder, high security, dual-locking cylinder with permanent core requiring restricted, patented keyway.
- c. SCHLAGE EVEREST PRIMUS Conventional: Everest T cylinder with interchangeable core with patented, restricted keyway.
3. Nickel silver bottom pins.
4. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication "Keying Systems and Nomenclature" for identification. Blind code marks shall not include actual key cuts.
5. Identification stamping provisions must be approved by the Architect and Owner.
6. Failure to comply with stamping requirements shall be cause for replacement of cylinders/cores involved at no additional cost to Owner.
 - a. Forward cylinders/cores to Owner, separately from keys, by means as directed by Owner.
7. Replaceable Construction Cores.
 - a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
 - 1) 12 construction change (day) keys.
 - b. Owner or Owner's Representative will replace temporary construction cores with permanent cores.
8. SCHLAGE EVEREST PRIMUS Patent Protection: Cylinders/cores requiring use of restricted, patented keys, patent-protected until the year, 2029.
9. SCHLAGE EVEREST PRIMUS Primus Cylinders: Where indicated, provide "Primus" cylinders/cores with "dual-locking mechanism" with interlocking finger pin(s) to check for patented features on keys.

2.10 KEYING

- A. Keying System: Existing system maintained by Owner or Owners representative, incorporating decisions made at keying conference.
 1. Contact Owner Facilities Department for additional keying information and direction.
- B. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference. SCHLAGE EVEREST PRIMUS Tie into the existing Schlage Primus Everest 29T key system.
- C. Requirements:
 1. Provide keying system capable of multiplex master keying with a 3-level hierarchy.
 2. Permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - a. Grand Master Key System: Cylinders/cores operated by change (day) keys, master key and grand master key.
 3. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements shall be cause for replacement of cylinders/cores involved at no additional cost to Owner.
 4. Provide keys with the following features:
 - a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - b. SCHLAGE EVEREST PRIMUS Patent Protection: Keys and blanks protected by one or more utility patent(s) until the year, 2029.

- c. SCHLAGE EVEREST PRIMUS Geographically Exclusive: Where "Primus" cylinders/cores are indicated, provide nationwide, geographically exclusive key system complying with the following restrictions.
 - 1) One allocation within postal zip codes with the same first 2 digits.
 - 2) One allocation per time zone.
 - 3) One allocation per Country.
- 5. Identification:
 - a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication "Keying Systems and Nomenclature" for identification. Blind code marks shall not include actual key cuts.
 - b. Identification stamping provisions must be approved by the Architect and Owner.
 - c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
 - d. Failure to comply with stamping requirements shall be cause for replacement of keys involved at no additional cost to Owner.
 - e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
- 6. Quantity: Furnish in the following quantities.
 - a. Change (Day) Keys: 3 per cylinder/core.
 - b. Permanent Control Keys: 3.
 - c. Master Keys: 6.

2.11 KEY CONTROL SYSTEM

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Telkee
 - 2. Acceptable Manufacturers: HPC, lund
- B. Requirements:
 - 1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
 - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
 - b. Provide hinged-panel type cabinet for wall mounting.

2.12 DOOR CLOSERS

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product: LCN 4010/4110/4020 series
 - 2. Acceptable Manufacturers and Products: Sargent 281/281P10/281TJ series factory assembled (without PRV)
- B. Requirements:
 - 1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Stamp units with date of manufacture code.
 - 2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
 - 3. Cylinder Body: 1-1/2 inch (38 mm) diameter, with 5/8 inch (16 mm) diameter double heat-treated pinion journal.

4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves with separate adjustment for latch speed, general speed, and backcheck.
7. Provide closers with a solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI/BHMA Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.13 DOOR TRIM

- A. Manufacturers:
 1. Scheduled Manufacturer: Ives
 2. Acceptable Manufacturers: Bums, Rockwood
- B. Requirements:
 1. Provide push plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick and beveled 4 edges. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
 2. Provide push bars of solid bar stock, diameter and length as scheduled. Provide push bars of sufficient length to span from center to center of each stile. Where required, mount back to back with pull.
 3. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
 4. Provide flush pulls as scheduled. Where required, provide back-to-back mounted model.
 5. Provide pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
 6. Provide pull plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
 7. Provide wire pulls of solid bar stock, diameter and length as scheduled.
 8. Provide decorative pulls as scheduled. Where required, mount back to back with pull.

2.14 PROTECTION PLATES

- A. Manufacturers:
 1. Scheduled Manufacturer: Ives
 2. Acceptable Manufacturers: Burns, Rockwood
- B. Requirements:
 1. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
 2. Sizes of plates:
 - a. Armor Plates: 36 inches (914 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

- b. Kick Plates: 8 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
- c. Mop Plates: 4 inches (102 mm) high by 2 inches (51mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.15 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS (Not Used)

- A. Manufacturers:
 - 1. Scheduled Manufacturers: Glynn-Johnson
 - 2. Acceptable Manufacturers: Rixson, Sargent
- B. Requirements:
 - 1. Provide heavy duty concealed mounted overhead stop or holder as specified for exterior and interior vestibule single acting doors.
 - 2. Provide heavy duty concealed mounted overhead stop or holder as specified for double acting doors.
 - 3. Provide heavy or medium duty and concealed or surface mounted overhead stop or holder for interior doors as specified. Provide medium duty surface mounted overhead stop for interior doors and at any door that swings more than 140 degrees before striking wall open against equipment, casework, sidelights, and where conditions do not allow wall stop or floor stop presents tripping hazard.
 - 4. Where overhead holders are specified provide friction type at doors without closer and positive type at doors with closer.

2.16 DOOR STOPS AND HOLDERS

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Ives
 - 2. Acceptable Manufacturers: Burns, Rockwood
- B. Provide door stops at each door leaf:
 - 1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
 - 2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.
 - 3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop.

2.17 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Zero International
 - 2. Acceptable Manufacturers: National Guard, Reese
- B. Requirements:
 - 1. Provide thresholds, weather-stripping (including door sweeps, seals, and astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
 - 2. Size of thresholds:
 - a. Saddle Thresholds: 1/2 inch (13 mm) high by jamb, width by door width
 - b. Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width
 - 3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.18 SILENCERS

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Ives
 - 2. Acceptable Manufacturers: Burns, Rockwood
- B. Requirements:
 - 1. Provide "push-in" type silencers for hollow metal or wood frames.
 - 2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
 - 3. Omit where gasketing is specified.

2.19 BI-PASS DOOR HARDWARE (Not Used)

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Grant
 - 2. Acceptable Manufacturers: KN Crowder
- B. Requirements:
 - 1. Provide complete sets of by-pass door hardware as recommended by manufacturer for door type and weight.
 - a. Include track, hangers, fasteners, guides, cup pulls, and other hardware as required for complete installation.

2.20 FINISHES

- A. Finish: BHMA 626/652 (US26D); except:
 - 1. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
 - 2. Protection Plates: BHMA 630 (US32D)
 - 3. Overhead Stops and Holders: BHMA 630 (US32D)
 - 4. Door Closers: Powder Coat to Match
 - 5. Wall Stops: BHMA 630 (US32D)
 - 6. Latch Protectors: BHMA 630 (US32D)
 - 7. Thresholds: Mill Finish Aluminum
 - 8. Hinges at Exterior Doors: BHMA 630 (US32D)
 - 9. Continuous Hinges: BHMA 628 (US28)
 - 10. Weather-stripping: Clear Anodized Aluminum

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Existing Door and Frame Compatibility: Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Where on-site modification of doors and frames is required:
 - 1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.
 - 2. Field-modify and prepare existing door and frame for new hardware being installed.
 - 3. When modifications are exposed to view, use concealed fasteners, when possible.

4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and width:
 - a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SOI A250.6.
 - b. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.
 - c. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 1. Standard Steel Doors and Frames: ANSI/SOI A250.8.
 2. Custom Steel Doors and Frames: HMMA 831.
 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- H. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 1. Replace construction cores with permanent cores as indicated in keying section.
- I. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- J. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Closers shall not be visible in corridors, lobbies and other public spaces unless approved by Architect.
- K. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- L. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- M. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- N. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- O. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- P. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
- Q. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate offset

pivot per door and one additional intermediate offset pivot for every 30 inches (750 mm) of door height greater than 90 inches (2286 mm).

3.4 FIELD QUALITY CONTROL

- A. AHC: Engage qualified independent AHC to perform inspections and to prepare inspection reports.
 - 1. AHC will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed 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.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
 - 2. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
- B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, and door hardware.

3.6 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

- A. Provide training for Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

3.8 DOOR HARDWARE SCHEDULE

- A. Locksets, exit devices, and other hardware items are referenced in the following hardware sets for series, type and function. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.
- B. **Hardware Sets:**— See Drawings.

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 General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Metal Trim
- D. Acoustic insulation.
- E. Gypsum sheathing.
- F. Gypsum wallboard.
- G. Joint treatment and accessories.
- H. Gypsum Board Shaft Wall Assemblies.

1.3 RELATED REQUIREMENTS

- A. Section 01 6116 – Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 07 8400 – Firestops and Smoke Seals: Sealing top-of-wall assemblies and through-wall penetrations at fire rated walls.
- C. Section 07 9005 – Joint Sealers: Acoustic sealant.

1.4 REFERENCE STANDARDS

- A. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- C. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2012.
- D. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2013.
- E. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- F. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2011.
- G. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- H. 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; 2011.
- I. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2007 (Reapproved 2013).
- J. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2010a.
- K. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.
- L. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing; 2013.
- M. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.

- N. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2014.
- O. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2013.
- P. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
- Q. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- R. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- S. ASTM E413 - Classification for Rating Sound Insulation; 2010.
- T. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2013.
- U. GA-600 - Fire Resistance Design Manual; Gypsum Association; 2012.
- V. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.5 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate special details associated with acoustic seals and framing.
- C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- D. Product Data: For each component of gypsum board shaft wall assembly
- E. Fire-Test-Response Reports: From a qualified independent testing and inspecting agency substantiating each gypsum board shaft-wall assembly's required fire-resistance rating.
- F. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- G. Samples: Submit two samples of gypsum board finished with proposed texture application, 12 by 12 inches in size, illustrating finish color and texture.

1.6 QUALITY ASSURANCE

- A. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.
- B. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance-Rated Assemblies: Indicated by design designations from UL's "Fire Resistance Directory."
- C. STC-Rated Assemblies: For gypsum board shaft-wall assemblies indicated to have STC ratings, provide assembly materials and construction complying with requirements of assemblies whose STC ratings were determined according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.
- D. Installer Qualifications: Company specializing in performing gypsum board application and finishing, with minimum 5 years of documented experience.

1.7 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire rated assemblies as indicated on drawings.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
- B. Interior Partitions Indicated as Acoustic: Provide completed assemblies with the following characteristics:

1. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES (Not Used)

2.3 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 1. Marino: www.marinoware.com.
 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
 1. Studs: "C" shaped with flat or formed webs .
 - a. Minimum Base Metal Thickness: 0.0312 (20 gauge) or as indicated in the drawings (more stringent value applies).
 - b. Depth: As indicated.
 2. Runners: U shaped, sized to match studs.
 3. Shaft Wall Assemblies: CH type as indicated in the drawings.
 4. Ceiling Channels: C shaped.
 5. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
- C. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
 1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
 2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating.
 3. Provide components UL-listed for use in UL-listed fire-rated head of partition joint systems indicated on drawings.
- D. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
- E. Suspended Ceiling and Soffit Framing:
 1. Components, General: Comply with ASTM C 754 for conditions indicated.
 2. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch-diameter wire.
 3. Hangers:
 - a. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.
 - b. Rod Hangers: ASTM A 510, mild carbon steel.
 - 1) Diameter: 1/4-inch.
 - 2) Protective Coating: ASTM A 153/A 153M, hot-dip galvanized.
 4. 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.
 5. Furring Channels (Furring Members): Commercial-steel sheet with ASTM A 653/A 653M, G40, hot-dip galvanized zinc coating.
 - a. Cold Rolled Channels: 0.0538-inch bare steel thickness, with minimum 1/2-inch-wide flange, 3/4 inch deep.
 - b. Steel Studs: ASTM C 645.

- 1) Minimum Base Metal Thickness: As indicated.
 - 2) Depth: As indicated.
6. Grid Suspension System for Interior Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
 - a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Armstrong World Industries, Inc.; Furring Systems/Drywall.
 - b. Main Beam: Shall be double-web construction (minimum 0.0179 inch prior to protective coating), hot dipped galvanized (per ASTM A653).
 - 1) HD8901: 1-1/2 inch web height, prefinished 15/16 inch flange with minimum G40 hot dipped galvanization.
 - c. Primary Cross Tees: Shall be double-web steel construction (minimum 0.0179 inch prior to protective coating), hot dipped galvanized (minimum G40 or G90 per ASTM A653), web height 1-1/2 inch with rectangular bulb and prefinished 1-1/2" knurled flange.
 - d. Secondary Framing Cross Tees : Shall be double web steel construction (minimum 0.0179 inch prior to protective coating), hot dipped galvanized (minimum G40, web height 1-1/2 inch rectangular bulb and 15/16 inch flange (XL8341)
 - e. Hat Furring Channel, HD8940: Shall be 48 inch x 1-3/8 inch x 7/8 inch, hot dipped galvanized steel (minimum G40 per ASTM A653); compatible with HD8901 and HD8906 main beams.
 - f. Wall Molding:
 - 1) HD7859: Hot dipped galvanized (minimum G40), hemmed angle molding, 1-1/4 inch height with 1-1/4 inch flange.
 - g. Clips:
 - 1) MBAC - Main Beam Adapter Clip
 - 2) DWACS, DW50, DW58 - Drywall Attachment Clip for transitions to acoustical ceilings
 - 3) XTAC - Cross Tee Adapter Clip
 - h. Screws for wallboard application shall be bugle head screws in accordance with thickness of material used.

2.4 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 1. Georgia-Pacific Gypsum: www.gpgypsum.com.
 2. National Gypsum Company: www.nationalgypsum.com.
 3. USG Corporation: www.usg.com.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 1. Application: Use for vertical surfaces and ceilings, 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. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Soffits/Ceilings: 1/2 inch.
- C. Abuse-Resistant Wallboard:
 1. Application: High-traffic areas indicated.
 2. Surface Abrasion: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.

3. Surface Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
 4. Soft-body Impact: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
 5. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 6. Glass Mat-Faced Type: Gypsum wallboard as defined in ASTM C1658/C1658M.
 7. Type: Fire-resistance rated Type X, UL or WH listed.
 8. Thickness: 5/8 inch.
 9. Microbial Resistance (ASTM D6329, EPA 12-week protocol): Will not support microbial growth.
 10. R-Value (ASTM C518): 0.67.
 11. Nail Pull Resistance (ASTM C473, ASTM C1658): Not less than 90 lbf.
 12. Humidified Deflection (ASTM C473, ASTM C1658): Not more than 1/8 inch.
 13. Hardness, Core, Edges, and Ends (ASTM C473, ASTM C1396, ASTM C1658): Not less than 15.
 14. Water Absorption (ASTM C630, ASTM C1396, ASTM C1658): Less than 5 percent of weight.
 15. Edges: Tapered.
 16. Products:
 - a. Georgia-Pacific Gypsum; DensArmor Plus Abuse-Resistant.
- D. Ceiling Board: Special sag-resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: soffits and ceilings, unless otherwise indicated.
 2. Thickness: 1/2 inch.
 3. Edges: Tapered.
 4. Products:
 - a. Georgia-Pacific Gypsum; ToughRock Span 24 Ceiling Board.

2.5 ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness as show on drawings.
- B. Finishing Accessories: ASTM C1047, paper face metal bead and trim., unless otherwise indicated.
 1. Types: As detailed and required for finished appearance.
 2. Special Shapes: In addition to conventional cornerbead and control joints, provide U-bead at exposed panel edges.
 3. Manufacturers - Finishing Accessories:
 - a. Same manufacturer as framing materials.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.
 1. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
 2. Mold resistant and asbestos free.
 3. Ready-mixed vinyl-based joint compound.
- D. Screws for Attachment to Steel Members Less Than 0.03 inch In Thickness, to Wood Members, and to Gypsum Board: ASTM C1002; self-piercing tapping type; cadmium-plated for exterior locations.
- E. Screws for Attachment to Steel Members From 0.033 to 0.112 Inch in Thickness: ASTM C954; steel drill screws for application of gypsum board to loadbearing steel studs.

- F. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.
- G. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
- H. Reinforcing: Galvanized-steel reinforcing strips with [0.033-inch (0.84-mm)] minimum thickness of base metal (uncoated).
- I. Acoustical Sealant: Section 07 90 05 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.2 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Provide metal Bracing: at midpoint up to 8' 0"; at third point over 8'-0".
- C. Studs: Space studs at 16 inches on center unless shown otherwise
 - 1. Extend partition framing to structure in all locations.
 - 2. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs minimum 16 gauge..
- E. Standard Wall Furring: Install at masonry walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 16 inches on center.
 - 1. Orientation: Horizontal.
- F. Blocking: Install wood blocking for support of:
 - 1. Framed openings.
 - 2. Plumbing fixtures.
 - 3. Toilet partitions.
 - 4. Toilet accessories.
 - 5. Wall mounted door hardware.
 - 6. Visual display boards.
 - 7. Various equipment as indicated in the drawings (Audio Video, IT, etc)
- G. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
 - 1. Level ceiling system to a tolerance of 1/1200.

3.3 SHAFT WALL INSTALLATION (Not Used)

3.4 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.5 BOARD INSTALLATION

- A. Comply with ASTM C 840 and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
- C. Double-Layer Non-Rated: 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. Installation on Metal Framing: Use screws for attachment of all gypsum board .
- E. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board with sealant.

3.6 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
 - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.7 JOINT TREATMENT

- A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 2. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
 - 2. Taping, filling and sanding is not required at base layer of double layer applications.

END OF SECTION

SECTION 09 3000

TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tile for floor applications.
- B. Stone thresholds.
- C. Non-ceramic trim.

1.02 REFERENCE STANDARDS

- A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2017.
- B. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2014.
- C. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- D. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement; 1999 (Reaffirmed 2010).
- E. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2009 (Revised).
- F. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- G. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 1999 (Reaffirmed 2010).
- H. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2010).
- I. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (Reaffirmed 2010).
- J. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 1999 (Reaffirmed 2010).
- K. ANSI A108.12 - American National Standard for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- L. 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).
- M. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2013 (Revised).
- N. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2012 (Revised).
- O. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation; 2010 (Reaffirmed 2016).
- P. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes For Thin-Set Ceramic Tile And Dimension Stone Installation; 2014.
- Q. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014.
- R. ASTM C150/C150M - Standard Specification for Portland Cement; 2016.
- S. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016.

- T. ICC-ES AC308 - Acceptance Criteria for Termite Physical Barrier Systems; 2014 (editorially revised 2017).
- U. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2017.

1.03 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. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
- D. 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.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.
- G. 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 Tile: 10 square feet (1 square meters) of each size, color, and surface finish combination.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in performing tile installation, with minimum of five years of documented experience.

1.05 MOCK-UP

- A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.
- B. Construct tile mock-up where indicated on drawings, incorporating all components specified for the location.
 - 1. Approved mock-up may remain as part of the Work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not install solvent-based products in an unventilated environment.
- B. Maintain ambient and substrate temperature of 50 degrees F (10 degrees C) during installation of mortar materials.

PART 2 PRODUCTS

2.01 TILE

- A. Manufacturers: All products by the same manufacturer.
- B. Terrazzo Tile:
 - 1. Composition: Portland cement, ASTM C150/C150M; aggregate complying with ASTM C33/C33M.
 - 2. Size: 12 by 12 inch (305 by 305 mm), nominal.
 - 3. Thickness: 1/2 inch (13 mm).
 - 4. Surface Finish: Polished.
 - 5. Color(s): To be selected by owner.

2.02 TRIM AND ACCESSORIES

- A. Pre-Formed Accessories To Be Covered with Tile: High density expanded polystyrene with ANSI A118.10 waterproofing finish.

- B. Non-Ceramic Trim: Satin brass anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
 - 1. Applications:
 - a. Open edges of floor tile.
 - b. Wall corners, outside and inside.
 - c. Transition between floor finishes of different heights.
- C. Thresholds: Marble, white or gray, honed finish; 2 inches (51 mm) wide by full width of wall or frame opening; 1/2 inch thick (12.7 mm thick); beveled one long edge with radiused corners on top side; without holes, cracks, or open seams.
 - 1. Applications:
 - a. At doorways where tile terminates.
 - b. At open edges of floor tile where adjacent finish is a different height.

2.03 SETTING MATERIALS

- A. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.
- B. Epoxy Adhesive and Mortar Bond Coat: ANSI A118.3.

2.04 GROUTS

- A. Standard Grout: ANSI A118.6 standard cement grout.
 - 1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
 - 2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.

2.05 MAINTENANCE MATERIALS

- A. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
 - 1. Composition: Water-based colorless silicone.

2.06 ACCESSORY MATERIALS

- A. Waterproofing Membrane: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
- B. Reinforcing Mesh: 2 by 2 inch (51 by 51 mm) size weave of 16/16 wire size; welded fabric, galvanized.
- C. Underlayment at Floors: Specifically designed for bonding to thin-set setting mortar; not primarily a waterproofing material and having the following characteristics:
 - 1. Crack Resistance: No failure at 1/16 inch (1.6 mm) gap, minimum; comply with ANSI A118.12.
 - 2. Water Resistance: Comply with ANSI A118.10, bonded waterproofing.
 - 3. Termite Resistance: 100 percent when tested in accordance with ICC-ES AC380.
 - 4. Type: Thin-Set Mortar Adhered Sheet.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor 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 sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.
- D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.

3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.

- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

3.03 INSTALLATION - GENERAL

- A. Install tile and thresholds and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.13, manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- E. Form internal angles square and external angles bullnosed.
- F. Install non-ceramic trim in accordance with manufacturer's instructions.
- G. Install thresholds where indicated.
- H. Sound tile after setting. Replace hollow sounding units.
- I. Keep control and expansion joints free of mortar, grout, and adhesive.
- 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.

3.04 CLEANING

- A. Clean tile and grout surfaces.

3.05 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 General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.3 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 07 90 05 - Joint Sealers: Acoustical sealant.
- C. Divisions 23 and 26 for fire alarm, air outlets and inlets, and light fixtures

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; 2013.
- B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 2013.
- C. 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; 2014.
- D. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- E. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2008.
- F. CAL (CHPS LEM) - Low-Emitting Materials Product List; California Collaborative for High Performance Schools (CHPS); current edition at www.chps.net/.
- G. Ceilings and Interior Systems Construction Association (CISCA): Code of Practices.

1.5 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components.
- C. Samples: Submit two samples 12 x 12 inch in size illustrating material and finish of acoustical units.
- D. Samples: Submit two samples each, 12 inches long, of suspension system main runner.
- E. Manufacturer's Installation Instructions: Indicate special procedures.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.6 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 5 years documented experience.
- C. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 5 years documented experience.
- D. Installers Qualifications: Company specializing in the installation of acoustical ceilings specified in this section with minimum 5 years documented experience.

1.7 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acoustic Panels:
 - 1. Armstrong World Industries, Inc: www.armstrong.com.
 - 2. Tectum Inc. info@tectum.com.
- B. Suspension Systems:
 - 1. Armstrong World Industries, Inc: www.armstrong.com.

2.2 ACOUSTICAL UNITS

- A. Acoustical Panels Type ACT: School Zone Fine Fissured.
 - 1. Size: 24 x 24 x 3/4 inches.
 - 2. Light Reflectance: 0.85 percent, determined as specified in ASTM E 1264.
 - 3. NRC Range: 0.70 to 0.70, determined as specified in ASTM E 1264.
 - 4. Ceiling Attenuation Class (CAC): 35, determined as specified in ASTM E 1264.
 - 5. Panel Edge: Square.
 - 6. Surface Pattern: fine fissured.
 - 7. Surface Color: White.
 - 8. Antimicrobial Paint Treatment.
 - 9. Humidity-Resistant.
 - 10. Bio block paint on face and back.
 - 11. Product: School Zone Fine Fissured # 1811 by Armstrong World Industries, Inc www.armstrong.com.
 - 12. Suspension System: Exposed grid Type Prelude XL.

2.3 SUSPENSION SYSTEM(S)

- A. Manufacturers:
 - 1. Armstrong World Industries, Inc; Product Prelude XL 15/16" and 9/16" Suprafine: www.armstrong.com.
 - 2. Structural Classification: Intermediate duty, ASTM C 635.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- C. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
 - 1. Profile: Tee; 15/16 and 9/16 narrow face inch wide face as indicated on drawings.
 - 2. Construction: Double web.
 - 3. Finish: White painted.

2.4 ACCESSORIES

- A. A.Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Same material and finish as grid.
 - 1. Minimum 7/8" horizontal flange
 - 2. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.

- C. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.
- D. Acoustical Sealant For Perimeter Moldings: Specified in Section 07 90 05.
- 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 INSTALLATION - SUSPENSION SYSTEM

- A. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- B. Locate system on room axis according to reflected plan.
- C. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- D. Hanger spacing not more than 48" oc. and not more than 8" from ends each member.
- E. 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. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- I. Do not eccentrically load system or induce rotation of runners.
- J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Install in bed of acoustical sealant.
 - 2. Use longest practical lengths.
 - 3. Overlap and rivet corners.

3.3 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 units after above-ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.
- G. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.
- H. Install seismic clips or stabilizer bars as per code requirements.

3.4 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.5 ADJUSTING AND CLEANING

- A. Replace damaged or broken material, clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with mfg, touch up procedures using touch up paint as required for small nicks and minor scratches in the surface, Remove and replace any work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.
 - 1. Provide touch up kit for Owner's use.

END OF SECTION

SECTION 09 6220
RESILIENT TERRAZZO TILE

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. Marble terrazzo tile and accessories.

1.03 REFERENCES

- A. ASTM D 695 - Standard Test Method for Compressive Properties of Rigid Plastics.
- B. ASTM D 2240 - Standard Test Method for Rubber Property--Durometer Hardness.
- C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- D. ASTM E 648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
- E. ASTM F 510 - Standard Test Method for Resistance to Abrasion of Resilient Floor Coverings Using an Abrader with a Grit Feed Method.
- F. ASTM F 540 - Standard Test Method for Squareness of Resilient Floor Tile by Dial Gage Method.
- G. ASTM F 970 - Standard Test Method for Static Load Limit.
- H. ASTM F 1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

1.04 SYSTEM DESCRIPTION

- A. Performance Requirements of Terrazzo Tiles:
 - 1. Abrasion Resistance: Maximum 0.0196 cubic centimeters volume loss, when tested in accordance with ASTM F 510, Taber abrader, S-39 wheels, at 500 cycles with 1000 gram load.
 - 2. Compressive Strength: Between 2900 and 5000 psi (20 and 34.5 MPa), when tested in accordance with ASTM C 109/C 109M or ASTM D 695.
 - 3. Static Load Limit: 0.0007 inch (0.012 mm) maximum indentation, when tested in accordance with ASTM F 970 at 125 pounds (57 kg).
 - 4. Hardness: When tested in accordance with ASTM D 2240:
 - a. Matrix: Shore D 78, minimum.
 - b. Aggregate: Between Barcol 55 and 100.
 - 5. Coefficient of Friction: Greater than 0.7, average 0.74, when tested in accordance with ASTM D 2047.
 - 6. Flame Spread Index: 15, maximum, when tested in accordance with ASTM E 84.
 - 7. Smoke Density: Specific optical density, when tested in accordance with ASTM E 662, of 231.76 (smoldering) and 292.05 (flaming).
 - 8. Critical Radiant Flux: Minimum of 0.93 watt/cubic centimeter (Class 1) when tested in accordance with ASTM E 648.
 - 9. Chemical Resistance: No change or surface attack, color change, or swelling, when tested in accordance with ASTM F 925.
 - 10. Oil Resistance: Complying with MIL D-3134.
 - 11. Corrosion Resistance: Complying with MIL D-3134.
 - 12. Electrical Conductance: Nonconductive.
 - 13. Squareness: 0.003 inch (0.076 mm) out of square, maximum, when measured in accordance with ASTM F 540.

1.05 SUBMITTALS

- A. Submit in accordance with Section 01300.

- B. Submit manufacturer's specifications and technical data for precast terrazzo tile and accessories; including manufacturer's printed installation instructions and maintenance manuals for each material specified.
- C. Samples for Selection: Submit manufacturer's samples of actual sections of tile and accessories; include manufacturer's full range of color and patterns available.
- D. Samples for Verification Prior to Installation: Submit full size samples of all types, colors, and patterns selected, indicating full range of patterning and color variations.
- E. Test Reports: Submit test reports for bond and moisture tests of substrates.
- F. Certificates: Submit certificates from manufacturer stating compliance with applicable requirements for materials specified.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has at least three years of experience with the installation of precast terrazzo tile and has successfully completed installations of a similar size and scope.
- B. Regulatory Requirements: Comply with requirements of local building codes and applicable regulations of other government authorities.
- C. Pre-Installation Meeting: Meet with tile manufacturer's representative and Owner prior to preparation of substrate and installation of tile, to review manufacturer's instructions and requirements to ensure the tile is installed properly.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original, unopened packages, containers or bundles bearing brand name and identification of manufacturer.
- B. Store materials inside, under cover in a manner to keep them dry, protected from the weather, direct sunlight, surface contamination, corrosion, and damage from construction traffic and other causes.

1.08 PROJECT CONDITIONS

- A. Maintain minimum temperature of 70 degrees F (21 degrees C) in spaces to receive terrazzo tile, for at least 48 hours before, during and after installation. Store materials in space where they will be installed for at least 48 hours or as required ensuring that the materials have reached 70 degrees F (21 degrees C) before starting installation.
- B. Install terrazzo tile and accessories after other finishing operations, including painting, have been completed.
- C. Do not install terrazzo tile on concrete slabs until they have been cured and are sufficiently dry to achieve bond with adhesives, as determined by the tile manufacturer's recommended bond and moisture test. Allow sufficient time for the slab to dry out before installation is started.
- D. Provide adequate lighting to allow for proper installation.
- E. Do not use portable or temporary heat.

1.09 WARRANTY

- A. Submit 20 year wear warranty written material warranty from tile manufacturer warranting that tile is free from defects in workmanship and material.
 - 1. Products must be installed so as not to void the manufacturer's warranty for wear.
 - 2. Warranty shall be in form acceptable to Owner.

1.10 MAINTENANCE

- A. 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.
 - 1. Deliver extra tile to Owner after completion of work.
 - 2. Furnish tiles in protective packaging with identifying labels.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: Fritz Industries, Inc., which is located at: 500 Sam Houston Rd. ; Mesquite, TX 75149; Toll Free Tel: 800-955-1323; Tel: 972-285-5471; Fax: 972-270-0179; Email: <<http://www.fritztile.com>>
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.
- C. Obtain all materials including terrazzo tile and recommended adhesives and leveling compounds from a single manufacturer.

2.02 MATERIALS

- A. Terrazzo Tile: Marble or granite chips embedded in flexible thermoset polyester resin matrix, with random distribution of chips and smooth factory applied urethane coating cured by ultra violet exposure process.
 - 1. Color/Pattern/Thickness: As selected by Owner from manufacturer's full range. 3/16" thick
 - 2. Size: 12 by 12 inches (305 by 305 mm), nominal.
- B. Patching Compound :
 - 1. Trowelable Leveling and Patching Compounds: Latex-modified, Portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.
- C. Floor Adhesive:
 - 1. Fritz FA-88 Powdered Multipurpose Adhesive mixed with water, for installation using 1/8 by 1/8 by 1/8 inch (3 by 3 by 3 mm) U-notched trowel.
- D. Sealer and Finish: Two coats of Fritz FCP-102 protective sealer and two coats of Fritz Duro-Gloss Finish FCP-300, applied as recommended by manufacturer.
- E. Sealant: Silicone, as specified in Section 07900, and of type approved by tile manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Concrete Subfloor:
 - 1. Inspect subfloor to verify that it is clean, flat, smooth, level and free from cracks, holes, ridges, coatings preventing adhesion, and other defects impairing performance or appearance.
 - 2. Notify Architect of conditions that would adversely affect flooring installation; do not proceed until defective conditions have been corrected.
 - 3. Perform bond and moisture tests on concrete subfloors to determine if surfaces are sufficiently cured and dry as well as to ascertain presence of curing, sealing, hardening or any other compounds.
 - a. Perform bond test in accordance with tile manufacturer's warranty requirements.
 - b. Perform moisture test in accordance with ASTM F 1869.
 - c. Do not install tile if moisture vapor transmission exceeds 7 pounds (3 kg) per 1000 square feet (93 sq m) in 24 hours using FA88 Adhesive.
 - d. Submit test results and obtain Architect's acceptance prior to beginning installation.
 - 4. Do not proceed until substrate preparation is complete and satisfactory, bond and moisture tests are completed and test reports submitted which indicate that bond and moisture values meet specified requirements.
- B. Coordinate work with that of other installers prior to installation so that tile work fits properly with doors, frames, saddles, floor drains, and other adjacent work.
- C. Start of work constitutes acceptance that conditions are satisfactory.
- D. Close the space and areas where flooring is being installed to traffic and other installers until flooring has set and sealing and finish of tiles are complete.

3.02 PREPARATION

- A. Fill small cracks, holes and depressions in subfloors using leveling and patching compounds recommended by tile manufacturer.

- B. Remove existing resilient flooring and flooring adhesives; follow the recommendations of RFCI Recommended Work Practices for Removal of Resilient Floor Coverings.
- C. Mechanically profile 100% of all existing substrates scheduled to receive new flooring to remove existing surface patching material and adhesive residues. Profile to CSP-3 as described by International Concrete Repair Institute using grinding or shot blast method. Provide dust control as required.
- D. Remove deleterious coatings from subfloor surfaces that would prevent a positive adhesive bond; such as curing compounds incompatible with adhesives, paints, oils, adhesives, waxes and sealers.
- E. Completely remove existing solvent-based adhesives to prevent bleed through and staining.
- F. 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".
- G. Use trowelable leveling and patching compound, according to manufacturer's written instructions, to fill cracks, holes and depressions in substrates.
- H. Provide leveling compound over 100% of all existing substrates receiving resilient flooring
- I. Prohibit traffic until filler is cured.
- J. Screen substrate as required to remove any ridges, trowel marks or imperfections that may transmit through the tile.
- K. Clean substrate.
- L. Remove existing floor covering, (per hazardous material abatement Section where applicable) and condition subfloor to provide smooth, clean continuous surface; level subfloor with self-leveling compound in compliance with tile manufacturer's specifications and installation instructions.

3.03 INSTALLATION

- A. Comply with manufacturer's instructions for terrazzo tile installation.
- B. Scribe, cut and fit tile to permanent fixtures, built-in furniture, cabinets, pipes, outlets and permanent columns, wall, and partitions using tile cutting procedures recommended by tile manufacturer.
- C. Maintain reference markers indicated on subfloor for future cutting, by repeating on finished terrazzo tile floor.
- D. Lay tile 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 use of cut widths less than one half tile at perimeters. Lay tile square to room axis, unless otherwise indicated.
- E. Adhere tile flooring to substrate using full spread of adhesive.
- F. Lay tile using conventional procedures for laying resilient tile, placing tile carefully and firmly in position and as level as possible. Butt tile cleanly, evenly and snugly against adjacent tile.
- G. Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged, if cartons are so numbered. Do not install broken, cracked or chipped tiles.
- H. Roll and cross roll floor with 150 pound sectional roller continuously while tile is being laid. Use hand roller in areas that cannot be reached with large roller. Cease rolling when rolling has no more effect.
- I. Do not subject floors to traffic until adhesive is dry and hard and sealers and finishes are applied.
- J. Remove and replace tiles that are not flat, including lipped, cupped, curved, or poorly adhered tile. Remove rejected tile from site.

3.04 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Provide on-site services of tile manufacturer or authorized distributor for technical assistance during preparation and installation.

3.05 CLEANING AND PROTECTION

- A. Upon completion of installation and curing of adhesive, apply sealant to entire perimeter and around columns, door frames, and other joints and penetrations to prevent water penetration into the adhesive layer due to accidental or maintenance (mopping) water accumulation.

- B. Remove excess adhesives, dirt, stain and other foreign material. Clean floors in accordance with tile manufacturer's instructions.
- C. Protect finished installation at all times. Repair or replace flooring damaged prior to final acceptance of installation by Owner.

END OF SECTION

SECTION 09 6500
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient tile flooring.
- B. Resilient base.
- C. Installation accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 – Volatile Organic Compound (VOC) Content Restrictions.

1.03 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 F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2017.
- C. ASTM F970 - Standard Test Method for Measuring Recovery Properties of Floor Coverings after Static Loading; 2017.
- D. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004, with Editorial Revision (2014).
- E. ASTM F1303 - Standard Specification for Sheet Vinyl Floor Covering with Backing; 2004 (Reapproved 2014).
- F. ASTM F1861 - Standard Specification for Resilient Wall Base; 2016.
- G. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2015.
- H. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; 2011.

1.04 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. Shop Drawings: Indicate seaming plans and floor patterns.
- D. Verification Samples: Submit two samples, 12 by 12 inch in size illustrating color and pattern for each resilient flooring product specified.
- E. Concrete Testing Standard: Submit a copy of ASTM F710.
- F. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of sub-floor is acceptable.
- G. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Materials: Quantity equivalent to 5 percent of each type and color.

1.05 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. Maintain temperature in storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C).
- D. Do not double stack pallets.

1.06 FIELD CONDITIONS

- A. Store materials for not less than 48 hours prior to 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).

PART 2 PRODUCTS

2.01 TILE FLOORING

VINYL PLANK FLOORING TO BE PROVIDED WILL BE THE PREMIUM COLOR AND PATTERN VINYL PLANK. THE OWNER WILL CHOOSE THE COLOR AND PATTERN DURING THE SUBMITTAL PROCESS.

- A. Vinyl Composition Tile: Homogeneous, with color extending throughout thickness.
 - 1. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
 - 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 - 3. Size: 12 by 12 inch (305 by 305 mm).
 - 4. VOC Content Limits: As specified in Section 01 6116.
 - 5. Thickness: 0.125 inch (3.2 mm).
 - 6. Pattern: As indicated on drawings.
 - 7. Color: To be selected by owner.

2.02 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
 - 1. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 - 2. Height: 4 inch (100 mm).
 - 3. Thickness: 0.125 inch (3.2 mm).
 - 4. Finish: Satin.
 - 5. Length: 4 foot (1.2 m) sections.
 - 6. Color: To be selected by owner..
 - 7. Accessories: Premolded external corners and internal corners.

2.03 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
- C. Moldings, Transition and Edge Strips: Same material as flooring.
- D. Sealer and Wax: Types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 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 Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
 - 1. Test in accordance with ASTM F710.
 - 2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Remove existing resilient flooring and flooring adhesives; follow the recommendations of RFCI (RWP).
- B. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

- C. 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.
- D. Prohibit traffic until filler is fully cured.
- E. Clean substrate.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Fit joints and butt seams tightly.
- E. Set flooring in place, press with heavy roller to attain full adhesion.
- F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
 - 1. Resilient Strips: Attach to substrate using adhesive.
- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 INSTALLATION - TILE FLOORING

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
- B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.

3.05 INSTALLATION - RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches (45 mm) between joints.
- B. Install base on solid backing. Bond tightly to wall and floor surfaces.
- C. Scribe and fit to door frames and other interruptions.

3.06 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

3.07 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

**SECTION 09 6725
EPOXY RESIN FLOORING**

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 SUMMARY

- A. This Section includes the following:
 - 1. Decorative monolithic epoxy-resin flooring.
 - 2. Integral cove base.

1.3 SUBMITTALS

- A. Product Data: For each type of product specified. Include manufacturer's technical data, installation instructions, and recommendations for each resinous flooring component required.
- B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors, textures, and patterns available for each resinous flooring system indicated.
- C. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- D. Material Certificates: Signed by manufacturers certifying that materials furnished comply with requirements.
- E. Maintenance Data: For resinous flooring to include in the maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer (applicator) who has specialized in installing resinous flooring similar in material, design, and extent to that indicated for this Project and who is acceptable and is certified, in writing, to resinous flooring manufacturer.
 - 1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to install resinous flooring systems specified.
- B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, and sealing or finish coats, through one source from a single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.
- C. Field Samples: On floor area selected by Architect, provide full-thickness resinous flooring system samples that are at least 48 inches square to demonstrate texture, color, thickness, chemical resistance, cleanability, and other features of each resinous flooring system required. Simulate finished lighting conditions for review of in-place field samples.
 - 1. If field samples are unacceptable, make adjustments to comply with requirements and apply additional samples until field samples are approved.

2. After field samples are approved, these surfaces will be used to evaluate resinous flooring.
3. Obtain Architect's approval of field samples before applying resinous flooring.
4. Final approval of colors will be from field samples, not samples submitted for verification.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.
- B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring installation.
- B. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated in the Resinous Flooring Schedule at the end of Part 3.

2.2 MATERIALS

- A. Resinous Flooring: Resinous floor surfacing system consisting of primer; body coat(s) including resin, hardener, aggregates, and colorants, if any; and sealing or finish coat(s). Comply with requirements indicated in the Resinous Flooring Schedule.
 1. Reinforcing Membrane: Manufacturer's flexible resin recommended for crack isolation to help prevent substrate cracks from reflecting through resinous flooring.
 - a. Provide fiberglass scrim embedded in reinforcing membrane.
- B. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.
- C. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service and joint condition indicated.
- D. Waterproofing Membrane: Type recommended or produced by manufacturer of epoxy resin composition flooring system for type of service and floor condition indicated.
- E. Anti Microbial Additive: Incorporate antimicrobial chemical additive to control growth of most algae, bacteria, fungi, mildew and mold.

- F. Moisture Mitigation System: Concrete, especially slab on grade should be tested in accordance with ASTM F1869. If pounds exceed flooring limit remedial action must be taken.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where decorative quartz epoxy flooring is to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected by the Contractor in a manner acceptable to the Architect

3.2 PREPARATION

- A. General: Prepare and clean substrate according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral substrate for resinous flooring application.
- B. Concrete and Ceramic Tile Substrates: Provide sound surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, existing floor finish and other contaminants incompatible with resinous flooring.
 - 1. Comply with ASTM C 811 requirements, unless manufacturer's written instructions are more stringent.
 - 2. Shot-blast surfaces with an apparatus that abrades the concrete and ceramic tile surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
 - 3. Repair and flash patched damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations and do a level of acceptance by the manufacturer.
- C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
- D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
- E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations.

3.3 APPLICATION

- A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
 - 1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate and optimum intercoat adhesion.
 - 2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
- B. Apply epoxy primer over prepared substrate at manufacturer's recommended spreading rate.

- C. Apply reinforcing membrane to substrate cracks.
- D. Apply self-leveling epoxy slurry body coat(s) in thickness indicated.
- E. Broadcast Coats: Apply liberal application of clear epoxy resin mixture, allow to self level, broadcast (by hand or spray machine) ceramic coated quartz aggregate, allow to set to hardness, sweep off excess unbonded aggregate and repeat process to achieve total nominal thickness of 1/16" 1/8".
- F. Integral Cove Base: Apply cove base mix to wall surfaces at locations indicated. Round internal and external corners. Install cove base according to manufacturer's written instructions and details including taping, mixing, priming, troweling, sanding, and topcoating of cove base.
- G. Finish or Sealing Coats: After quartz filled broadcast coats have cured sufficiently, apply finish coats of type recommended by flooring manufacturer to produce a slip resistant finish matching approved submittal sample and in number of coats and spreading rates recommended by manufacturer.
 - 1. Finished floor shall be 1/8" thick, uniform in color and free of trowel marks

3.4 FIELD QUALITY CONTROL

- A. Material Sampling: Owner may at any time and at any number of times during flooring application require material samples for testing for compliance with requirements.
 - 1. Owner will engage an independent testing agency to take samples of materials being used. Material samples will be taken, identified and sealed, and certified in presence of Contractor.
 - 2. If test results show installed materials do not comply with specified requirements, pay for testing, remove noncomplying materials, prepare surfaces coated with unacceptable materials, and reapply flooring materials to comply with requirements.

3.5 CURING, CLEANING AND PROTECTING

- A. Cure decorative quartz epoxy flooring materials according to manufacturer's directions, taking care to prevent contamination during application stages and before completing curing process. Close application area for a minimum of 24 hours.
- B. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.
- C. Clean resinous flooring not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each Project area. Use cleaning materials and procedures recommended in writing by resinous flooring manufacturer.

3.6 RESINOUS FLOORING SCHEDULE

- A. Epoxy Resinous Flooring : Provide resinous flooring system complying with the following:
 - 1. Stonshield ESD by www.Stonhard.com. Install as per manufacturer recommendations

END OF SECTION

**SECTION 09 6813
TILE CARPETING**

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. Carpet tile, fully adhered.

1.3 RELATED REQUIREMENTS

- A. Section 01 61 16 - 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; 2014.
- B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- C. CRI104 - Standard for Installation of Commercial Carpet; Carpet and Rug Institute; 2015.
- D. NFPA 253- Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; National Fire Protection Association; 2015.

1.5 SUBMITTALS

- A. See Section 01 30 00- Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.7 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 - PART 2 PRODUCTS

2.1 MATERIALS

- A. Tile Carpeting: Tufted, manufactured in one color dye lot.
 - 1. Critical Radiant Flux: Minimum of 0.22 watts/sq em, when tested in accordance with Class 1 ASTM E648 or NFPA 253.
 - 2. Gage: 1/10 inch.
 - 3. Stitches: 10.2 per inch.
 - 4. Pile Weight: 14 oz/sq yd (gm/sq m).
 - 5. Primary Backing Material: Non-woven synthetic.
 - 6. Secondary Backing Material: EcoWorx.
- B. Manufacturers:
 - 1. Patcraft.com
 - 2. Model lines "Orbital" & "Futura".

2.2 ACCESSORIES

- A. Edge Strips: Rubber, color as selected by Architect.
- B. Adhesives:
 - 1. Compatible with materials being adhered; maximum VOC content as specified in Section 01 61 16.
- C. Carpet Tile Adhesive: Recommended by carpet tile manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for flooring installation by testing for moisture and pH.
 - 1. Test in accordance with ASTM F710.
 - 2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

3.2 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured. Provide filler over 100% of floor areas.

- D. Vacuum clean substrate.

3.3 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in square pattern, with pile direction alternating to next unit, set parallel to building lines.
- F. Fully adhere carpet tile to substrate.
- G. Trim carpet tile neatly at walls and around interruptions.
- H. Complete installation of edge strips, concealing exposed edges.

3.4 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

END OF SECTION

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**SECTION 09 8413
FIXED SOUND-ABSORPTIVE PANELS**

PART 1 - 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 the following:
 - 1. Acoustical Wall Panel.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for acoustical wall panels, including plans, elevations, sections, details, and attachments to other Work.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors, textures, and patterns available for facing materials for each type of acoustical wall panel indicated. Include samples of installation devices and accessories.
- D. Samples for Verification: 8-by-11-inch (200-by-280-mm) units of each type of acoustical wall panel indicated; in sets for each color, texture, and pattern specified for facing materials, showing the full range of variations expected in these characteristics. Include samples of installation devices and accessories.
- E. Product Certificates: Signed by manufacturers of acoustical wall panels certifying that products furnished comply with requirements.
- F. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- G. Product Test Reports: From a qualified testing agency indicating acoustical wall panels comply with requirements, based on comprehensive testing of current products.
- H. Maintenance Data: For acoustical wall panels and facings to include in maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing acoustical wall panels similar to those indicated for this Project and with a record of successful in-service performance.
- B. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- C. Source Limitations for Acoustical Wall Panels: Obtain acoustical wall panels from one source with resources to provide products of consistent quality in appearance and physical properties.
- D. Fire-Test-Response Characteristics: Provide acoustical wall panels with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify acoustical wall panels with appropriate markings of applicable testing and inspecting agency.
 - 1. Flame Spread: 25 or less.
 - 2. Smoke Developed: 450 or less.

- E. Acoustical Test Report: Provide acoustical test report from a qualified testing agency indicating acoustical wall panels meets 1.15 NRC per ASTM C-423.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect acoustical wall panels from excessive moisture when shipping, storing, and handling. Deliver in unopened bundles and store in a dry place with adequate air circulation. Do not deliver material to building until wet-work, such as concrete and plaster, has been completed and cured to a condition of equilibrium. Protect panel edges from crushing and impact.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical wall panels until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.7 WARRANTY

- A. General Warranty: Special warranty 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. Special Warranty: Written warranty, signed by manufacturer agreeing to repair or replace components of acoustical wall panel system that fail in performance, materials, or workmanship within specified warranty period. Failure in performance includes, but is not limited to, acoustical performance. Failure in materials includes, but is not limited to, sagging or distortion of facing or warping of core.

PART 2 - PRODUCTS

2.1 ACOUSTICAL WALL PANELS, GENERAL

- A. Fabricate panels to sizes and configurations indicated; attach facing materials to cores to produce installed panels with visible surfaces fully covered and free from waves in fabric weave, wrinkles, sags, blisters, seams, adhesive, or other foreign matter.
 - 1. Fabricate back-mounted panels in factory to exact sizes required to fit wall surfaces, based on field measurements of completed substrates indicated to receive acoustical wall panels.
 - 2. Where square corners are indicated, tailor corners.
- B. Back-Mounting Accessories: Manufacturer's standard or recommended accessories for securely mounting panels of type and size indicated to substrates provided, and complying with the following requirements:
 - 1. Mechanically Mounted Edge-Reinforced Panels: Metal panel-clip and base-support bracket system consisting of two-part panel clips, with one part of each clip mechanically attached to back of panel and the other part to wall substrate, designed to support panels laterally; and base-support brackets designed to support full weight of panels; with both designed to allow for panel removal.

2.2 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated for each designation in the Acoustical Panel Schedule at the end of Part 3.

PART 3 - EXECUTIONS

3.1 EXAMINATION

- A. Examine substrates and blocking, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting acoustical wall panel performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install acoustical wall panels in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other panels, and scribed to fit adjoining work accurately at borders and at penetrations. Comply with panel manufacturer's written instructions for installation of panels using type of mounting accessories indicated or, if not indicated, as recommended by manufacturer.

3.3 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels with fabric facing, on completion of installation, to remove dust and other foreign materials according to manufacturer's written instructions.
- C. Remove surplus materials, rubbish, and debris resulting from acoustical wall panel installation, on completion of the Work, and leave areas of installation in a neat and clean condition.

3.4 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure acoustical wall panels are without damage or deterioration at time of Substantial Completion.
- B. Replace panels that cannot be cleaned and repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 ACOUSTIC PANEL SCHEDULE

- A. Acoustical Wall Panels shall be 2" thick – 6.0-7.0 lb. per cubic foot high-density fine fibered fiberglass. Manufactures standard panel construction, wrapped with panel manufactures standard full line of fabric.
 - 1. Products
 - a. AlphaSorb Wall Panels by Acoustical Solutions, Inc.
 - 2. Facing Material: Guilford of Maine FR 701 – Style 2100 – 100% polyester
 - 3. Panel Thickness: nominal 2" thick
 - 4. Noise Reduction Coefficient: NRC 1.15
 - 5. Panel Width: As indicted, up to 4 feet wide
 - 6. Panel Length: As indicated, up to 10 feet long.
- B. CONSTRUCTION
 - 1. The acoustical wall panel product shall be supplied in widths up to 4 feet wide and lengths up to 10 feet long. All edges will be fully wrapped with mounting as indicated.
- C. MOUNTING
 - 1. Back-Mounting Accessories: Manufactures standard accessories for securely mounting panels, of type and size indicated and complying with the following requirements:
 - a. Z Clips: Two part metal clips designed to support weight of panels. One part mechanically attached to wall substrate according to manufactures standard pattern and other part fastened to back of panel.
 - b. 2. Impaling Clips: Clip is mounted to the wall, adhesive applied on wall around clip, then panel pressed into place until flush with wall.
- D. ACOUSTICAL PERFORMANCE

1. Sound Absorption: Per ASTM C – 423
2. Sound Absorption Coefficient per Octave Band Center
3. Frequency (Hz)

125	250	500	1000	2000	4000	NRC
0.22	0.81	1.24	1.30	1.21	1.16	1.15

E. **FLAMABILITY**

1. All components shall have a Class A Flammability rating per ASTM E- 84: Surface Burning Characteristics of Building Materials, with a Flame Spread of 25 or less and Smoke Developed of 450 or less

END OF SECTION

SECTION 09 9000
PAINTING AND COATING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, General Provisions of the Agreement Between Owner and Contractor and Other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish all newly installed or disturbed interior surfaces exposed to view, unless fully factory-finished

1.03 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; 2012.

1.04 SUBMITTALS

- A. See Section 01 3000 -Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on all finishing products, including VOC content.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum five years documented experience.
- B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats

1.06 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. coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges
 - 1. 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 Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide all paint and coating products used in any individual system from the same manufacturer; NO exceptions.
- B. Paints:
 - 1. Base Manufacturer: Benjamin Moore.

2.02 PAINTS AND COATINGS -GENERAL

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.

1. Provide paints and coatings 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. Supply each coating material in quantity required to complete entire projects work from a single production run.
 3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Volatile Organic Compound (VOC) Content:
1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart a. (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

2.03 PAINT SYSTEMS -INTERIOR

- A. Ferrous Metals, Primed, Acrylic Latex, 2 Coat:
1. Touch-up with latex primer.
 2. OR Semi-gloss: Two coats of; Super Spec Interior Latex Semi-Gloss Finish (276).
- B. Paint GI-OP-3L -Gypsum Board/Plaster, Latex, 3 Coat:
1. One coat of Moore Super Spec Latex Enamel Undercoater & Primer Sealer (253).
 2. Eggshell: Two coats of latex enamel; Moore: Super Spec Interior Latex Eggshell Contractor74.

2.04 ACCESSORY MATERIALS

- A. Accessory materials: provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. 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. Gypsum Wallboard: 12 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to coating 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.
- F. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's 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.
- 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.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

END OF SECTION

SECTION 09 9723
CONCRETE AND MASONRY COATINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Moisture resistant textured concrete and masonry coatings.
- B. Moisture resistant smooth concrete and masonry coatings.

1.02 REFERENCE STANDARDS

- A. ASTM D968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive; 2017.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Coatings - General: Provide complete systems formulated and recommended by manufacturer for the applications indicated, in the thicknesses indicated.
 - 1. Maximum volatile organic compound (VOC) content: As required by applicable regulations.
- B. High Build, One Coat, Water Based Textured Coating for 'Green' Concrete: Water based, epoxy-acrylic resin with graded perlite aggregate.
 - 1. Stated by manufacturer as suitable for installation on visibly damp surfaces and concrete that has hardened but is not fully cured ("green" concrete) without requiring a primer.
 - 2. Abrasion Resistance: Passing, when tested according to ASTM D968 with 792 gallons (3,000 L) of falling sand.
 - 3. Color: To be selected by owner.
- C. High Build, Water Based Textured Coating System for Masonry: Water based styrene-acrylic resin primer; acrylic terpolymer (elastomeric) top coat and graded perlite aggregate.
 - 1. Stated by manufacturer as suitable for masonry and concrete surfaces cured 28 days, minimum: cement plaster, cement fiber board, and metal.
 - 2. Color: To be selected by owner.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. 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.

3.02 PREPARATION

- A. Clean surfaces of loose foreign matter.
- B. Remove substances that would bleed through finished coatings.
- C. Remove finish hardware, fixture covers, and accessories and store.
- D. Existing Painted and Sealed Surfaces:
 - 1. Remove loose, flaking, and peeling paint. Feather edge and sand smooth edges of chipped paint.
 - 2. Clean with mixture of trisodium phosphate and water to remove surface grease and foreign matter.
- E. Protect adjacent surfaces and materials not receiving coating from spatter and overspray; mask if necessary to provide adequate protection. Repair damage.

3.03 PRIMING

- A. Apply primer to all surfaces, unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.
- B. Concrete and Masonry: Prior to priming, patch holes and indentations and fill cracks with manufacturer's recommended crack repair material.

3.04 COATING APPLICATION

- A. Apply coatings in accordance with manufacturer's instructions, to thicknesses specified.
- 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.

3.05 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.

END OF SECTION

SECTION 10 1101 VISUAL DISPLAY BOARDS

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. Tackboards.
- B. Markerboards.

1.3 RELATED REQUIREMENTS

- A. Section 09 21 16 – Gypsum Board Assemblies: Blocking and supports.

1.4 1.4 REFERENCE STANDARDS

- A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.
- B. ANSI A208.1 - American National Standard for Particleboard; 2009.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- D. ASTM F793 - Standard Classification of Wall Covering by Use Characteristics; 2010a.
- E. FS L-P-1040 - Plastic Sheets and Strips (Polyvinyl Fluoride); Federal Specifications and Standards; Revision B, 1977.

1.5 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data on markerboard, tackboard, tackboard surface covering, trim, and accessories.
- C. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.
- D. Samples: Submit color charts for selection of color and texture of tackboard and trim.
- E. Manufacturer's printed installation instructions.
- F. Maintenance Data: Include data on regular cleaning, stain removal.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 5 years documented experience.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Visual Display Boards:
 - 1. Claridge Products and Equipment, Inc: www.claridgeproducts.com.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 TACKBOARDS: FABRIC LAMINATED TO CORK.

- A. Cork Thickness: 7/32 inch.
- B. Fabric: Vinyl coated fabric.
- C. Color: As selected from manufacturer's full range.
- D. Backing: Hardboard, 1/4 inch thick, laminated to tack surface.

- E. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
- F. Size: As indicated on drawings.
- G. Frame: Extruded aluminum, with concealed fasteners.
- H. Frame Profile: As indicated on drawings
- I. Frame Finish: Anodized, natural.

2.3 MATERIALS

- A. Vinyl Coated Fabric: ASTM F793 Category VI; clear top overcoat of polyvinyl fluoride in accordance with FS L-P-1040 Type 1, Grade B, Class 2, 0.0005 inch thick.
- B. Hardboard for Cores: ANSI A135.4, Class 1 - Tempered, S2S (smooth two sides).

2.4 MARKERBOARDS

- A. Face Sheet: LCS-II porcelain Enamel steel markerboard.
- B. Core Material: 7/16" Duracore.
- C. Color: As selected from manufacturer's full range.
- D. Backing: Steel back.
- E. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
- F. Size: As indicated on drawings.
- G. Frame: Extruded aluminum, with concealed fasteners.
- H. Frame Profile: As indicated on drawings
- I. Frame Finish: Anodized, natural.
- J. Model #: Series 8.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

3.2 INSTALLATION

- A. Install boards in accordance with manufacturer's instructions.
- B. Secure units level and plumb.
- C. Butt Joints: Install with tight hairline joints.

3.3 CLEANING

- A. Clean board surfaces in accordance with manufacturer's instructions.
- B. Remove temporary protective cover at date of Substantial Completion.

END OF SECTION

SECTION 11 6010 STAGE CURTAINS

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 SUMMARY

- A. Complete System: The Rigging Contractor shall provide all items necessary for a complete, safe, fully functional system as described herein, including all tools, scaffolding, labor, and supervision, even though they may not be specifically enumerated. Any errors, omissions or ambiguities do not relieve the Contractor of this responsibility, but shall be brought to the attention of the Architect for clarification
- B. This Section includes stage curtain rigging system and stage curtains:
 - 1. Remove existing stage curtains, tracks, rigging and related equipment.
 - 2. Replacement of all stage curtains including all rigging, components and hardware.
 - 3. Replacement of front lights for stage.
 - 4. Replacement of all hanging points with new
 - 5. Replacement of existing dead hung rigging suspension hardware.
 - 6. Provide 8'High x 12'Wide Screen with electric controls and motor to raise and lower the screen.
 - 7. Other curtains as indicated on drawings.
 - 8. Curtain tracks.

1.3 RELATED SECTIONS:

- A. None.

1.4 SUBMITTALS

- A. Bill of Materials: Submit a complete bill of materials identifying equipment and quantities being offered.
- B. Drawings: Submit component and installation drawings and schedules showing all information necessary to fully explain the design features, appearance, function, fabrication, installation, and use of system components in all phases of operation.
 - 1. Do not proceed with fabrication, installation, or erection until approved by the Architect. Such approval does not relieve the Rigging Contractor of the responsibility of providing equipment in accordance with the specifications.
- C. Catalog Cuts: Submit catalog cuts for standard equipment items. These must contain full information on dimensions, construction, applications, etc. to permit proper evaluation. In addition, they must be properly identified as to their intended use. Any options or variations must be clearly noted.
- D. Schedule: Prior to the commencement of the installation work, the Rigging Contractor shall submit an outline of the proposed schedule and requirements for approval.
- E. Shop Drawings: Include plans, elevations, and detail sections of typical track and rigging elements. Show anchors, hardware, operating equipment, and other components not included in manufacturer's Product Data.
- F. Samples for Verification: Not less than 36 inches square of each fabric from dye lot to be used for the Work, with specified treatments applied, and showing complete pattern repeat, if any. Mark top and face of fabric.

- G. Product Certificates: Signed by manufacturers of stage curtains certifying that products furnished comply with requirements. Give name of flame-retardant chemical used, identification of applicator, treatment method, application date, allowable life span for treatment, and details of any restrictions and limitations.

1.5 QUALITY ASSURANCE

- A. Manufacturer of curtain material with minimum of ten (10) years' experience in the fabrication of stage curtains and components.
- B. Rigging Contractor shall be an approved rigging manufacturer or an authorized representative or dealer of an approved manufacturer. The contractor shall have been installing stage rigging systems for a period of five years or more, and shall have completed at least ten installations of this type and scope. The architect shall be the final judge of the suitability of experience.
 - 1. The Rigging Contractor shall employ an Entertainment Technician Certification Program (ETCP) Certified Theatre Rigger. The Certified Rigger shall be either the project manager or site foreman, and be responsible for the overall project including the layout, inspection, and training.
- C. Fire-Test-Response Characteristics: Provide stage curtains with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or a testing and inspecting agency acceptable to authorities having jurisdiction. Permanently attach label to each fabric of curtain assembly indicating whether fabric is inherently and permanently flame resistant, or treated with flame-retardant chemicals, and whether it will require retreatment after designated time period or cleaning.
 - 1. Flame-Resistance Ratings: Passes NFPA 701.

1.6 INSTRUCTION:

- A. The Rigging Contractor shall go through the manual and provide a safety and instruction class with personnel designated by the owner to demonstrate and explain the operation and maintenance of the systems.
- B. Refer to Section 01 7800 - Closeout Submittals and Section 01 7900 - Demonstration and Training for additional requirements.
- C. Signage with basic operating instructions and warnings shall be posted in the area where the equipment will be operated. Signage shall be in conformance with ANSI-Z535.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify stage curtain and window openings and dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.8 WARRANTY

- A. The Rigging Contractor shall provide a written guarantee against defects in materials or workmanship for three years (two years for motorized equipment) starting from the date of acceptance of equipment by the Owner's representative.
- B. The guarantee shall not cover equipment that has become defective due to misuse, abuse, accident, act of God, alteration, vandalism, ordinary wear and tear, improper maintenance, or used not in a manner intended.
- C. Any required maintenance or replacement shall be provided by the Rigging Contractor within thirty days of notification by the Owner except for safety related items, which shall be corrected within 48 hours of notification.

- D. Subsequent to the expiration of the guarantee period the Rigging Contractor agrees to furnish repair and maintenance service, at the Owner's expense, within thirty days of request for such service.

PART 2 - PRODUCTS

2.1 RIGGING MANUFACTURERS

- A. Acceptable Rigging Manufacturer:
1. J.R. Clancy, Inc, 7041 Interstate Island Road, Syracuse, New York 13209; Voice: 215-625-3603, Fax: 215-625-3527; E-mail: rigging@jrclancy.com.
 2. M. Cramer & Associates, Inc, 229 N. 12th Street, Philadelphia, PA 19107; Voice 215-625-3603, Fax: 215-625-3527, E-mail: info@mrcramer.com
 3. These firms are examples for quality and other firms with comparable experience will be considered.
- B. The manufacturer must have a product testing program, including determination of recommended working loads for products based on destructive testing by an independent laboratory and review by an independent licensed engineer.
- C. The manufacturer of the stage equipment must have a quality management system registered to the ISO 9001:2000 standard.
- D. Substitutions: See Section 01 6000 - Product Requirements and shall include:
1. Evidence that the manufacturer has been in business for a minimum of ten years manufacturing stage equipment
 2. A listing of five equivalent installations including:
 - a. Name, address and telephone number of Owner;
 - b. Name, address and telephone number of architect;
 - c. Scope of work.
 3. A brief written description of the contractor's operation including facilities, financial capabilities, and experience of key personnel.
 4. A copy of the ETCP Certified Theatre Rigger's certification credentials.
 5. Written, third party evidence showing that the manufacturer has the testing, quality management required in paragraph B in place

2.2 GENERAL

- A. Standards:
1. Materials shall conform to the following ASTM and ANSI standard specifications:
 - a. A-36 - Specification for structural steel
 - b. A-47 - Specification for malleable iron casting
 - c. A-48 - Specification for gray iron casting
 - d. A-120 - Specification for black and hot-dipped zinc-coated (galvanized) steel pipe for ordinary use
 - e. B18.2.1&2 - Specification for square and hex bolts and nuts
 2. In order to establish minimum standards of safety, the following factors shall be used:
 - a. Cables and fittings - 8:1 Safety Factor
 - b. Cable bending ratio - Sheave tread diameter is 30 times cable diameter
 - c. Tread Pressures - 500 lbs. for cast iron
900 lbs. for Nylatron
1000 lbs. for steel
 - d. Maximum fleet angle - 1-1/2 degrees
 - e. Steel - 1/5 of yield
 - f. Bearings - Two times required load at full speed for 2000 hours
 - g. Bolts - Minimum SAE J429 Grade 5 (ISO R898 Class 8.8), zinc

- plated
 - h. Motors - 1.0 Service Factor
 - i. Gearboxes Factor - 1.25 Mechanical Strength Service Factor
- B. Materials: All materials used in this project shall be new, unused and of the latest design. Re-furnished and obsolete materials are not permitted.
- C. Sheaves:
 - 1. Sheaves shall be of the following materials, as specified:
 - a. ASTM A-48 Class 30 grey iron castings
 - b. Nylatron or Polyamide Nylon (PA6-G)
 - c. Steel
 - 2. Groove depths shall be sufficient to encompass fully the cables and ropes. Grooves shall have sloped sides (8 degree minimum) and conform to rope and cable manufacturers' standards for groove shape and tolerance.
 - 3. Sheaves shall be supported by bearings and a machined steel shaft, which shall be keyed to one side plate to prevent rotation. Proper adjustment of the bearing shall be accomplished by means of a fine thread, self-locking nut on the opposite end of the shaft. Each sheave shall run plumb and true without rubbing its side plates when rotated.

2.3 FABRICATION:

- A. The mechanical fabrication and workmanship shall incorporate best practices for good fit and finish. There shall be no burrs or sharp edges to cause a hazard nor shall there be any sharp corners accessible to personnel.
- B. All moving parts shall have specified tolerances. Sheaves shall run plumb and true and shall not scrape housings.
- C. All equipment shall be built and installed to facilitate future maintenance and replacement.

2.4 FINISHES:

- A. Paint shall be the manufacturer's standard finish and color except as noted.
- B. All turnbuckles, clips, tracks, chains and other items of incidental hardware shall be furnished plated or painted.

2.5 RECOMMENDED WORKING LOAD:

- A. This specification calls for minimum recommended working loads for many hardware items. This is the maximum load which the manufacturer recommends be applied to properly installed, maintained, and operated new equipment. Manufacturer's recommended working loads shall be determined by calculations by a Licensed Professional Engineer and destructive testing by an independent testing laboratory. These calculations and reports shall be available for review.

2.6 MANUAL WINCH SETS

- A. 12" Head Block:
 - 1. The sheave shall be Nylatron® or Polyamide (PA6-G) nylon with a 12" outer diameter. The cable grooves shall have equal pitch diameters. The sheave shall be equipped with a 1" diameter machined steel shaft and two tapered roller bearings.
 - 2. Base angles shall be a minimum 2" x 1-1/2" x 1/4" angle with the short leg turned in.
 - 3. Side plates shall be a minimum of 10-gauge steel, and shall fully enclose the sheave. Side plates shall be bolted and welded to the base angles for extra strength. There shall be a minimum of six bolts with spacers between the side plates, four of which prevent cables from escaping the sheave grooves.
 - 4. The block and associated mounting hardware shall have a recommended working load of at least 2,500 lbs.
 - 5. Blocks used in wire guide systems shall have tie-off points for the guide wires.

6. Head blocks shall be J. R. Clancy 1255 series, grooved for six or eight ¼" lift lines.
- B. Loft Block:
 1. The sheave shall have an 8-½" outside diameter, and shall be Nylatron® or Polyamide (PA6-G) nylon. The sheave shall be equipped with a 17 mm diameter machined steel shaft and two sealed, precision ball bearings.
 2. Base angles shall be a minimum 1-½" x 1-½" x 3/16" angle punched with a universal hole pattern for easy installation.
 3. Side plates shall be a minimum of 12-gauge steel, and shall fully enclose the sheave. Side plates shall be bolted to the base angles. There shall be a minimum of seven ¼" bolts with spacers between the side plates, four of which prevent cables from escaping the sheave grooves.
 4. The block and associated mounting hardware shall have a recommended working load of at least 500 lbs, and shall be designed for use in either upright or underhung usage.
 5. Loft blocks shall be J. R. Clancy 2NC-10855R, grooved for one ¼" lift line.
- C. Idler assemblies:
 1. Loft block idlers shall be provided to carry the weight of the cables and prevent rubbing against adjacent block side plates. They shall not be installed to carry line loads or to act as deflector or mule blocks.
 2. Idler assemblies shall consist of one or two 3-1/2 inch diameter, 3 line Nylatron® idler pulleys mounted on the side of the loft block in a steel housing.
 3. The sheaves shall have 1/4 inch cable grooves and shall ride on a 3/8-inch shaft.
 4. The housing shall consist of a 12-gauge side plate and two 1/4 inch bolts and pipe spacers to mount the housing and captivate the cables in the grooves.
 5. All nuts shall be of the nylon insert self-locking type.
- D. Manual Hand Winch:
 1. Manual hand winch shall be Thern CW11-2M.
 2. Include Thern clew guide.
 3. Include all additional mounting hardware to fasten winch to building structure. This shall include Thern Clew Winch Pedestal or appropriate Unistrut.
- E. Lift Cables:
 1. All lift cables shall be 7 x 19 construction, galvanized aircraft cable, sized as required, and with breaking strengths as follows:
 - a. 1/8" diameter - 2,000 pounds
 - b. 3/16" diameter- 4,200 pounds
 - c. 1/4" diameter - 7,000 pounds
 - d. 5/16" diameter- 9,800 pounds
 - e. 3/8" diameter - 14,400 pounds
- F. Damaged or deformed cable shall not be used. All wire rope rigging shall be installed so as to prevent abrasion of the wire rope against any part of the building construction or other equipment.
- G. Cable Fittings:
 1. Cable clips shall conform to wire rope manufacturer's recommendations as to size, number, and method of installation. Clips shall be drop forged ACrosby® or approved equal. Under no circumstances may malleable cable clips be used in suspension or lifting lines.
 2. Swaged sleeve fittings shall be copper Nicopress™. Swaged fittings shall be installed per the fitting manufacturer's instructions, using the appropriate tools, and checked with the appropriate Nicopress™ "Go - No go" gauge.
 3. Eyes shall be formed over galvanized wire rope thimbles of correct size.
- H. Trim Chains:

1. Trim chains shall be 36" long, made of 1/4" plated, grade 30 Proof Coil chain. Connection between the end link and the lifting cable shall be made with a thimble and copper Nicopress sleeve. Chains shall be wrapped one and one half turns around the batten and attached back to the thimble at the end of the lift line with a 1/4" forged shackle. Adjustment is made by connecting the shackle into a link along the return side of the chain.
 2. Provide and install one 3/8" diameter safety bolt, one nylon insert nut and two flat washers per trim chain after batten is leveled.
 3. Trim chains shall have a recommended working load of at least 750 lbs.
 4. Trim chains shall be J.R. Clancy No. 031-1192.
- I. Pipe Battens:
1. All battens shall be 1-1/2" nominal diameter, schedule 40 pipe in lengths as shown on the drawings or Bill of Materials. All joints shall be spliced with 18" long sleeves with 9" extending into each pipe and held by two 3/8" hex bolts and lock nuts on each side of the joint.
 2. Each end shall be covered with a bright yellow, closed end, soft vinyl safety cap at least 4 inches in length.
 3. Pipe battens shall be J.R. Clancy No. 015-67R, match existing lengths.

2.7 DEAD HUNG RIGGING

- A. Dead Hung Rigging
1. All existing dead hung rigging suspension hardware shall be replaced.
 2. Existing dead hung pipe battens shall remain.
 3. Chains shall be 1/4" grade 30 proof coil. Zinc plated finish.
 4. Beam clamps shall be J. R. Clancy 015-698 or 015-798 as applicable. Side beam clamps are not acceptable. Wrapping of chain around beams is not acceptable.
 5. Chain shall be attached to pipe battens with two wraps and 1/4" domestic screw pin anchor shackle.
 6. Chain shall be attached to traveler tracks with 3/8" x 6" turnbuckles.

2.8 STAGE CURTAIN SPECIFICATIONS:

- A. Description and Sizes: Curtains shall be as made by J.R. Clancy in accordance with the following:

<u>Description</u>	<u>Qty</u>	<u>Height</u>	<u>Width</u>	<u>Fullness</u>	<u>Fabric</u>	<u>Lining</u>
Main Curtain	match exist.	match exist.	match exist.	50%	1	3
Main Valance	match exist.	match exist.	match exist.	50%	1	3
All other curtains	match exist.	match exist.	match exist.	50%	2	None
Screen	match exist.	match exist.	match exist.	flat	4	None

- B. Fabric types:
1. KM Fabrics Charisma Velour. Inherently flame retardant 24.1 ounce polyester. Standard color as selected by owner's representative.
 2. KM Fabrics Crescent Velour. Inherently flame retardant 18 - 20 ounce polyester. Standard color as selected by owner's representative.
 3. Dazian Fabrics Janus. Inherently flame retardant polyester. Standard color as selected by owner's representative.
 4. Dazian Fabrics Muslin. Cotton seamless heavy weight muslin. Standard color as selected by owner's representative.

- C. Flame Retardancy: Cotton fabrics and other flammable fabrics must be chemically mill treated for flame retardancy according to the requirements of the National Fire Protection Association's NFPA #701.
- D. Fullness: See above for fullness of each curtain.
 - 0% = flat, no extra material.
 - 50% - 100% = additional fabric to be included, exclusive of turnbacks and hems.
- E. Seams: Seams between strips shall be single stitched without puckers using thread of matching color. All fabrics with a grain or pile shall have all strips running in the same direction.
- F. Pleats: Pleats shall be box type on 12" centers. Valances and borders are to have their pleats arranged to conceal the seams.
- G. Top Finish: 3-1/2" jute webbing shall be double stitched to the top of the curtain with 1" of face fabric turned under the webbing.
 - 1. Brass rustproof grommets shall be inserted in pleat centers (12" centers on flat curtains). Grommets shall be used as follows:
 - a. #2 grommets - muslin, lightweight fabrics.
 - b. #3 grommets - unlined velour, medium weight fabrics.
 - c. #4 grommets - lined velour, heavy weight fabrics.
 - 2. Track-mounted curtains shall be supplied with plated wire S-hooks or CCF-2 curtain to carrier snap hooks. Batten-mounted curtains are to be supplied with 36" braided #4 cotton tie lines. Tie lines shall be black or white to best match the curtains with the center line in alternate color to aid in hanging curtains.
- H. Bottom Hems:
 - 1. Valances and borders shall have 4" bottom hems.
 - 2. All full height curtains shall have 6" bottom hems complete with separate interior chain pockets filled with #8 plated jack chain. Chain pockets shall be stitched so that the chain will ride 2" above the finished bottom edge of the curtain.
 - 3. Scrims, drops and screens shall have an additional pipe pocket sewn to the back of the hem and shall be furnished with a 3/4" pipe batten, threaded and coupled every 10 feet.
- I. Side Hems:
 - 1. House (Main) Curtain shall have 1/2 width of face fabric turned back at the leading edge.
 - 2. All traveler curtains shall have 12" of face fabric turned back at the leading edge.
 - 3. All other side hems shall be 2".
- J. Lining: Lining, if required in the above listing, shall conform to the following requirements.
 - 1. Lining shall be in the same fullness as face fabric.
 - 2. Lining shall finish 2" shorter than face fabric.
 - 3. Lining shall be attached to the face fabric along the bottom hem at seams by 4" long heavy woven cotton tape.

2.9 TRACKS

- A. Curtain Track:
 - 1. All cord operated tracks shall have new operating cord. ADC 2828 or ADC 1728 as appropriate for track.
 - 2. All cord operated tracks to have new tension floor pulleys. ADC 2865.
 - 3. All track carriers, end pulleys, end stops and master carriers shall have three (3) links of trim chain added if not already present. ADC TC-2.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for supporting members, blocking, installation tolerances, clearances, and other conditions affecting

performance of stage curtain work. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Examine inserts, clips, blocking, or other supports required to be installed by others to support tracks and battens. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. The Rigging Contractor shall be responsible for storage of stage equipment, tools, and equipment during the period of the installation.
- B. Extent: All specified equipment shall be installed by fully trained superintendents and workmen. Equipment shall be installed in a workman like manner, per plans and specifications. Equipment shall be aligned, adjusted, and trimmed for the most efficient operation, the greatest safety and for the best visual appearance.
- C. Standards: Installation practices shall be in accordance with OSHA Safety and Health Standards and all local codes. All welding must be performed in full compliance with the latest edition of the Structural Welding Code (ANSI/AWS D1.1).
- D. Alignment: Mule blocks, cable rollers and guides shall be installed, as required, to provide proper alignment, to maintain specified fleet angles, and to prevent contact with other surfaces.
- E. Attachments: All equipment shall be securely attached to the building structure. Underhung blocks and mule blocks shall be welded in place unless otherwise directed.
- F. Finishes:
 - 1. All welds must be touched up to match disturbed finishes.
 - 2. All finishes which are disturbed during shipping and installation shall be touched up to match the original.

3.4 CLEAN UP

- A. The Contractor shall be responsible for cleanup, including removal of packing materials etc. and the protection of surfaces or equipment provided by other contractors.

3.5 INSPECTION AND TESTING

- A. Inspection: During the installation of equipment the Rigging Contractor shall arrange for access as necessary for inspection of equipment by the Owner's representatives.
- B. System Inspection & Pre-Testing By Rigging Contractor: On completion of installation and testing the Rigging Contractor shall conduct a complete pre-test of the system to ensure it is working properly and in conformance with this specification. This shall include a complete test of all electrical systems and components. All tests shall be conducted as if the Architect or Consultant were present and appropriate corrections made before the final inspection. Inspection shall be done using the rigging equipment manufacturer's written inspection forms.
- C. Special Testing: If specifications, the Architect's instructions, laws, ordinances, or any public authority require any work to be specially tested or approved, the Rigging Contractor shall give the Architect timely notice of its readiness for inspection, and of dates of inspections to be made by other authorities.
- D. Completion Testing: Upon completing the installation of all equipment specified under this section, the Contractor shall notify the Architect, who will schedule an inspection. At the time of inspection, the Rigging Contractor shall furnish sufficient workers to operate all equipment and to perform such adjustments and tests as may be required by the Owner's representative. Any equipment, which fails to meet with approval, shall be repaired or replaced with suitable equipment and the inspection shall be re-scheduled under the same conditions as previously specified. At the time of these inspections, no other work shall be performed in the auditorium

and stage areas. All temporary bracing, scaffolding, etc. shall be removed to permit full operation of, and access to, all equipment. Final approval will be withheld until all systems have been thoroughly tested and found to be in first class operating condition in every particular.

- E. Manuals and instruction in the operation of the equipment shall be provided in accordance with 1.05.

END OF SECTION

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SECTION 12 2940 ROLLER SHADES

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. Manual operated bead chain clutch operated roller shades.
- B. Fascia.
- C. Accessories.
- D. Emergency Rescue Window sticker.

1.3 RELATED SECTIONS

- A. Section 06 1000 - Rough Carpentry: Wood blocking and grounds for mounting roller shades and accessories.
- B. Section 09 2116 - Gypsum Board Assemblies: Coordination with gypsum board assemblies for installation of shade pockets, closures and related accessories.
- C. Section 09 5100 - Acoustical Ceilings: Coordination with acoustical ceiling systems for installation of shade pockets, closures and related accessories.

1.4 REFERENCES

- A. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- B. NFPA 70 - National Electrical Code.
- C. NFPA 701 - Fire Tests for Flame-Resistant Textiles and Films.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
 - 3. Storage and handling requirements and recommendations.
 - 4. Mounting details and installation methods.
 - 5. Typical wiring diagrams including integration of motor controllers with building management system, audiovisual and lighting control systems as applicable..
- C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.
 - 1. Prepare shop drawings on AutoCAD format using base sheets provided electronically by the Architect.
- D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.
- E. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.
- F. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.
- G. 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 Chains: Provide 500 linear feet of #10 qualified stainless steel chain rated to 90 lb.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years' experience in manufacturing products comparable to those specified in this section.
- B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years' experience in installing products comparable to those specified in this section and approved by the manufacturer.
- C. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.
- D. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing.
- E. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

1.7 MOCK-UP

- A. Provide a mock-up (manual shades only) of one roller shade assembly for evaluation of mounting, appearance and accessories.
 1. Locate mock-up in window designated by Architect or Owner.
 2. Do not proceed with remaining work until, mock-up is accepted by Architect.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.10 WARRANTY

- A. Roller Shade Hardware and Chain Warranty: Manufacturer's standard non-depreciating twenty-five year limited warranty.
- B. Standard Shadecloth: Manufacturer's standard twenty-five year warranty.
- C. Roller Shade Motors and Motor Control Systems: Manufacturer's standard non-depreciating five year warranty.
- D. Roller Shade Installation: Two year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: MechoShade Systems, Inc., www.mechoshade.com.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 2500 - Substitution Procedures.

2.2 ROLLER SHADE TYPES

- A. Manual operating, chain drive, sunscreen roller shades shall be provided at all exterior windows of classrooms and spaces shown on the Drawings. Shades are to be reverse roll unless otherwise noted.
- B. Manual Shades
 - 1. Mounting: Surface mounted.
 - 2. Product: Mecho/5 bracket with fascia.

2.3 SHADE CLOTH

- A. Visually Transparent Shadecloth: MechoShade Systems, Inc., ThermoVeil series, Privacy Weave 0900 Series 0-1% open, single thickness non-raveling 0.030-inch thick vinyl fabric, woven from 0.018-inch diameter extruded vinyl yarn comprising of 25 percent polyester and 75 percent vinyl coating.
 - 1. Color: selected by Architect

2.4 SHADE BAND

- A. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.
 - 1. Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.
 - 2. Shade Band and Shade Roller Attachment:
 - a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch (39.37 mm) in diameter for manual shades, and less than 2.55 inches (64.77 mm) for motorize shades are not acceptable.
 - b. Provide for positive mechanical engagement with drive / brake mechanism.
 - c. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" snap-off" spline mounting, without having to remove shade roller from shade brackets.
 - d. Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
 - e. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets are not acceptable.

2.5 SHADE FABRICATION

- A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.
- B. Fabricate shade cloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shade cloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design. Fabricate hem as follows:
 - 1. Standard concealed hem bar.
- C. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shade bands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shade cloth

within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.

- D. For railroaded shade bands, provide seams in railroaded multi-width shade bands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shade bands.
- E. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shade bands.

2.6 COMPONENTS

- A. Access and Material Requirements:
 - 1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
 - 2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
 - 3. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester will not be acceptable.
- B. Manual Operated Chain Drive Hardware and Brackets:
 - 1. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.
 - 2. Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.
 - 3. Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.
 - 4. Provide shade hardware system that allows for operation of multiple shade bands (multi-banded shades) by a single chain operator, subject to manufacturer's design criteria. Connectors shall be offset to assure alignment from the first to the last shade band.
 - 5. Provide shade hardware system that allows multi-banded manually operated shades to be capable of smooth operation when the axis is offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve, for a 12 degrees total offset.
 - 6. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable
 - 7. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.
 - 8. Drive Bracket / Brake Assembly:
 - a. MechoShade Drive Bracket model M5 shall be fully integrated with all MechoShade accessories, including, but not limited to: SnapLoc fascia, room darkening side / sill channels, center supports and connectors for multi-banded shades.
 - b. M5 drive sprocket and brake assembly shall rotate and be supported on a welded 3/8 inch (9.525 mm) steel pin.

- c. The brake shall be an over-running clutch design which disengages to 90 percent during the raising and lowering of a shade. The brake shall withstand a pull force of 50 lbs. (22 kg) in the stopped position.
- d. The braking mechanism shall be applied to an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes an articulated brake assembly, which assures a smooth, non-jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated. Products that require externally applied lubrication and or not permanently lubricated are not acceptable.
- e. The entire M5 assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.
- f. Drive Chain: #10 qualified stainless steel chain rated to 90 lb. (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted.

2.7 ACCESSORIES

- A. Fascia:
 - 1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
 - 2. Fascia shall be able to be installed across two or more shade bands in one piece.
 - 3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
 - 4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.
 - 5. Notching of Fascia for manual chain shall not be acceptable.
 - 6. Color: Manufacturer's standard as selected by the Architect.
- B. Bead chain Hold Down Device: WCMA approved.
- C. Rescue labels will be provided by the shade installer and shall be placed on the window treatment (roller shade, horizontal blinds etc.) and visible from occupied side when closed. Coordinate with existing window locations.
- D. Rescue Labels: Windows designated on drawings as "EEW" emergency escape and rescue windows shall meet all applicable codes and shall include two (2) conforming label as follows:
 - "RESCUE WINDOW
FOR EMERGENCY USE ONLY"
 - 1. Signs shall be 3" x 5" with bright yellow background with black letter.
 - a. Vinyl decal.
 - b. Text and image as indicated on drawings.
 - c. Adhesive for mounting on window treatment.
 - 2. One label shall be placed on the window treatment (roller shade, horizontal blinds etc.) and visible from occupied side when closed.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Owner's Representative of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.
- B. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- C. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
- D. Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 12 3550 LIBRARY CASEWORK

PART 1 GENERAL

1.1 Section Includes

- A. All Wood Library Shelving
- B. Optional Features
 - a. Optional Plywood Library Shelving
 - b. Optional Steel Library Shelving
 - c. Optional Steel Mobile Base

1.2 References

- A. Architectural Woodwork Institute (AWI): Quality Standards.
- B. ADA (ATBCB ADAAG): Americans with Disabilities Act Accessibility Guidelines.

1.3 Warranty

- A. Furniture Manufacturer Warranty is a limited 12 year warranty. Warranty is for the conditions indicated below, and when notified in writing from Owner, manufacturer shall promptly investigate and address said deficiencies.
 - a. Defects in materials and workmanship.
 - b. Deterioration of material and surface performance.
 - c. Within the warranty period, we shall, at our option, repair, replace, or refund the purchase price of defective casework.
- B. Furniture manufacturer shall be notified immediately of defective products, and be given a reasonable opportunity to inspect the goods prior to return.
- C. Furniture manufacturer will not assume responsibility, or compensation, for unauthorized repairs or labor.
- D. Furniture manufacturer makes no other warranty, expressed or implied, to the merchantability, fitness for a particular purpose, design, sale, installation, or use, of furniture; and, shall not be liable for incidental or consequential damages, losses of or expenses, resulting from the use of their products.
- E. The warranty with respect to products from another company sold by the casework manufacturer is limited to the warranty extended by that other company.

PART 2 PRODUCTS

2.1 Materials

- A. Wood Species: Exposed wood shall be northern red oak hardwoods free of imperfections and shall be carefully selected for uniformity of grain, texture and figure. All Hardwoods shall be air seasoned, kiln dried and stabilized to approximately 7% moisture content.
- B. Veneers: In order to control quality and to ensure matching all library furniture, exposed veneers shall be hand selected plain sliced, Grade A premium northern red oak, slip matched for uniform color and not less than 1/28" thick.
- C. Plywood: Solid hardwood veneer core panels shall be constructed of an odd number of plies with face and back of northern red oak veneers. Each ply shall be applied at a right angle to the grain of the adjacent ply to resist warping. All plies shall be hardwood and free from structural voids or other defects. All plywood shall meet standards as currently established by the HPVA (Hardwood Plywood Veneer Association).

- D. High Pressure Laminate: Where specified for work surfaces and shelving soffits, HPL (high pressure laminate) shall be .050" thick. HPL shall be maximum hardness to resist scratches, fading or staining due to required use and purpose. Where HPL is used on work surfaces it shall be matched with a backer to prevent warp or de-lamination. All HPL shall conform to standards NEMA_LDI-1964 and LD-3 GP50. All standard laminates from Wilson Art, Nevamar, Pionite or Formica available at no additional charge.
- E. Joinery: All joints shall be traditional furniture construction including bore and dowel, glued and screwed, reinforced cleats and mortise and tenon.
- F. Wood Finish: 5-Step finishing process shall be utilized including toning hand wiping, staining, sanding and top coat. Top coat if a catalyzed lacquer finish for a hard durable surface. Finishes to meet AWI Standards
- G. Hardware: All hardware shall be constructed to meet institutional requirements. Door and drawer pulls shall be architecturally designed and 126mm. (Wire pulls not acceptable) Hinges shall be European styled concealed hinges with 170 degree opening radius. Locks shall be 5-disc tumbler locks, colored to match pulls and located on all doors and drawers.

2.2 Manufacturers

- A. Specified manufacturer: Paladin Caseworks Inc, Columbia Series Library Furniture. South Bend IN www.paladincaseworks.com OR APPROVAL EQUAL
- B. Acceptable equals: to be determined by architect

2.3 Fabrication

A. Library Shelving

- a. General Construction: All shelving shall be sectional in construction for maximum flexibility in arrangement. All heights and depths shall be as specified. There shall be one starter section for each range of shelving and all other sections in the range shall be adder sections. A starter section of shelving shall be 37 1/8" wide overall and an adder section shall be 36 1/8" wide overall. All end panels, center panels, soffits and bases shall be manufactured to allow backs to be fully captured for wall or free standing shelving. (Backs that are not fully captured will be considered unacceptable.) All shelves shall be adjustable on a minimum of 32 mm centers vertically. In order to prevent accidental dislodgment of the shelf pins, all shelf pins shall have an integral shoulder and shall be 5 mm in diameter. All shelves shall be rated at 150# uniform load and shall have a maximum deflection not to exceed 3/16".
- b. End Panels: All shelving end panels shall be a minimum of 1" thick plywood. All end panels shall receive plain sliced, Grade "A" red oak veneers on both sides and all exposed vertical edges shall receive minimum 1/4" solid northern red oak edge banding. All horizontal exposed edges of all shelving shall be banded with minimum 1/4" solid northern red oak. All panels shall be of the nominal dimension specified.
- c. Center Panels: All center panels shall be a minimum of 1" plywood. All center panels shall receive plain sliced, Grade "A" red oak veneers on both sides and all exposed vertical edges shall receive minimum 1/4" solid northern red oak edge banding. All horizontal exposed edges of all shelving shall be banded with minimum 1/4" solid northern red oak. All panels shall be of the nominal dimension specified.
- d. Soffits: Top soffits for 60"h and less shall be 3/4" thick plywood with a decorative HPL surface for protection from damage. Top soffit for 72 and 82"h units shall be inverted 3/4" thick plywood stained to match the rest of the shelving for a complete finished look. Top soffit rail shall be solid northern red oak 2-3/4" wide. Top mounting shall be with all metal to metal fastening.
- e. Bases: All bases shall receive a 3-1/4" x 3/4" plywood face strip with 1/4" edge banding. The base must be grooved to capture the bottom of the back eliminating any racking in taller units.

- f. Backs: True ¼" thick Slate Gray double faced melamine on MDF core backs shall come standard with all single and double faced shelving. Optional oak veneer on MDF core available when requested.
 - g. Connecting Hardware: Soffits and bases shall attach to end and center panels with 5/16" bolts for all metal to metal attachment (lag bolts or wood to metal contact shall not be considered acceptable).
 - h. Solid Wood Shelves: All solid wood shelves shall be constructed of ¾" solid northern red oak for a uniform finish. Picture book shelves shall have 4 wire book supports per shelf. Magazine shelves shall have a 1" lip for magazine display. Mixed species or any species other than solid oak is not acceptable.
- B. Optional features
- a. Optional Plywood Shelves: All plywood shelves shall be constructed of 1" thick plywood. All shelves shall receive plain sliced, Grade "A" red oak veneers on both sides and front vertical edge to receive a minimum 1/4" solid northern red oak edge banding. Picture book shelves shall have 4 wire book supports per shelf. Magazine shelves shall have a 1" lip for magazine display. Mixed species or any species other than solid oak is not acceptable.
 - b. Optional Steel Shelves: All steel shelves shall be 18 gauge, powder-coated steel with triple-bent front & rear edges for additional rigidity and safety. Backstop steel shelf shall have an integral 2" high backstop. Multimedia steel shelves shall have six adjustable dividers. Picture book steel shelves shall have six adjustable dividers. Magazine steel shelves shall have a flange at the bottom for book display.
 - c. Optional Mobile Base: Two 5" w x 21 ½" d, 16 gauge tech black powder coated steel end supports, fully welded and concealed with ¾" thick oak veneer platform, grooved for fully captured back. 3" h concealed casters bolt directly to the steel frame transferring the load directly to the casters eliminating the risk of a wood joint failure. Available for 60" H and lower shelving only.

PART 3 EXECUTION

3.1 Installation

- A. Install library furniture in accordance with manufacture's instructions.
- B. Installation of library furniture shall be plum, level true and straight.
- C. Use concealed shims as required.
- D. All continuous tops on shelving shall be scribed to wall.

3.2 Protection

- A. Inspect library furniture for damage or soiled areas; remove, refinish or touch-up as required.
- B. Cover installed library furniture and equipment to protect from other trades.
- C. Protect installed products until completion of project.

End of Section

SECTION 22 0000

GENERAL PLUMBING REQUIREMENTS

PART 1 -GENERAL

1.01 RELATED DOCUMENTS

- A. Provisions of the General Conditions, Supplementary Conditions and Division 01 -General Requirements, and applicable provisions elsewhere in the Contract Documents apply to work of Division 22.
- B. In case of disagreement between Drawings and Specifications, or within either document itself, obtain written clarification from the Mechanical Engineer through the Architect. Failure to obtain clarification prior to bid will result in the better quality and greater quantity being required during the construction phase without additional reimbursement.

1.02 DESCRIPTION OF SYSTEMS

- A. The related work of Division 22 includes but is not limited to:
 - 1. Section 220000 - General Plumbing Requirements.
 - 2. Section 220553 - Plumbing Identification.

1.03 DESCRIPTION OF WORK

- A. A. Work Included: Unless specified otherwise, provide all supervision, labor, materials, transportation, equipment, hauling, and services necessary for a complete and operational mechanical system. Provide all incidental items such as offsets, fittings, etc. required as part of the work even though not specifically shown on Contract Drawings or Specifications.
- B. B. Inspection: Inspect work proceeding or interfacing with work of Division 22 sections prior to submitting bid and report any known or observed defects that affect the Mechanical Design to the General Contractor. Do not proceed with the construction work until defects are corrected.
- C. C. Existing Utilities are indicated as accurately as possible on the Drawings. If utilities are encountered and not indicated on Drawings, notify the Architect prior to proceeding with work.

1.04 UTILITIES, EXTENSIONS, CONNECTIONS AND FEES FOR WATER AND SEWER

- A. Provide all services within the building to a point five (5) feet outside of building. Provide permanent marker at grade for other contractors' location reference for connection purposes.
- B. Provide all building services and connections to site utilities, as indicated on Drawings.
- C. In the event that the serving utility company installs their own taps, service, meters, etc., all costs imposed by this action shall be paid for by the Owner. Extensions from termination points to connection with building services and systems will be the responsibility of the Division 22 Contractor.
- D. Contractor shall be responsible for all pads, meter enclosures, valves and appurtenances, all in conformance with requirements of the serving utility company.

1.05 REFERENCES

- A. General:
 - 1. FOR PRODUCTS OR WORKMANSHIP SPECIFIED BY ASSOCIATION, TRADE OR FEDERAL STANDARDS, COMPLY WITH REQUIREMENTS OF THE STANDARD, EXCEPT WHEN MORE RIGID REQUIREMENTS ARE SPECIFIED OR ARE REQUIRED BY APPLICABLE CODES.
 - 2. THE DATE OF THE STANDARD IS THAT WHICH IS IN EFFECT AS OF THE DATE OF THE CONTRACT DOCUMENTS, EXCEPT WHEN A SPECIFIC DATE IS SPECIFIED.

1.06 QUALITY CONTROL

- A. Materials and apparatus required for the work shall be new and of first-class quality; to be furnished, delivered, erected, connected and finished in every detail; and to be so selected and arranged so as to fit properly into the building spaces.

- B. Unless otherwise specifically indicated, equipment and materials shall be installed in accordance with the recommendations of the manufacturer. This includes the performance of tests as recommended by the manufacturer.

1.07 EXAMINATION OF CONTRACT DRAWINGS AND SPECIFICATIONS

- A. The Mechanical Drawings show the general arrangement of piping, ductwork, mechanical equipment, and appurtenances, and shall be followed as closely as actual building construction and the work of other trades will permit.
- B. The Architectural and Structural Drawings shall be considered part of the mechanical work insofar as these Drawings furnish this Division with information relating to design and construction of the building.
- C. Field verify building dimensions governing mechanical work. Do not scale the Mechanical Drawings for dimensions. If field dimensions are not available take dimensions, measurements, locations, levels, etc. from the Architectural Drawings and the approved Shop Drawings submitted on the actual equipment to be furnished.
- D. The Mechanical Contractor shall request of the Test and Balance (TAB) Contractor an early review of the Contract Documents for the purpose of identifying where proper balancing cannot be achieved. The report requirements are referred to in Division 23, Temperature Controls section, "Submittals." Forward a copy of the report to the mechanical engineer for review. The Mechanical Contractor shall modify the system as recommended by the TAB Contractor or refer unresolved issues to the Mechanical Engineer for resolution prior to ordering of ductwork and equipment. Unresolved balancing issues from untimely or incomplete application of these requirements will be the responsibility of the Mechanical Contractor to correct.
- E. No extra compensation shall be claimed or allowed due to differences between the actual dimensions and those indicated on the Drawings.
- F. Discrepancies: Examine Drawings and Specifications for other parts of the work, and if any discrepancies occur between the plans for the work of this Division and the plans for the work of others, report such discrepancies to the General Contractor and obtain written instructions for any changes necessary. Report any inconsistencies between the drawings and specifications and the installation requirements of equipment manufacturers.
- G. Order of Precedence: The precedence of Mechanical Construction Documents is as follows:
 - 1. ADDENDA AND MODIFICATIONS TO THE DRAWINGS AND SPECIFICATIONS TAKE PRECEDENCE OVER THE ORIGINAL DRAWINGS AND SPECIFICATIONS.
 - 2. SHOULD THERE BE A CONFLICT WITHIN THE SPECIFICATIONS OR WITHIN DRAWINGS OF THE SAME SCALE, THE MORE STRINGENT OR HIGHER QUALITY REQUIREMENTS SHALL APPLY.
 - 3. IN THE DRAWINGS, THE PRECEDENCE SHALL BE FIGURED DIMENSIONS OVER SCALED DIMENSIONS AND NOTED MATERIALS OVER GRAPHIC INDICATIONS.
 - 4. SHOULD A CONFLICT ARISE BETWEEN THE DRAWINGS AND THE SPECIFICATIONS THE MOST STRINGENT SHALL HAVE PRECEDENCE.
 - 5. SHOULD THERE BE A CONFLICT IN DIMENSIONS OR LOCATIONS BETWEEN MECHANICAL DRAWINGS AND/OR ARCHITECTURAL/STRUCTURAL DRAWINGS, THE ARCHITECTURAL/STRUCTURAL DRAWINGS SHALL HAVE PRECEDENCE.

1.08 EXAMINATION OF PROJECT SITE

- A. Examine site carefully to determine conditions to be encountered, work to be performed, equipment, materials to be transported, stored, furnished, and other features applicable to completion of the work.
- B. Study Drawings and Specifications, report inconsistencies, errors, omissions or conflicts with codes and ordinances.
- C. Submittal of bid will indicate satisfactory examination of the Documents have been made, and applicable allowances included in the bid.

1.09 REGULATORY REQUIREMENTS

- A. Refer to Architectural Drawings and Division 01 specifications for a list of applicable codes.

- B. Execute work per Underwriters, Public Utility, Local and State Codes, Ordinances and applicable regulations. Obtain and pay for required permits, inspections, and certificates. Notify Architect of items not meeting said requirements.
- C. Comply with latest editions of all applicable codes, standards, ordinances and regulations in effect as of the date of the Contract Documents.
- D. If discrepancies occur between the Contract Documents and any applicable codes, ordinances, acts, or standards, the most stringent requirements shall apply.
- E. Where hourly fire and smoke ratings are indicated or required, whether or not shown, provide components and assemblies meeting requirements of the American Insurance Association, Factory Mutual Insurance Association and listed by Underwriters Laboratories, Inc.

1.10 COORDINATION

- A. The Contractor shall plan all of his work in advance, and shall inform the General Contractor of the proposed construction schedule and anticipated completion date upon request. Contractor shall complete the entire installation as soon as the condition of the remaining building construction will permit.
- B. Before purchase, fabrication, or installation of items, determine if the installation will properly fit and can be installed as contemplated without interference with structural elements or the work of other trades.
- C. Locations of pipes, ducts, switches, panels, equipment, and fixtures, shall be adjusted to accommodate the work or interferences anticipated and encountered. Determine the exact route and location of each pipe and duct prior to fabrication.
- D. Right of Way: Lines which pitch shall have the right-of-way over those which do not pitch. Lines whose elevations cannot be changed shall have right-of-way over lines whose elevations can be changed.
- E. Offsets, transitions and changes in direction of pipes and ducts shall be made as required to maintain proper head room and pitch of sloping lines whether or not indicated on the Drawings.
- F. Where major conflicts occur, contractor shall rely upon the Architect/Engineer to make final decision regarding priority of right-of-way. Contractor shall request written clarification from the Architect/Engineer prior to conflict reaching critical stage requiring removal of previously installed equipment or system components either by himself or by other trades involved.
- G. When directed by the Architect/Engineer, submit Shop Drawings showing interrelationship of various portions of work and work of other trades. Failure to properly coordinate may result in removal and relocation at expense to the Contractor.
- H. Coordinate all electrical work with Electrical Contractor. Read the Electrical Specification and report any inconsistencies. See "Electrical Wiring and Safety Device Work and Material Responsibilities" in this section.
- I. Coordinate all cutting & patching with General Contractor.
- J. Utility Interruptions: Coordinate mechanical utility interruptions with the Owner and the Utility Company. Plan work so that duration of the interruption is kept to a minimum.

1.11 PROJECT CONDITIONS

- A. Accessibility:
 - 1. CONTRACTOR SHALL BE RESPONSIBLE FOR THE SUFFICIENCY OF THE SIZE OF SHAFTS AND CHASES AND THE ADEQUATE CLEARANCE IN DOUBLE PARTITIONS AND HUNG CEILINGS FOR PROPER INSTALLATION OF WORK. COORDINATE THESE REQUIREMENTS WITH THE GENERAL CONTRACTOR. SUCH SPACES AND CLEARANCES SHALL BE KEPT TO THE MINIMUM SIZE REQUIRED.
 - 2. LOCATE ALL EQUIPMENT WHICH MUST BE SERVICED, OPERATED, OR MAINTAINED IN FULLY ACCESSIBLE POSITIONS. FURNISH ACCESS DOORS FOR THIS PURPOSE. MINOR DEVIATIONS FROM DRAWINGS MAY BE ALLOWED TO PROVIDE FOR BETTER ACCESSIBILITY. ANY CHANGES SHALL BE APPROVED BY THE ARCHITECT PRIOR TO MAKING THE CHANGE.

3. PROVIDE THE GENERAL CONTRACTOR WITH THE EXACT LOCATIONS OF ACCESS DOORS. LOCATIONS OF THESE DOORS SHALL BE SUBMITTED IN SUFFICIENT TIME TO BE INSTALLED IN THE NORMAL COURSE OF WORK.
 4. DEMONSTRATION OF ACCESS WILL BE REQUIRED PRIOR TO PROJECT COMPLETION. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING REASONABLE AND SAFE ACCESS FOR ALL SYSTEM COMPONENTS. CONTRACTOR TO ARRANGE WITH AN OWNER'S REPRESENTATIVE A TIME FOR THE DEMONSTRATION PRIOR TO THE FINAL PUNCHLIST.
- B. Fabrication: Before installing and/or fabricating any lines of piping or ductwork the Contractor shall assure himself that they can be run as contemplated in cooperation with Contractors of other Divisions of the Work and the physical constraints of the Structural and Architectural Work.
- C. Freeze Protection: Do not run pipes in outside walls, or locations where freezing may occur. Piping next to outside walls shall be in furred spaces with insulation between the piping and the outside wall. Insulation of piping shall not be considered freeze protection.
- D. Scaffolding, Rigging and Hoisting: Provide scaffolding, rigging, hoisting and services necessary for erection and delivery into the premises of any equipment and apparatus furnished. Remove same from premises when no longer required.

1.12 SUBMITTALS:

- A. Within thirty days after award of the Contract, submit to Architect complete catalog data and/or Shop Drawings for each item of material and for every manufactured item of equipment to be used in the work. Such data shall include specific performance data, material description, rating, capacity, dimensions, and type for each item of material, each manufactured item, and all component parts utilized in final operating mechanical system. Applicable data shall be underlined and each applicable item identified in each catalog by the same identification acronyms used on the Drawings.
- B. This Contractor shall submit to the Architect the number of copies required by the General and Special Conditions of Division 01, but in no case less than four (4) copies.
- C. Each item submitted shall bear the Contractor's stamp, be dated and signed certifying that he has reviewed and approved the Submittal.
- D. For each item scheduled on the Drawings, submit a replication of that schedule indicating actual data of the submitted equipment in the schedule.
- E. The review comments of the Architect and/or Engineer do not in any case supersede the Drawings and Specifications, and shall not relieve the Contractor from responsibility for deviations from the Drawings or Specifications unless the Contractor has called to the attention of the Architect and/or Engineer, in writing, such deviations at the time of submission, nor shall it relieve the Contractor from responsibility for errors of any sort in the items submitted.
- F. Test Reports: Submit certified test reports as required by various Sections of Division 22 showing compliance in accordance with the General Conditions of the Contract.
- G. Deviations: It is the contractors responsibility to indicate deviations from the Plans And Specifications. Approval shall not be considered acceptance of the deviation unless it has been explicitly indicated.

1.13 SITE OBSERVATION REPORTS

- A. During the construction period the Engineer may issue periodic site observation reports. The contractor shall immediately address the issues and provide a written response identifying the "Responsible Contractor," "Date," "Corrective Action Taken," and "Recommendations."
- B. The written response must be returned to the Architect no later than (5) working days after receipt of the site observation report.

1.14 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Substitutions: Comply with Division 01 & Instructions to Bidders.
- B. Contractors desiring to use alternate equipment or materials and manufacturers or suppliers desiring to furnish alternate materials or equipment in lieu of those specified, shall submit requests for approval to

the Engineer not less than seven (7) calendar days prior to scheduled closing date for receipt of proposals.

- C. Materials and equipment are specified by manufacturer and catalog numbers. The manufacturers and catalog numbers are used to establish a degree of quality and style for such equipment and material.
- D. When alternate or substitute materials and equipment are used, Contractor will be responsible for space requirement, configurations, performance, changes in bases, supports, structural members and openings in structure, electrical changes and other apparatus and trades that may be affected by their use. Contractor shall provide drawings for alternate/substitute equipment in detail equal to the construction documents.

1.15 PROJECT RECORD DOCUMENTS

- A. General: Comply with Division 01.
- B. Job Site Documents: Maintain at the job site, one record copy of the following:
 - 1. Drawings
 - 2. Specifications
 - 3. Addenda
 - 4. Reviewed Shop Drawings
 - 5. Field Test Records
- C. Do not use record documents for construction purposes. Maintain documents in clean, dry legible condition, apart from documents used for construction.
- D. Record Information: Label each document "Record Document." Mark information with contrasting color using ink. Keep each record current. Do not permanently conceal any work until required information is recorded. Record the following information on drawings:
 - 1. Horizontal and vertical location of underground utilities.
 - 2. Location of internal utilities and appurtenances concealed in construction.
 - 3. Field changes of dimension and detail.
 - 4. Changes by change order or field order.
 - 5. Details not on original Contract Drawings.
- E. Contractor shall transfer all as-built information on to CAD files. Electronic copy will be provided upon request.
- F. Record the following information on Specifications:
 - 1. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.
 - 2. Changes by change order or field order.
 - 3. Other matters not originally specified.
- G. Shop Drawings: Maintain Shop Drawings as record documents recording changes made after review as specified for drawings above.

1.16 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store materials and equipment in manufacturer's unopened containers fully identified with manufacturer's name, trade name, type, class, grade, size and color.
- B. Protection: Make provisions for coordination with Owner and other Contractors for safe storage of materials and equipment. Store materials and equipment off the ground and under cover, protected from damage.
- C. All items subject to moisture damage, such as controls, shall be stored in a dry, heated space.
- D. Large Items: Make arrangements with other Contractors on the job for introduction into the building of equipment too large to pass through finished openings. Schedule delivery of large equipment requiring special openings as required for installation without delaying the work of other project trades.
- E. Acceptance: Check and sign for materials to be furnished by Division 22 and other trades for installation under Division 22 upon delivery. Assume responsibility for the storage and safekeeping of such materials from time of delivery until final acceptance.

- F. Inspection: Stored material shall be readily accessible for inspection by the Architect until installed.

1.17 WARRANTIES

- A. Warranty: In accordance with Division 01, provide a written warranty to the Owner covering the entire mechanical work to be free from defective materials, equipment and workmanship. If the warranty period is not defined in Division 01, the minimum warranty period will be for a period of two years after Date of Acceptance. Purchase of manufacturer's extended warranty may be required to comply with the warranty period requirement. During this period provide labor and materials as required to repair or replace defects at no additional cost to the Owner. Provide certificates for such items of equipment which have warranties in excess of one year. Submit to the General Contractor.
- B. This warranty will be in addition to the terms of any specific equipment warranties or warranty modifications resulting from use of equipment for temporary heat or ventilation.

1.18 SCHEDULE OF TESTING

- A. Provide testing in accordance with the General Conditions of the Contract. Make all specified tests on piping, ductwork and related systems as necessary. Demonstrate the proper operation of equipment installed under this project.
- B. Equipment shall not be tested, or operated for any purpose until fully lubricated in accordance with manufacturer's instructions and until connections to fully operative systems have been accomplished.
- C. A schedule of testing shall be drawn up by the Division 22 Contractor in such a manner that it will show areas tested, test pressure, length of test, date, time and signature of testing personnel. All testing must be performed in the presence of the General Contractor's representative; his signature for verification of the test must appear on the schedule. At completion of testing, the schedule shall then be submitted in triplicate to the Architect.
- D. Make sure operational and performance tests are made on seasonal equipment.
- E. Complete all tests required by Code Authorities, such as smoke detection, life safety, fire protection and health codes.

1.19 DEMONSTRATION OF ACCESS

- A. The Contractor shall demonstrate to the Owner's designated representative the access to all switches, valves, actuators, dampers, motors, lubrication lines, sensors and panels. Contractor shall correct deficiencies noted by the Owner. Refer outstanding issues to the Architect/Engineer for resolution. Contractor to be responsible for arranging the demonstration prior to final inspection.

1.20 CERTIFICATES AND KEYS

- A. Certificates: Upon completion of the work, deliver to the General Contractor one copy of Certificate of Final Inspection.
- B. Keys: Upon completion of work, submit keys for mechanical equipment, panels, etc. to the General Contractor.

1.21 OPERATING AND MAINTENANCE DATA

- A. Submit three (3) typed and bound copies of the maintenance manual, 8-1/2" x 11" in size, to the Architect, for review and approval. These approved copies shall then be transmitted to the Owner.
- B. The manual shall be enclosed in a stiff-back, three-ring binder and shall have:
1. TABLE OF CONTENTS, EQUIPMENT LIST WITH IDENTIFICATION USED IN CONTRACT DOCUMENTS.
 2. ALPHABETICAL LIST OF ALL SYSTEM COMPONENTS INCLUDING THE NAME, ADDRESS, AND 24-HOUR PHONE NUMBER OF THE COMPANY RESPONSIBLE FOR SERVICING EACH ITEM DURING THE FIRST YEAR OF OPERATION.
 3. OPERATING INSTRUCTIONS FOR COMPLETE SYSTEM, INCLUDING PROCEDURES FOR FIRE OR FAILURE OF MAJOR EQUIPMENT AND PROCEDURES FOR NORMAL STARTING/OPERATING/SHUTDOWN AND LONG-TERM SHUTDOWN.
 4. MAINTENANCE INSTRUCTIONS, INCLUDING VALVES, VALVE TAG AND OTHER IDENTIFIED EQUIPMENT LISTS, PROPER LUBRICANTS AND LUBRICATING

INSTRUCTIONS FOR EACH PIECE OF EQUIPMENT AND NECESSARY
CLEANING/REPLACING/ADJUSTING SCHEDULES.

5. MANUFACTURER'S DATA ON EACH PIECE OF EQUIPMENT, INCLUDING:
 - a. INSTALLATION INSTRUCTIONS.
 - b. DRAWINGS AND SPECIFICATIONS (APPROVED SHOP DRAWINGS).
 - c. PARTS LISTS.
 - d. COMPLETE WIRING AND TEMPERATURE CONTROL DIAGRAMS. (APPROVED SHOP DRAWINGS).
 - e. COMPLETED AND APPROVED TAB REPORT.

1.22 INSTRUCTIONAL SESSIONS

- A. Be responsible for scheduling instructional meetings for maintenance personnel on the proper operation and maintenance of all mechanical systems, using the maintenance manual as a guide. These meetings must be scheduled through the Architect or General Contractor and with enough advanced notice that all personnel can be notified. Provide instructional sessions as required.
- B. Video tape instructional sessions for Owner's future use.

PART 2 -PRODUCTS (NOT APPLICABLE)

PART 3 -EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 22 0517

SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe sleeves.

1.02 REFERENCE STANDARDS

- A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2016.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).

1.03 SUBMITTALS

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

PART 2 PRODUCTS

2.01 PIPE SLEEVES

- A. Manufacturers:
 - 1. Flexicraft Industries; Pipe Wall Sleeve: www.flexicraft.com/#sle.
 - 2. or approved equal.
- B. Vertical Piping:
 - 1. Sleeve Length: 1 inch (25 mm) above finished floor.
 - 2. Provide sealant for watertight joint.
 - 3. Blocked Out Floor Openings: Provide 1-1/2 inch (40 mm) angle set in silicon adhesive around opening.
 - 4. Drilled Penetrations: Provide 1-1/2 inch (40 mm) angle ring or square set in silicone adhesive around penetration.
- C. Pipe Passing Through Below Grade Exterior Walls:
 - 1. Zinc coated or cast iron pipe.
 - 2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.

3.02 INSTALLATION

- A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- B. Install piping to conserve building space, to not interfere with use of space and other work.
- C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
 - 1. Underground Piping: Caulk pipe sleeve watertight with lead and oakum or mechanically expandable chloroprene inserts with bitumen sealed metal components.
 - 2. Aboveground Piping:
 - a. Pack solid using mineral fiber complying with ASTM C592.
 - b. Fill space with an elastomer caulk to a depth of 0.50 inch (15 mm) where penetrations occur between conditioned and unconditioned spaces.

- E. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

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 ABBREVIATIONS AND ACRONYMS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NRS: Non-rising stem.
- D. OS&Y: Outside screw and yoke.

1.03 REFERENCE STANDARDS

- A. API STD 594 - Check Valves: Flanged, Lug Wafer, and Butt-Welding; 2017.
- B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
- C. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service; 2010a.
- D. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.
- E. NSF 61 - Drinking Water System Components - Health Effects; 2017.
- F. 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.

1.05 QUALITY ASSURANCE

- A. Manufacturer:
 - 1. Obtain valves for each valve type from single manufacturer.

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. Domestic, Hot and Cold Water Valves:
 - 1. 2 NPS (50 DN) and Smaller:
 - a. 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. Solder-joint Connections: ASME B16.18.
- F. Valve Materials for Potable Water: NSF 61 and NSF 372.

2.03 BRASS BALL VALVES

- A. 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.

2.04 BRONZE BALL VALVES

- A. Two Piece, Full Port with Bronze Trim:
 1. Comply with MSS SP-110.
 2. SWP Rating: 150 psig (1035 kPa).
 3. CWP Rating: 600 psig (4140 kPa).
 4. Body: Bronze.
 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; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- D. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014).
- E. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
- F. MFMA-4 - Metal Framing Standards Publication; 2004.
- G. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

1.03 SUBMITTALS

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

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. Manufacturers:
 - a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.
 - b. Thomas & Betts Corporation: www.tnb.com/#sle.
 - c. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
 - d. or approved equal.
 - 2. Comply with MFMA-4.
- C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
 - 1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Piping up to 1 inch (27 mm) nominal: 1/4 inch (6 mm) diameter.
 - b. Piping larger than 1 inch (27 mm) nominal: 3/8 inch (10 mm) diameter.

- D. Pipe Supports:
 - 1. Liquid Temperatures Up To 122 degrees F (50 degrees C):
 - a. Overhead Support: MSS SP-58 Types 1, 3 through 12.
 - b. Support From Below: MSS SP-58 Types 35 through 38.
- E. Pipe Hangers: For a given pipe run use hangers of the same type and material.
 - 1. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
 - 2. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.
- F. Anchors and Fasteners:
 - 1. Manufacturers - Mechanical Anchors:
 - a. Hilti, Inc: www.us.hilti.com/#sle.
 - b. ITW Red Head, a division of Illinois Tool Works, Inc: www.itwredhead.com/#sle.
 - c. Powers Fasteners, Inc: www.powers.com/#sle.
 - d. Simpson Strong-Tie Company Inc: www.strongtie.com/#sle.
 - e. or approved equal.
 - 2. 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. 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. Tags.
- B. Pipe markers.
- C. Ceiling tacks.

1.02 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2015.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2017.

1.03 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.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Piping: Tags.
- B. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.02 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 equal.
- 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.

2.03 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. or approved equal.
- 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.

2.04 CEILING TACKS

- A. Manufacturers:
 - 1. Craftmark Pipe Markers: www.craftmarkid.com/#sle.
 - 2. or approved equal.
- B. Description: Steel with 3/4 inch (20 mm) diameter color coded head.

YPS#10816

C. Color code as follows:

1. Plumbing Valves: Green.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Install tags with corrosion resistant chain.
- B. Install plastic pipe markers in accordance with manufacturer's instructions.
- C. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- D. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 22 0719

PLUMBING PIPING INSULATION

PART 2 PRODUCTS

1.01 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.
- B. See Schedule on P-500.

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. Domestic water.
 - 2. Storm water.
 - 3. Pipe hangers and supports.
 - 4. Valves.

1.02 REFERENCE STANDARDS

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
- C. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- D. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2016.
- E. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2016.
- F. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.
- G. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2016.
- H. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; 2009 (Revised 2012).
- I. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2015.
- J. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- K. NSF 61 - Drinking Water System Components - Health Effects; 2017.
- L. NSF 372 - Drinking Water System Components - Lead Content; 2016.

1.03 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.

1.04 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 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.

2.03 STORM WATER PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING

- A. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

2.04 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.
- 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 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 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.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- C. 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.

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 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. ASME A112.6.4 - Roof, Deck, and Balcony Drains; 2008 (Reaffirmed 2012).
- D. NSF 61 - Drinking Water System Components - Health Effects; 2017.
- E. NSF 372 - Drinking Water System Components - Lead Content; 2016.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.

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. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
 - 2. Josam Company: www.josam.com/#sle.
 - 3. Zurn Industries, LLC: www.zurn.com/#sle.
 - 4. or approved equal.
- B. Area Drains:
 - 1. Assembly: ASME A112.6.4.
 - 2. Body: Lacquered cast iron with sump.
 - 3. Strainer: Round nickel-bronze.
 - 4. Accessories: Membrane flange and membrane clamp with integral gravel stop, with adjustable under deck clamp.
- C. Floor Drains:
 - 1. Manufacturers:
 - a. Jay R. Smith Manufacturing Company: www.jrsmith.com/#sle.
 - b. or approved equal.
- D. Floor Drain (FD-1):
 - 1. ASME A112.6.3; lacquered cast iron or stainless steel, two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer.

2.03 CLEANOUTS

- A. Manufacturers:
 - 1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
 - 2. Josam Company: www.josam.com/#sle.
 - 3. Zurn Industries, LLC: www.zurn.com/#sle.
 - 4. or approved equal.
- B. Cleanouts at Interior Finished Floor Areas (CO-3):

1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.

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. Zurn Industries, LLC: www.zurn.com/#sle.
 4. or approved equal.

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. Install floor cleanouts at elevation to accommodate finished floor.
- D. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatory sinks.

END OF SECTION

SECTION 22 1010
UNDERGROUND FUEL TANK SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION/SUMMARY

- A. The contractor shall provide one 8' dia. 6,000 gallon, underground tank, double wall, fiberglass storage tank, manufactured by Containment Solutions, or equal. Tank shall be equipped and installed with new piping, monitoring equipment, sensors, control panel, and manholes as detailed on drawings and specifications.
- B. The Contractor shall furnish the labor, materials, equipment, appliances, services and hauling, and perform operations in connection with the removal, construction and installation of the Work. Work shall be as herein specified and as denoted on the accompanying Drawings.
- C. The Owner will provide fuel to fill tanks. Contractor shall notify Owner in advance of setting date of tank for Owner to fill immediately thereafter.

1.02 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications apply to this Section.
- B. Refer to details and schedules on the drawings for additional requirements.
- C. Facility Fuel Oil Piping - Section 22 1113

1.03 GOVERNING STANDARDS

- A. Underwriters Laboratories Inc. standard 1316, Glass-Fiber Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures.
- B. Underwriters Laboratories of Canada standard ULC-S615, Reinforced Plastic Underground Tanks for Flammable & Combustible Liquids.
- C. National Fire Protection Association codes and standards:
- D. NFPA 30 Flammable and Combustible Liquids Code
- E. NFPA 31 Installation of Oil-Burning Equipment Standard
- F. City of New York Department of Buildings M.E.A., 71-85-M
- G. American Concrete Institute standard ACI 318, Building Code Requirements for Structural Concrete.
- H. All tanks and piping shall be properly installed in accordance with the manufacturer's instructions and either "Petroleum Equipment Institute Recommended Practices for Installation of Underground Liquid Storage Systems" or "American Petroleum Institute Publication Installation of Underground Petroleum Storage Systems."
- I. U.L. 971 - Non metallic pipe and U.L. standard 567-89 pipe connections for flammable and combustible LP gas.
- J. ASTM Specification A53. Pipe, steel, black and hot-dipped, zinc coated welded and seamless.
- K. NYS Mechanical Code for Fuel oil Piping and Storage.
- L. NEC (NFPA 70)

1.04 QUALITY ASSURANCE

- A. Tanks shall be constructed to meet governing standards with certification plate (UL Label) affixed.
- B. Shop Drawings: Contractor shall submit 5 copies of shop drawings for each tank. Drawings shall include all critical dimensions, locations of fittings and accessories, i.e.: spill containment, etc.
- C. All tanks equipment and piping materials shall be physically inspected and air tested before being installed. Any defects observed shall be immediately brought to the attention of the Owner. It shall be the sole responsibility of the Contractor to correct any deficiencies, with the manufacturer in strict accordance with manufacturer's recommendations, at no additional cost to the Owner.

- D. Contractor shall submit 5 copies of manufacturer's literature including 5 copies of manufacturer's current installation instructions to the Owner.
- E. The Contractor shall be a licensed UST installer in the State of New York, during the entire duration of the project. The Contractor shall have the responsibility of notifying and coordinating with all local and state officials. All inspection and registration fees shall be paid by the Owner. The Contractor shall coordinate with the Owner to provide a written site safety plan.

PART 2: PRODUCTS

2.01 FUEL STORAGE TANK

- A. FUEL TANK EQUIPMENT SCHEDULE:
 - 1. UNDERGROUND PIPING
 - a. UNDERGROUND TANK - DWT -6 TYPE II (8) 8' DIA., 6000 GALLON DOUBLE-WALL FIBERGLASS BY CONTAINMENT SOLUTIONS
 - b. UNDERGROUND PIPING - FRANKLIN FUELING SYSTEMS APT BRAND, F.O.S. AND F.O.R. SHALL BE 1.00" NON-METALLIC DOUBLE MODEL XP-100-SC
 - c. VENT PIPING - 2" NON-METALLIC SINGLE WALL, APT MODEL XP-200-D
 - d. TANK SUMP ENTRY BOOTS- MFG. BY APT: VENT PIPING FEB-200-D; ELECTRIC CONDUIT FEB-075-D; FOS AND FOR, DDB-100-SC.
 - e. PIPE ADAPTERS - MFG. BY APT: MODEL MN-XP-100-100 FOR F.O.S. AND F.O.R.; MODEL MS-XP-200-200 FOR VENT PIPING
 - f. SECONDARY CONTAINMENT TEST BOOTS- APT MODEL STB-100
 - g. PIPE DUCTING - 4" APT MODEL DCT-400
 - h. PIPING SUMP -CONTAINMENT SOLUTIONS SW-PTS-WT40-(FV X/X/X)-42/8-3 SINGLE WALL ROUND TANK SUMP W/WATERTIGHT LID
- B. HARDWARE AND MANHOLES
 - 1. TANK FILL
 - a. SPILL CONTAINER - SHALL BE MFG. BY FRANKLIN FUELING SYSTEMS EBW BRAND MODEL 705-474-65-BLK (with riser cap and adapter)
 - b. FILL ADAPTOR - EBW MODEL 778-301-01 OR MORRISON BROS. MODEL 305L 0200AA
 - c. FILL CAP - EBW MODEL 777-201-02 OR MORRISON BROS. MODEL 305C 0100 AC
 - d. OVERFILL PREVENTION VALVE - EBW AUTOLIMITER AUTOMATIC SHUTOFF MODEL 708-491-01
- C. MANHOLES
 - 1. ACCESS MANHOLE/ PIPING SUMP MANHOLE -MORRISON BROS. MODEL 418L-4400 AM
 - 2. TANK MONITOR MANHOLE(S) - MORRISON BROS. MODEL 418TM 1100AM
 - 3. LEAK DETECTION -HYDROSTATIC RESERVOIR & BRINE SECONDARY CONTAINMENT MONITORING
- D. VALVES AND CAPS
 - 1. BALL VALVES FOR F.O.S. - MORRISON BROS. 1.0" MODEL 691-0500-1V
 - 2. VENT CAP - 2" UP FLOW VENT CAP EBW MODEL 800-207-02
- E. TANK MONITORING SYSTEM
 - 1. CONTROL PANEL - OMNTEC OEL 8000II P W/ PRINTER
 - 2. LEVEL PROBE - OMNTEC MTG 6 (Fuel Oil)
 - 3. INTERSTITIAL LEAK SENSOR - OMNTEC BX-RES
 - 4. PIPE SUMP SENSOR -OMNTEC BX-PDS
 - 5. HIGH LEVEL ALARM - OMNTEC RAS-1-NYS w/ IB-RAS Card for panel
- F. BACKFILL & CONCRETE
 - 1. 3/8" CRUSHED STONE IN ACCORDANCE WITH TANK MFG. REQUIREMENTS
 - 2. NYSDOT ITEM 304 UNDER CONCRETE SIDEWALK

PART 3: EXECUTION

3.01 INSTALLATION OF TANKS

- A. The tank must be installed in accordance with all local, state, and federal environmental regulations and safety codes.
- B. Tanks must be grounded per local codes,
- C. Tanks shall be protected and secured from vandalism. The tank shall also be protected from accidental damage, such as vehicular impacts in accordance with all local applicable codes.
- D. Do Not Drop Or Drag The Tanks. Proper lifting equipment shall be supplied by the contractor to properly lift the tanks into place.
- E. Tanks shall be carefully handled to prevent damage to the exterior tank coating. The use of the nylon straps is preferred to prevent damage to the tank coating. When using cables, chains, they shall be padded and of adequate length and size.
- F. It is the responsibility of the contractor or buyer to touch- up and repair any damage to the coating that occurs during transportation, installation or piping.
- G. Installing contractor shall be familiar with all the manufacturers installation and testing procedures.

3.02 PART 4: LIMITED WARRANTY

3.03 LIMITED WARRANTY

- A. Warranty shall be Containment Solutions limited warranty in effect at time of delivery.

END OF SECTION

SECTION 22 1113
FACILITY FUEL-OIL PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping and fittings.
- B. Flanges and piping components.
- C. Valves.
- D. Flexible connectors.
- E. Underground fuel storage tanks.

1.02 REFERENCE STANDARDS

- A. API Spec 5L - Line Pipe; 2018.
- B. API RP 1615 - Installation of Underground Petroleum Storage Systems; 2011.
- C. ASME BPVC - Boiler and Pressure Vessel Code; 2019.
- D. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing and Fusing Operators; 2017.
- E. ASME B1.1 - Unified Inch Screw Threads; 2003 (Reaffirmed 2018).
- F. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2016.
- G. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard; 2017.
- H. ASME B16.9 - Factory-Made Wrought Buttwelding Fittings; 2018.
- I. ASME B16.11 - Forged Fittings, Socket-welding and Threaded; 2016 (Errata 2017).
- J. ASME B16.12 - Cast Iron Threaded Drainage Fittings; 2009 (Reaffirmed 2014).
- K. ASME B16.39 - Malleable Iron Threaded Pipe Unions Classes 150, 250, and 300; 2014.
- L. ASME B18.2.1 - Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series); 2012, Including July 2013 Errata.
- M. ASME B18.2.2 - Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series); 2015.
- N. ASME B31.3 - Process Piping; 2018.
- O. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- P. ASTM A182/A182M - Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service; 2019a.
- Q. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2017.
- R. ASTM A312/A312M - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes; 2019.
- S. ASTM A733 - Standard Specification for Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples; 2016.
- T. ASTM B687 - Standard Specification for Brass, Copper, and Chromium-Plated Pipe Nipples; 1999 (Reapproved 2016).
- U. ASTM D229 - Standard Test Methods for Rigid Sheet and Plate Materials Used for Electrical Insulation; 2019, with Editorial Revision.
- V. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; 2013.
- W. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

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.
- C. Shop Drawings: Indicate tanks, system layout, pipe sizes, location, and elevations. For fuel oil tanks, indicate dimensions and accessories including manholes and hold down straps.

1.05 QUALITY ASSURANCE

- A. Welding Materials and Procedures: Comply with ASME BPVC.
- B. Welders Certification: In accordance with ASME BPVC-IX.
- C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- D. Valves: Manufacturer's name and pressure rating marked on valve body.

PART 2 PRODUCTS

2.01 PIPING AND FITTINGS

- A. Regulatory Requirements:
 - 1. Comply with the material, fabrication, and operating requirements of ASME B31.3, except as modified herein.
- B. Comply with the material, fabrication, and operating requirements of ASME B31.3, except as modified herein.
- C. Carbon Steel Pipe:
 - 1. Comply with One of the Following:
 - a. ASTM A53/A53M, Type E or S, Grade B, seamless or electric welded, Schedule 80 for pipe less than 2-1/2 inch (65 mm) in diameter or Schedule 40 for pipe 2-1/2 inch (65 mm) in diameter and larger.
 - b. API Spec 5L, Product Specification Level (PSL) 1, Grade B, submerged-arc welded or gas metal-arc welded.
 - c. Exterior Underground Piping - Refer to Specification Section 231010
 - 2. End Connections:
 - a. Forged, socket weld type, complying with ASTM A182/A182M and ASME B16.11 for pipe or fittings less than 2-1/2 inch (65 mm).
 - b. Buttweld type complying with ASTM A234/A234M, Grade WPB and ASME B16.9 for pipe or fittings 2-1/2 inch (65 mm) and larger of the same wall thickness as the adjoining pipe.
 - c. Threaded type complying with ASME B16.3, Class 150 or ASME B16.11.

2.02 FLANGES, COUPLINGS, AND PIPING COMPONENTS

- A. Flanges:
 - 1. Provide flanged end connections on equipment, fittings, piping, piping components, adapters, couplings, and valves complying with ASME B16.5, Class 150.
 - 2. Gaskets, Non-Isolating:
 - a. 1/8 inch (3.2 mm) thick.
 - b. Comply with ASME B16.12, raised-faced type.
 - c. Material: Buna-N.
 - 3. Gaskets, Electrically Isolating:
 - a. Comply with ASTM D229.
 - b. Electrical Insulating Material: 1000 ohms resistance.
 - c. Chemically compatible with fuel handled.
 - d. Full face type.

- e. Provide full surface, spiral-wound, mylar, insulating sleeves between bolts and holes of flanges.
- f. Furnish bolt shank diameter not less than diameter at root of threads.
- g. Provide high-strength 1/8 inch (3.2 mm) thick, phenolic, insulating washers next to flanges with flat, circular, stainless steel washers over the insulating and under bolt heads and nuts.
- h. Supply adequate bolt length to accommodate insulating gaskets and stainless steel washers.
- 4. Bolts, Nuts, and Washers:
 - a. Comply with ASME B18.2.1 and ASME B18.2.2.
 - b. Bolts:
 - 1) Regular hexagonal type.
 - 2) Threaded in accordance with ASME B1.1, Class 2A fit, Coarse Thread Series, for sizes 1 inch (25 mm) and smaller and Eight-Pitch Thread Series for sizes larger than 1 inch (25 mm).
 - 3) Provide sufficient length to obtain full bearing on nuts, projecting no more than two full threads beyond nuts with bolts tightened to required torque.
 - c. Nuts:
 - 1) Hexagonal, heavy series type.
 - 2) Threaded in accordance with ASME B1.1, Class 2B fit, Coarse Thread Series for sizes 1 inch (25 mm) and smaller and Eight-Pitch Thread Series for sizes larger than 1 inch (25 mm).
- B. Piping Components:
 - 1. Provide components that meet the material, fabrication, and operating requirements of ASME B31.3, except as modified herein.
 - 2. Pressure Design Class: Class 150 as defined in ASME B16.5.
 - 3. Welded Nipples: Comply with ASTM A733 or ASTM B687 and construct of same material as connecting pipe.
 - 4. Steel Couplings: Comply with API Spec 5L, seamless, extra heavy, wrought steel with recessed ends.
 - 5. Threaded Unions:
 - a. Comply with ASME B16.39, Class 150.
 - b. Materials: Comply with ASTM A312/A312M, Grade 304 or 316.
 - c. Dielectric Unions: Comply with dimensional, strength, and pressure requirements of ASME B16.39, Class 150.
 - d. Provide galvanized, plated, or steel parts.
 - e. Furnish water-impervious insulation barrier capable of limiting galvanic current to one percent of the short-circuit current in a corresponding bimetallic joint and withstand a 600 volt breakdown test when dry.
 - 6. Joint Compound: Resistant to water and suitable for use with fuel containing 40 percent aromatics.

2.03 GATE VALVES

- A. MSS SP-80, Class 125, bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge disc, solder ends.

2.04 BALL VALVES

- A. MSS SP-110, Class 150, 400 psi CWP (Class 150, 2760 kPa CWP), bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder.

2.05 FLEXIBLE CONNECTORS

- A. Bronze inner hose and braided exterior sleeve, suitable for minimum 200 psi (1380 kPa) CWP and 250 degrees F (121 degrees C).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that excavations are to required grade, are dry, and have not been over-excavated.

3.02 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.

3.03 PIPING INSTALLATION

- A. Install in accordance with manufacturer's instructions and API RP 1615.
- B. Route piping in orderly manner and maintain gradient.
- C. Group piping whenever practical at common elevations.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- E. Provide clearance for installation of insulation and access to valves and fittings.

END OF SECTION

SECTION 22 4000
PLUMBING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water closets.
- B. Lavatories.

1.02 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2018.
- C. NSF 61 - Drinking Water System Components - Health Effects; 2017.
- D. NSF 372 - Drinking Water System Components - Lead Content; 2016.

1.03 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.

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.
- B. Water Efficiency: EPA WaterSense label is required for all water closets, urinals, lavatory faucets, and showerheads.

2.02 REGULATORY REQUIREMENTS

- A. Comply with applicable codes for installation of plumbing systems.
- B. Perform work in accordance with local health department regulations.

2.03 TANK TYPE WATER CLOSETS

- A. Tank Type Water Closet Manufacturers:
 - 1. American Standard, Inc: www.americanstandard-us.com/#sle.
 - 2. Gerber Plumbing Fixtures LLC: www.gerberonline.com/#sle.
 - 3. Kohler Company: www.kohler.com/#sle.
 - 4. Zurn Industries, Inc: www.zurn.com/#sle.
- B. Bowl: ASME A112.19.2; floor mounted, siphon jet, vitreous china, 16.5 inches (420 mm) high, close-coupled closet combination with elongated rim, insulated vitreous china closet tank with fittings and lever flushing valve, bolt caps, vandalproof cover locking device.
 - 1. Water Consumption: Maximum 1.6 gallons (6 liters) per flush.
- C. Seat Manufacturers:
 - 1. American Standard, Inc: www.americanstandard-us.com/#sle.
 - 2. Bemis Manufacturing Company: www.bemismfg.com/#sle.
 - 3. Church Seat Company: www.churchseats.com/#sle.
 - 4. or approved equal.
- D. Seat: Solid white plastic, open front, extended back, less cover, complete with self-sustaining hinge.

2.04 LAVATORIES

- A. Lavatory Manufacturers:
 - 1. American Standard, Inc: www.americanstandard-us.com/#sle.
 - 2. Gerber Plumbing Fixtures LLC: www.gerberonline.com/#sle.
 - 3. Kohler Company: www.kohler.com/#sle.
 - 4. Zurn Industries, Inc: www.zurn.com/#sle.
 - 5. or approved equal.

- B. Supply Faucet Manufacturers:
 - 1. American Standard, Inc: www.americanstandard-us.com/#sle.
 - 2. Kohler Company: www.kohler.com/#sle.
 - 3. Zurn Industries, Inc: www.zurn.com/#sle.
 - 4. or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

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.

3.04 CLEANING

- A. Clean plumbing fixtures and equipment.

3.05 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.
- B. Repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 22 6500
UNDERGROUND STORAGE TANK REMOVAL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Removal and disposal of underground storage tank and connected piping.
- B. Cleaning and vapor freeing of tank.
- C. Fuel removal.
- D. Temporary containment of excavated soil.
- E. Testing soils for contamination.
- F. Disposal of contaminated soil.
- G. Water disposal.
- H. Providing reports required by regulatory agencies.
- I. Backfilling.
- J. Filing paperwork with NYSDEC/Westchester County Department of Health.

1.02 RELATED REQUIREMENTS

- A. Section 01 7000 - Execution and Closeout Requirements: Dewatering of excavations and water control.
- B. Section 02 4100 - Demolition.
- C. Section 31 2323 - Fill: Fill materials, filling, and compacting.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 2200 - Unit Prices, for general requirements applicable to unit prices related to removal and disposal of underground storage tanks.

1.04 REFERENCE STANDARDS

- A. API RP 1604 - Closure of Underground Petroleum Storage Tanks; American Petroleum Institute; 1996 (R2010).
- B. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications; 2010.
- C. 29 CFR 1910.38 - Emergency action plans; Occupational Safety and Health Standards; Code of Federal Regulations; current edition.
- D. 29 CFR 1910.134 - Respiratory protection; Occupational Safety and Health Standards; Code of Federal Regulations; current edition.
- E. COE EM-385-1-1 - Safety and Health Requirements Manual; Corps of Engineers; 2008.
- F. EPA SW-846 - Test Methods for Evaluating Solid Waste, Physical/Chemical Methods; Environmental Protection Agency; current edition on-line at <http://www.epa.gov/epawaste/hazard/testmethods/sw846/index.htm>.
- G. EPA 600-4-790-20 - Methods for Chemical Analysis of Water and Wastes; Environmental Protection Agency; 1983.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Site Safety and Health Plan: Describe safety and health plan and procedures as related to underground tank removal and pipe removal, and as related to operations associated with petroleum contaminated soils and water.
- C. Tank and Piping Removal and Disposal Plan: Describe methods, means, sequence of operations, and schedule to be employed in the testing, pumping, cleaning, de-vaporizing, inspecting, removal, and disposal of underground storage tanks and piping.

D. Reports:

1. Identification of tanks removed and disposed of, including site map showing location of tank and piping.
2. Starting and ending dates of reporting period.
3. Closure report. Incorporate reports, records, and data into a single binder with the title "TANK CLOSURE REPORT" on the cover of the binder.
4. Laboratory testing reports, including location of soil excavated and associated OVA/PID (organic vapor analyzer/photo ionization device) readings, and sampling and test results for:
 - a. NYSDEC Closure Summary, (CP51-Petroleum Compounds)/Westchester County Department of Health.
5. Cumulative quantities of soil excavated, beginning with start date for each tank and associated piping.

E. Record Documents:

1. Building permit, inspection permits, and other permits required for underground tank removal.
2. Results of excavation, including sketch showing location of underground storage tank, sampling locations, and extent of excavation.
3. Tank disposal paperwork, such as copy of UST Notification to NYSDEC/Westchester County Department of Health.
4. Contaminated soil disposal paperwork, such as laboratory testing reports.
5. Contaminated water disposal paperwork, such as laboratory testing results.
6. Soil Disposal Receipts.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with local, state, and federal regulations and 40 CFR 280.
- B. Qualifications: Prior to start of work, submit documentation of recent experience and resumes of personnel working on the project.
- C. References: Furnish data proving experience on at least three prior projects that included types of activities similar to those in this project. Provide project titles, dates of projects, owners of projects, point of contact for each project, and phone numbers of each point of contact.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Plastic Sheeting: ASTM D4397.

PART 3 EXECUTION

3.01 PREPARATION FOR TANK REMOVAL AND DISPOSAL

- A. Site Safety And Health Plan (SSHP): Furnish safety, health, and accident prevention provisions and develop a Site Safety and Health Plan (SSHP).

3.02 TEMPORARY CONTAINMENT OF EXCAVATED SOIL

- A. Provide temporary containment area near the excavated area.
- B. Cover containment area with 6 mil polyethylene sheeting.
 1. Place excavated soil on the impervious barrier and cover with 6 mil polyethylene sheeting.
 2. Provide straw bale berm around the outer limits of the containment area and cover with polyethylene sheets.
 3. Secure edges of sheets to keep the polyethylene sheeting in place.

3.03 EXCAVATION

- A. Provide Engineer with written documentation, no later than 30 days before work begins, that proper state or local authorities have been notified.
- B. Notify Engineer at least 48 hours prior to start of tank removal work.
 1. Stage operations to minimize the time that tank excavation is open and the time that contaminated soil is exposed to the weather.

2. Provide protection measures around the excavation area to prevent water runoff and to contain the soil within the excavation area.
- C. Excavation: Excavate as required to remove tanks and piping.
 1. Place soil removed from the excavation in a temporary containment area.
 2. Collect and temporarily store water runoff from stockpiled soils.
- D. Excavation Methods: Select methods and equipment to remove soil to minimize disturbance to areas beyond the limits of the excavation area.
 1. Material that becomes contaminated as a result of Contractor's operations shall be removed and disposed of at no additional cost to Owner.
 2. Where excavation extends into groundwater levels, dewatering methods shall be employed on a localized basis to facilitate excavation operations, as specified in Section 01 7000.
 3. Water generated by dewatering during excavation required for removal of tanks or piping, surface water collected in open excavation, or water used for washing equipment or existing concrete or bituminous surfaces, shall be collected and tested.
 - a. Test in accordance with EPA SW-846 and EPA/600/4-79/20 and state or locally required analyses.
 - b. Water that contains contaminants above locally acceptable levels shall be disposed of in accordance with federal, state, and local regulations.
 - c. Non-contaminated water may be disposed of on-site.

3.04 TESTING

- A. Stockpiled Contaminated Soils: All soils determined as contaminated by Engineer or New York State Department of Environmental Conservation (NYSDEC) shall be tested and disposed of as per required in the Unit Pricing for Petroleum Contaminated Soil Disposal.
 1. Test for disposal shall be as required for land fill requirements, as determined by NYSDEC and the contractors proposed landfill.
 2. Furnish results to Engineer within 24 hours after the results are obtained.
- B. Testing Under Tank After Removal of Tank:
 1. Collect closure samples from excavation and piping trenches as required by NYSDEC, or at a minimum of one composite sample from each sidewall and bottom of excavation and pipe trench.
 2. Analyze samples per NYSDEC tank closure requirements.
 3. Conform to standards for sampling and analysis as specified above for stockpiled soils.
 4. Soils that test at levels less than the above may be used as clean fill.
 5. Furnish results to Engineer within 24 hours after the results are obtained.
 6. Along with the results furnish a sketch showing underground tank, sampling location, and extent of excavations.

3.05 WATER DISPOSAL

- A. Dewatering will be permitted only with approval of Engineer.
- B. Store and test water generated during removal of tanks and piping.
 1. If contaminated, transport and dispose of water in an EPA approved disposal site in accordance with federal, state, and local requirements. Refer to Unit Pricing.
 2. Non-contaminated water may be disposed of on-site.

3.06 DISPOSAL OF UNDERGROUND TANKS, ANCHORS, SLABS, AND ASSOCIATED PIPING

- A. Preparation: API RP 1604. Remove the fill pipe, gage pipe, submersible pumps, and drop tube.
 1. Cap or remove non-product piping, except vent piping.
- B. Tank Removal and Disposal:
 1. Plug or cap accessible holes. One plug shall have a minimum 1/8 inch vent hole.
 2. Remove tank from the excavation, place it on a level surface and render it useless in accordance with API RP 1604.
 3. Transport and dispose of tank at an EPA approved disposal site in accordance with federal, state, and local regulations.

3.07 CLOSURE REPORT (SITE ASSESSMENT REPORT)

- A. Provide Engineer a Site Assessment Report in a single binder notebook that contains the full collection of reports relating to this work, including but not limited to, records, starting and ending dates of reporting period, inspections, documentation, and data as follows:
1. Complete UST Notification Form (within 30 days of closure) to Westchester County Department of Health.
 2. Description of work, including removal procedures, number of tanks removed, identification of tanks removed and disposed of, cubic yards of excavated soil, location of disposal sites, and dates of excavation.
 3. Site plan, including location of tanks and piping, limits of excavation, sampling points, results of excavation, and depths.
 4. Laboratory testing reports, copies of data and test results from testing laboratory.
 5. Tank disposal paperwork, contaminated soil disposal paperwork, and contaminated water disposal paperwork.
 6. Certifications required by implementing agency.
 7. Building permit, inspection permits, and other permits required for underground tank removal, notifications, and inspection reports.
 8. Cumulative quantities of soil excavated, beginning with start date for each tank and associated piping.

3.08 BACKFILLING

- A. Provide backfill, compaction, grading, and seeding in accordance with Section 31 2323 - Fill.

END OF SECTION

SECTION 23 0000

GENERAL PROVISIONS - MECHANICAL

PART 1 GENERAL

1.01 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.

1.02 SUMMARY

- A. The work to be completed under this division of the specifications shall include the furnishing of all supplies, equipment, labor, supervision and all materials not specifically mentioned, ready for use, in accordance with all applicable codes and authorities having jurisdiction, including heating, ventilation, air conditioning, plumbing, sprinkler equipment, associated items and Automatic Temperature Control components. It is the intention of these specifications and drawings to indicate finished work that is tested and ready for operation including but not limited to:
 - 1. Removals.
 - 2. Cutting and Patching
 - 3. Piping.
 - 4. Drainage from noted equipment to floor drains, roof, sink, or funnel drains.
 - 5. Piping connections to equipment.
 - 6. Vibration isolation elements for piping and equipment.
 - 7. Equipment isolation bases.
 - 8. Seismic restraints for isolated and non-isolated ductwork, VAV boxes, and equipment
 - 9. Testing.
- B. The data indicated in these drawings and specifications are as exact as could be secured but their absolute accuracy is not guaranteed. Do not scale drawings. Exact locations, distances, levels and other conditions will be governed by the building. Use the drawings and specifications or guidance and secure the engineer's approval of changes in locations.
- C. Construction methods and good installation practice.
 - 1. The contractor shall visit the site and become thoroughly familiar with all existing conditions under which the work and work of other trades will be installed. This contract includes all necessary offsets, transitions, modifications and relocation required to install all new equipment in new or existing spaces. Contractor shall include any modifications required in existing ductwork and/or equipment for installation of new HVAC equipment and new equipment of other trades. All new and existing equipment and systems shall be fully operational under this contract before the project is considered complete.
 - 2. The contractor shall be held responsible for any assumptions that are made, any omissions or errors made as a result of failure to visit the site and become thoroughly familiar with the existing conditions and the contract documents of all trades.

1.03 DEFINITIONS

- A. Refer to Section 01 4216 -Definitions.

1.04 CODES, REGULATIONS AND STANDARDS

- A. Refer to Section 01 4100 -Regulatory Requirements for additional requirements
- B. Published specifications, standards tests, or recommended methods of trade, industry or governmental organizations apply to work in all Sections as noted below:
 - 1. ASHRAE -American Society of heating, Refrigerating and Air Conditioning engineers.
 - 2. AABC -Associated Air Balance Controls.
 - 3. AMCA -Air Moving and Conditioning Association.
 - 4. ADC -Air Diffuser Council.
 - 5. NEMA -National Electrical Manufacturers' Association.
 - 6. ANSI -American National Standards Institute.
 - 7. ASME -American Society of Mechanical Engineers.

8. ASTM -American Society for Testing and Materials.
9. EPA -Environmental Protection Agency
10. NFPA -National Fire Protection Association.
11. NFPA 101 -Life Safety Code
12. NFPA 70 -National Electrical Code
13. NFPA 72 -National Fire Alarm Code
14. ARI -Air-Conditioning and Refrigeration Institute.
15. UL -Underwriters' Laboratories, Inc.
16. OSHA -Occupational Safety and Health Administration Regulations
17. All New York State and local codes

1.05 PERMITS, FEES AND INSPECTIONS

- A. The contractor shall give all necessary notices, obtain all permits, and pay for all government, state sales taxes and applicable fees. The contractor shall file all drawings, complete all documents and obtain all necessary approvals from the proper authorities or agency having jurisdiction. Obtain all required certificates of inspection covering work. The contractor shall see that all required inspections and tests are made and shall cooperate to make these tests as thorough and as readily made as possible.

1.06 MATERIALS AND WORKMANSHIP

- A. Refer to Section 01 4000 -Quality Requirements for additional requirements.
- B. All materials and apparatus required for the work, except as otherwise specified, shall be new and of first-class quality. It shall be furnished, delivered, erected, connected, finished in every detail and so selected and arranged as to fit properly into the building spaces. Where no specific kind or quality material is given, a first-class standard article as accepted by the engineer shall be furnished.
- C. All equipment and materials shall be specification grade and bear the underwriter's label. No substitute or alternate equipment, material, etc. Will be considered for this project.
- D. All work shall be of a quality consistent with good trade practice and shall be installed in a neat, workmanlike manner. The engineer/owner reserves the right to reject any work which, in his opinion, has been installed in a substandard, dangerous or in an unserviceable manner. The contractor shall replace rejected work in a satisfactory manner at no extra cost to the owner.

1.07 GUARANTEE AND SERVICE

- A. The contractor shall. Guarantee all workmanship and materials for a period of two year from the date of acceptance of the installation. In addition, the contractor shall Provide, free of charge, one year 's maintenance guarantee on maintained service and adjustment of all equipment in this contract.

1.08 RECORD DRAWINGS

- A. Refer to Section 01 7800 -Closeout Submittals for additional requirements.
- B. Maintain, at the job site, a set of drawings indicating all changes in location of the equipment, devices, etc. From the original layout. Clearly mark in red all changes on the drawings. At the completion of the project the contractor shall turn over the record drawings to the engineer/owner.

1.09 COORDINATION

- A. All work shall be carried out in conjunction with other trades and full cooperation shall be given in order that all work may proceed with a minimum of delay and interference.

1.10 SHOP DRAWING

- A. Refer to Section 01 3000 -Administrative Requirements for additional requirements.
 1. Prior to delivery to the work area, but well in advance of requirements necessary to allow engineer ample time for review, contractor shall submit for approval, in PDF format of each shop drawing. Indicate on each submission:
 - a. Location
 - b. Architect/Engineers names
 - c. Item identification/description
 - d. Approval stamp of prime contractor

- e. All shop drawings and coordination drawings shall include locations and sizes of existing equipment along with new work. Drawings shall indicate locations of hangers, supports, expansion joints, guides, anchors and anchor loads. Submit shop drawings for the following
 - 1) Piping.
 - 2) Pipe insulation.
 - 3) Duct insulation.
 - 4) Valves
 - 5) Ductwork layout, coordination drawings, sheet metal standards and details
 - 6) Air outlets (exhaust grilles)
 - 7) Air and piping balancing reports
 - 8) Heating element covers
 - 9) Fans
 - 10) Dielectric fittings.
 - 11) Through-penetration firestop assemblies.
 - 12) Design Calculations: Signed and sealed by a qualified professional engineer,
 - 13) licensed in the state where the work is being performed for selecting seismic
 - 14) restraints
 - 15) Testing.
 - 16) Controls

1.11 OPERATING INSTRUCTIONS

- A. Refer to Section 01 7800 -Closeout Submittals for submittal and additional requirements.
- B. The contractor shall furnish to the architect/engineer instructions for operating and maintaining all systems and equipment.
 - 1. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions
- C. The contractor, in the above-mentioned instructions, shall include the maintenance schedule for the principal items of equipment furnished under this division.
- D. An authorized manufacturer's representative shall attest in writing that his equipment has been properly installed prior to startup. These letters will be bound into operating and maintenance books.

1.12 MANUFACTURER'S INSTRUCTION

- A. Install all equipment in accordance with manufacturer's instructions or requirements for proper operation and maintenance.

1.13 CUTTING, PATCHING, REPAIRING AND PAINTING

- A. Refer to Section 01 7000 Execution for additional requirements.
- B. The general contractor shall perform all cutting, patching, repairing and painting for all electrical items and equipment called for under this contract.

1.14 TEMPORARY FACILITIES AND CONTROLS

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

1.15 DRAWING AND INTENT

- A. Drawings are intended as working drawings for general layout of the various items of equipment. However Layout of accessories, specialties, equipment and piping systems are diagrammatic unless specifically dimensioned, and do not necessarily indicate every required valve, fittings, elbow, pipe, transitions, trap, junction or pull box, offsets or similar items required for the installation to be complete.

1.16 CONTINUITY OF EXISTING SYSTEM;

- A. Maintain continuity of the existing vent, waste, soil, hot and cold water systems to the areas not affected by the alteration.

1.17 INTERRUPTION OF SERVICE

- A. Contractor shall request shut down of service for all mechanical and electrical systems.
- B. Contractor shall coordinate with Owner's Representative. All shut downs shall be scheduled by the Owner's Representative.

1.18 MEASUREMENTS

- A. All measurements taken at the building shall take precedence over scale dimensions. Every part of the plans shall be fitted to the actual conditions at the building. If there is a conflict with the scale dimensions. Contact architect and/or engineer for direction/clarification.

1.19 PROTECTION OF EQUIPMENT MATERIALS AND FIXTURES

- A. Close pipe openings with caps or plugs during installation. Tightly cover and protect fixtures and equipment against dirt, water and chemical or mechanical injury. At completion of all work, fixtures, exposed materials and equipment shall be thoroughly cleaned.

1.20 SCAFFOLDING, RIGGING AND HOISTING:

- A. Unless otherwise specified, contractor shall furnish all scaffolding, rigging, hoisting, and services necessary for the erection and delivery into the premises of any equipment and apparatus furnished. This will apply to any equipment that is being removed from the premises.

1.21 HOUSEKEEPING

- A. This contractor shall be responsible for keeping stock of materials and equipment stored on premises in a tidy and orderly manner and, at all times, keep the premises free from accumulation of waste material or rubbish caused by their employees at work. He shall remove his rubbish and surplus materials from the job site and shall have the premises and their work in a clean and well maintained condition.

1.22 QUIET OPERATION

- A. All work shall operate under all conditions of load without any sound or vibration which is offensive in the opinion of the engineer. In the case of the moving machinery, sound or vibration noticeable outside of room in which it is installed, or annoying inside given room, will be considered unacceptable by the engineer and shall be remedied in approved manner by the contractor at their own expense.

1.23 ACCESSIBILITY

- A. Place valves, unions, drains, and items requiring maintenance, adjustment, or repair, in accessible locations. Coordinate final location of access panels with architect.

1.24 OWNER'S INSTRUCTIONS AND SYSTEM OPERATION

- A. Refer to Section 01 7900 -Demonstration and Training

1.25 AT THE TIME OF THE JOB'S ACCEPTANCE BY THE OWNER, CONTRACTOR SHALL FURNISH ONE COMPLETE SET OF APPROVED CERTIFIED DRAWINGS TO THE OWNER. IN ADDITION THE CONTRACTOR SHALL FURNISH MAINTENANCE AND OPERATING INSTRUCTIONS FOR ALL EQUIPMENT. THE INSTRUCTIONS SHALL BE WRITTEN IN LAYMAN'S TERMS AND SHALL BE INSERTED IN VINYL-COVERED THREE RING BINDER. THE INFORMATION IN THE BINDER SHALL BE FIRST SENT TO AND APPROVED BY THE ARCHITECT/ENGINEER BEFORE TURNING OVER TO THE OWNER.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All materials and equipment provided under this section shall be new, first grade, best of their respective kinds and in no way shall they be less than the quality and intent set forth under this section. They shall meet the requirements of all standards set up to govern the manufacturer of HVAC materials and comply with all applicable codes and standards.

PART 3 -EXECUTION

3.01 EXAMINATION

- A. Verify that existing conditions are acceptable prior to starting installations.

- B. Preinstallation Testing: Test substrate for existing fire alarms system prior to modifications.

3.02 PREPARATION

- A. Protection of In-Place Conditions: Prior to removals and during new work protect existing, floor, walls, ceilings, equipment and furnishings.
- B. Removal: Removing existing equipment, ductwork, devices, wiring as required to install new work.
- C. Measure indicated mounting heights to bottom of unit, devices, registers, etc. for suspended items and to center of unit for wall-mounting items.
- D. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

3.03 INSTALLATION GENERAL

- A. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- B. Right of Way: Give to piping systems installed at a required slope.
- C. All work, materials and manner of installing same shall be in strict accordance with the latest code.
- D. Unless otherwise indicated all wiring exposed in finished and occupied areas shall be wire mold (2000 series or equal). Conduit shall be installed within new stud partitions, mechanical room, above ceilings in rigid galvanized steel conduit (RGS) shall be used for wiring in the following locations:
 - 1. Exposed to moisture or mechanical damage.
- E. Electrical metallic tubing (EMT) shall be used for concealed and exposed wiring in dry locations as follows:
 - 1. Interior receptacle and power branch circuit wiring
- F. All conduit shall be installed in parallel and perpendicular to the building lines. All conduit shall be supported using cadmium plated conduit straps and hangers. Separate conduit systems shall be installed for normal, and low voltage power.
- G. Mechanical equipment shall be isolated from the building structure by means of noise and vibration isolators as scheduled on the drawings or within these specifications.
- H. No rigid connections between equipment and building structure shall be made that degrades the noise and vibration isolation systems herein specified.
- I. Electrical circuit connections to isolated equipment shall be looped to allow free motion of isolated equipment.
- J. The contractor shall not install any equipment, piping or conduit which makes rigid contact with the "building" unless permitted in this Specification. Building includes, but is not limited to, slabs, beams, columns, studs and walls.
- K. Isolation mounting deflection shall be minimum as specified or scheduled on drawings.
- L. Coordinate work with other trades to avoid rigid contact with the building. Inform other trades following work, such as plastering or electrical, to avoid any contact which would reduce the vibration isolation.

3.04 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

3.05 PIPING INSTALLATIONS

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicate piping locations and arrangements if such were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

- B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

3.06 EXHAUST FAN INSTALLATION

- A. Inspection
 - 1. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.
- B. Installation
 - 1. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.
 - 2. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.
- C. Cleaning
 - 1. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other

3.07 ADJUSTING

- A. Repair or remove and replace defective work, as directed by (Architect/Owner) upon completion of installation.
- B. Adjust moving or operating parts to function smoothly.

3.08 CLEANING AND PROTECTING

- A. Thoroughly clean all electrical equipment, devices and enclosures upon completion of all work. Repaint any equipment whose finish is damaged or rusted. Match manufacturer's original finish.
- B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.
- C. Properly and completely protect against all damage, all apparatus, equipment, etc., included in this contract. The contractor will be held responsible for any damage to furnished apparatus, equipment, etc., until final acceptance.
- D. The contractor shall take whatever means necessary and/or required to protect owner's property within the working areas from dust, debris and other matter generated by the work. No work shall commence in areas where protection is required until approval has been given to the contractor by the owner.

END OF SECTION

SECTION 23 0516

EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flexible pipe connectors.
- B. Expansion joints and compensators.

1.02 REFERENCE STANDARDS

- A. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2010.
- B. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard; 2013.
- C. ASME B16.11 - Forged Fittings, Socket-welding and Threaded; 2016 (Errata 2017).

1.03 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.

PART 2 PRODUCTS

2.01 FLEXIBLE PIPE CONNECTORS - STEEL PIPING

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com.
 - 2. The Metraflex Company: www.metraflex.com/#sle.
 - 3. or approved equal.
- B. Inner Hose: Bronze.
- C. Exterior Sleeve: Single braided, stainless steel.
- D. Pressure Rating: 125 psi and 450 degrees F (862 kPa and 232 degrees C).
- E. Joint: Flanged.
- F. Size: Use pipe sized units.

2.02 EXPANSION JOINTS - STAINLESS STEEL BELLOWS TYPE

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com.
 - 2. The Metraflex Company: www.metraflex.com/#sle.
 - 3. or approved equal.
- B. Pressure Rating: 125 psi and 400 degrees F (862 kPa and 204 degrees C).
- C. Maximum Compression: 1-3/4 inches (45 mm).
- D. Maximum Extension: 1/4 inch (6 mm).
- E. Joint: As specified for pipe joints.
- F. Size: Use pipe sized units.

2.03 EXPANSION JOINTS - EXTERNAL RING CONTROLLED STAINLESS STEEL BELLOWS TYPE

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com.
 - 2. The Metraflex Company: www.metraflex.com/#sle.
 - 3. or approved equal.
- B. Pressure Rating: 125 psi and 400 degrees F (862 kPa and 204 degrees C).

- C. Maximum Compression: 15/16 inch (24 mm).
- D. Maximum Extension: 5/16 inch (8 mm).
- E. Maximum Offset: 1/8 inch (3 mm).
- F. Joint: Flanged.
- G. Size: Use pipe sized units.
- H. Accessories: Internal flow liner.
- I. Application: Steel piping over 2 inches (50 mm).

2.04 EXPANSION JOINTS - HOSE AND BRAID

- A. 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.
- B. Provide flexible loops capable of movement in the x, y, and z planes. Flexible loops to impart no thrust loads to the building structure.
- C. Flexible Connectors: Flanged, braided type with wetted components of stainless steel, sized to match piping.
 - 1. Maximum Allowable Working Pressure: 150 psig (1030 kPa) at 120 degrees F (49 degrees C).
 - c. Angular Rotation: 15 degrees.
 - d. Force developed by 1.5 times specified maximum allowable operating pressure.
 - 3. End Connections: Same as specified for pipe jointing.
 - 4. End Connections: Threaded; complying with ASME B16.11.
 - 5. Provide necessary accessories including, but not limited to, swivel joints.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install flexible pipe connectors on pipes connected to vibration isolated equipment. Provide line size flexible connectors.
- C. 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 23 0517

SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe sleeves.

1.02 REFERENCE STANDARDS

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

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.
- B. Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

1.05 WARRANTY

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

PART 2 PRODUCTS

2.01 PIPE SLEEVES

- A. Vertical Piping:
 - 1. Sleeve Length: 1 inch (25 mm) above finished floor.
 - 2. Provide sealant for watertight joint.
- B. Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.
- C. Pipe Passing Through Below Grade Exterior Walls:
 - 1. Zinc coated or cast iron pipe.
 - 2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.
- D. Pipe Passing Through Concrete Beam Flanges, except where Brass Pipe Sleeves are Specified:
 - 1. Galvanized steel pipe or black iron pipe with asphalt coating.
 - 2. Connect sleeve with floor plate except in mechanical rooms.
- E. Pipe Passing Through Mechanical, Laundry, and Animal Room Floors above Basement:
 - 1. Galvanized steel pipe or black iron pipe with asphalt coating.
 - 2. Connect sleeve with floor plate except in mechanical rooms.
- F. Penetrations in concrete beam flanges are permitted but are prohibited through ribs or beams without prior approval from the Architect.
- G. Clearances:
 - 1. Provide allowance for insulated piping.
 - 2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch (25 mm) greater than external; pipe diameter.
 - 3. All Rated Openings: Caulked tight with fire stopping material conforming to ASTM E814 in accordance with Section 07 8400 to prevent the spread of fire, smoke, and gases.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.

3.02 INSTALLATION

- A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- B. Install piping to conserve building space, to not interfere with use of space and other work.
- C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
- E. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.03 CLEANING

- A. Upon completion of work, clean all parts of the installation.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

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 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- 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.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating 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: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 - 1. Comply with MFMA-4.
- C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
- D. Anchors and Fasteners:
 - 1. Manufacturers - Mechanical Anchors:
 - a. Hilti, Inc: www.us.hilti.com/#sle.
 - b. ITW Red Head, a division of Illinois Tool Works, Inc: www.itwredhead.com/#sle.
 - c. Powers Fasteners, Inc: www.powers.com/#sle.
 - d. or approved equal.
 - 2. 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. 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 23 0548

VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Equipment support bases.
- B. Vibration isolators.
- C. Seismic snubber assemblies.
- D. Seismic restraints for suspended components and equipment.

1.02 REFERENCE STANDARDS

- A. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; 2015.
- B. FEMA 412 - Installing Seismic Restraints for Mechanical Equipment; 2002.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data:
 - 1. Provide manufacturer's product literature documenting compliance with PART 2 PRODUCTS.
 - 2. Include seismic rating documentation for each isolator and restraint component accounting for horizontal, vertical, and combined loads.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. General:
 - 1. All vibration isolators, base frames and inertia bases to conform to all uniform deflection and stability requirements under all operating loads.
 - 2. Steel springs to function without undue stress or overloading.

2.02 VIBRATION ISOLATORS

- A. Seismic Type:
 - 1. Coil Springs Consisting of Single Elements:
 - a. Housing: Manufactured from cast iron material.
 - b. Ductile Material: Designed and rated for seismic applications.
 - c. Spring: Restrained by housing without significant degradation of vibration isolation capabilities during normal equipment operating conditions.
 - d. Resilient Snubbing Grommet System: Incorporated and designed with clearances of no more than 0.25 inch (6 mm) in any direction preventing direct metal-to-metal contact between supported member and fixed restraint housing.
 - e. Resilient Pad: Located in series with spring.
 - f. Coil Springs: Color coded elements to have a lateral stiffness greater than 0.8 times the rated vertical stiffness with 50 percent overload capacity.
 - g. Finish: Suitable for the application.

2.03 SEISMIC SNUBBER ASSEMBLIES

- A. Comply with:
 - 1. ASHRAE (HVACA) Handbook - HVAC Applications.
 - 2. FEMA 412.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Install in accordance with manufacturer's instructions.
- B. On closed spring isolators, adjust so side stabilizers are clear under normal operating conditions.

- C. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.

END OF SECTION

SECTION 23 0553

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tags.
- B. Pipe markers.

1.02 RELATED REQUIREMENTS

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

1.03 SUBMITTALS

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

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Piping: Tags.

2.02 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. or approved equal.

2.03 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. or approved equal.
- B. 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.
- C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

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 tags with corrosion resistant chain.
- B. Install plastic pipe markers in accordance with manufacturer's instructions.

END OF SECTION

SECTION 23 0593

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 REFERENCE STANDARDS

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.
- B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008.
- C. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems; 2015, Eighth Edition.
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

1.03 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, system capacity and 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. Final test report forms to be used.
 - d. Details of how TOTAL flow will be determined; for example:
 - 1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
 - 2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.
 - e. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
 - f. 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 I-P (inch-pound) units only.
 - 6. Include the following on the title page of each report:
 - a. Name of Testing, Adjusting, and Balancing Agency.
 - b. Address of Testing, Adjusting, and Balancing Agency.
 - c. Telephone number of Testing, Adjusting, and Balancing Agency.
 - d. Project name.
 - e. Project location.
 - f. Project Engineer.
 - g. Project Contractor.
 - h. Report date.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
 - 1. AABC (NSTSB), AABC National Standards for Total System Balance.
 - 2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
 - 3. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
 - 4. SMACNA (TAB).
- 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.
 - 2. Having minimum of three years documented experience.
 - 3. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: www.aabc.com; upon completion submit AABC National Performance Guaranty.
 - b. NEBB, National Environmental Balancing Bureau: www.nebb.org.
 - c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org.
- D. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

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.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Fans are rotating correctly.
 - 7. Air coil fins are cleaned and combed.
 - 8. Access doors are closed and duct end caps are in place.
 - 9. Air outlets are installed and connected.
 - 10. Hydronic systems are flushed, filled, and vented.
 - 11. Pumps are rotating correctly.
 - 12. Proper strainer baskets are clean and in place.
 - 13. Service and balance valves are open.

3.03 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.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.04 RECORDING AND ADJUSTING

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

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.
- B. Measure air quantities at air inlets and outlets.
- C. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- D. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

3.06 WATER SYSTEM PROCEDURE

- A. Adjust water systems to provide required or design quantities.
- B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gages to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
- C. Effect system balance with automatic control valves fully open to heat transfer elements.
- D. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

3.07 SCOPE

- A. Test, adjust, and balance the following:
 - 1. Boiler Feedwater Pumps.
 - 2. HVAC Pumps.
 - 3. Air Coils.
 - 4. Air Handling Units.
 - 5. Air Filters.
 - 6. Air Terminal Units.
 - 7. Air Inlets and Outlets.

3.08 MINIMUM DATA TO BE REPORTED

- A. Electric Motors:
 - 1. Manufacturer.
 - 2. Model/Frame.
 - 3. RPM.
 - 4. Service factor.
 - 5. Starter size, rating, heater elements.
 - 6. Sheave Make/Size/Bore.
- B. V-Belt Drives:
 - 1. Identification/location.
 - 2. Required driven RPM.
 - 3. Driven sheave, diameter and RPM.
 - 4. Belt, size and quantity.
- C. Pumps:
 - 1. Identification/number.
 - 2. Manufacturer.
 - 3. Size/model.
 - 4. Impeller.
 - 5. Design flow rate, pressure drop, BHP.
 - 6. Actual flow rate, pressure drop, BHP.
 - 7. Discharge pressure.
 - 8. Suction pressure.
 - 9. Total operating head pressure.
- D. Combustion Equipment:

1. Boiler manufacturer.
 2. Model number.
 3. Serial number.
 4. Firing rate.
 5. Overfire draft.
 6. Gas meter timing dial size.
 7. Gas meter time per revolution.
 8. Gas pressure at meter outlet.
 9. Gas flow rate.
 10. Percent carbon monoxide (CO).
 11. Percent carbon dioxide (CO₂).
 12. Percent oxygen (O₂).
 13. Flue gas temperature at outlet.
 14. Ambient temperature.
 15. Percent combustion efficiency.
- E. Heating Coils:
1. Identification/number.
 2. Location.
 3. Service.
 4. Manufacturer.
 5. Air flow, design and actual.
 6. Water flow, design and actual.
 7. Water pressure drop, design and actual.
 8. Entering water temperature, design and actual.
 9. Leaving water temperature, design and actual.
 10. Entering air temperature, design and actual.
 11. Leaving air temperature, design and actual.
 12. Air pressure drop, design and actual.
- F. Exhaust Fans:
1. Location.
 2. Manufacturer.
 3. Model number.
 4. Serial number.
 5. Air flow, specified and actual.
 6. Total static pressure (total external), specified and actual.
 7. Discharge pressure.
 8. Fan RPM.
- G. Terminal Unit Data:
1. Manufacturer.
 2. Type, constant, variable, single, dual duct.
 3. Identification/number.
 4. Location.
 5. Model number.
 6. Size.
 7. Maximum design air flow.
 8. Maximum actual air flow.

END OF SECTION

SECTION 23 0719
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. See schedule on M500

1.02 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- 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 INSTALLATION

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

END OF SECTION

SECTION 23 2113 HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hydronic system requirements.
- B. Heating water piping, above grade.
- C. Pipe hangers and supports.
- D. Unions, flanges, mechanical couplings, and dielectric connections.
- E. Valves:

1.02 REFERENCE STANDARDS

- A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2016.
- B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
- C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
- D. ASME B31.9 - Building Services Piping; 2014.
- E. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- F. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- G. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2016.
- H. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2016.
- I. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications; 2007 (Reapproved 2013).
- J. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011-AMD 1.
- K. AWWA C606 - Grooved and Shouldered Joints; 2015.
- L. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

1.03 SUBMITTALS

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

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

- A. Comply with ASME B31.9 and applicable federal, state, and local regulations.
- B. Piping: Provide piping, fittings, hangers and supports as required, as indicated, and as follows:
 - 1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
 - 2. Use non-conducting dielectric connections whenever joining dissimilar metals.
 - 3. Grooved mechanical joints may be used in accessible locations only.
 - a. Accessible locations include those exposed on interior of building, in pipe chases, and in mechanical rooms, aboveground outdoors, and as approved by Architect.
 - b. Use rigid joints unless otherwise indicated.
 - 4. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.
- C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.

D. Valves: Provide valves where indicated:

2.02 HEATING WATER PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:
 - 1. Threaded Joints: ASME B16.3, malleable iron fittings.
- B. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn, using one of the following joint types:
 - 1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.
 - a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
 - b. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.
 - 2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.

2.03 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. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch (13 to 38 mm): Malleable iron, adjustable swivel, split ring.
- B. In grooved installations, use rigid couplings with offsetting angle-pattern bolt pads or with wedge shaped grooves in header piping to permit support and hanging in accordance with ASME B31.9.

2.04 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

- A. Unions for Pipe 2 Inches (50 mm) and Less:
 - 1. Ferrous Piping: 150 psig (1034 kPa) malleable iron, threaded.
 - 2. Copper Pipe: Bronze, soldered joints.
- B. Flanges for Pipe 2 Inches (50 mm) and Greater:
 - 1. Ferrous Piping: 150 psig (1034 kPa) forged steel, slip-on.
 - 2. Copper Piping: Bronze.
- C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
 - 1. Dimensions and Testing: In accordance with AWWA C606.
 - 2. Mechanical Couplings: Comply with ASTM F1476.
 - 3. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
 - 4. When pipe is field grooved, provide coupling manufacturer's grooving tools.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Prepare pipe for grooved mechanical joints as required by coupling manufacturer.
- C. Remove scale and dirt on inside and outside before assembly.
- D. Prepare piping connections to equipment using jointing system specified.
- E. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- F. After completion, fill, clean, and treat systems. Refer to Section 23 2500 for additional requirements.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and to avoid interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Slope piping and arrange to drain at low points.

END OF SECTION

SECTION 23 2114
HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air vents.
- B. Radiation valves.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description and model.

PART 2 PRODUCTS

2.01 AIR VENTS

- A. Manufacturers:
 - 1. Armstrong International, Inc: www.armstronginternational.com/#sle.
 - 2. ITT Bell & Gossett: www.bellgossett.com/#sle.
 - 3. Taco, Inc: www.taco-hvac.com/#sle.
 - 4. or approved equal.
- B. Manual Type: Short vertical sections of 2 inch (50 mm) diameter pipe to form air chamber, with 1/8 inch (3 mm) brass needle valve at top of chamber.

2.02 RADIATION VALVES

- A. Manufacturers:
 - 1. Armstrong International, Inc: www.armstronginternational.com/#sle.
 - 2. ITT Bell & Gossett: www.bellgossett.com/#sle.
 - 3. Myson, Inc: www.mysoninc.com/#sle.
 - 4. or approved equal.
- B. Angle or straight pattern, rising stem, inside screw globe valve for 125 psi (860 kPa) working pressure, with bronze body and integral union for screwed connections, renewable composition disc, plastic wheel handle for shut-off service, and lockshield key cap and set screw memory bonnet for balancing service.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install specialties in accordance with manufacturer's instructions.
- B. Provide manual air vents at system high points and as indicated.
- C. Provide radiator valves on water inlet to terminal heating units such as radiation, unit heaters, and fan coil units.

END OF SECTION

SECTION 23 3100
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal ductwork.
- B. Nonmetal ductwork.

1.02 REFERENCE STANDARDS

- A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals; 2017.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip; 2016b.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- F. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for duct materials.
- C. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.04 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 DUCT ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to NFPA 90A standards.
- B. Ducts: Galvanized steel, unless otherwise indicated.
- C. Low Pressure Supply (Heating Systems): 1/2 inch w.g. (125 Pa) pressure class, galvanized steel.
- D. Return and Relief: 1/2 inch w.g. (125 Pa) pressure class, galvanized steel.
- E. General Exhaust: 1/2 inch w.g. (125 Pa) pressure class, galvanized steel.
- F. Outside Air Intake: 1/2 inch w.g. (125 Pa) pressure class, galvanized steel.

2.02 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

2.03 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
- B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- D. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

2.04 MANUFACTURED DUCTWORK AND FITTINGS

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install in accordance with manufacturer's instructions.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

END OF SECTION

SECTION 23 3300
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct access doors.
- B. Flexible duct connections.

1.02 RELATED REQUIREMENTS

- A. Section 23 3100 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).

1.04 SUBMITTALS

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

PART 2 PRODUCTS

2.01 DUCT ACCESS DOORS

- A. Manufacturers:
 - 1. Acudor Products Inc, a Division of Nelson Industrial Inc: www.acudor.com.
 - 2. Elgen Manufacturing, Inc: www.elgenmfg.com.
 - 3. Lloyd Industries, Inc: www.firedamper.com/#sle.
 - 4. Nailor Industries, Inc: www.nailor.com.
 - 5. Ruskin Company, a brand of Johnson Controls: www.ruskin.com.
 - 6. SEMCO LLC: www.semcohvac.com.
 - 7. Ward Industries, a brand of Hart and Cooley, Inc: www.wardind.com.
 - 8. or approved equal.

2.02 FLEXIBLE DUCT CONNECTIONS

- A. Manufacturers:
 - 1. Carlisle HVAC Products; Dynair Connector Plus G90 Steel Offset Seam Neoprene Fabric: www.carlislehvac.com/#sle.
 - 2. Elgen Manufacturing, Inc: www.elgenmfg.com.
 - 3. or approved equal.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. Flexible Duct Connections: Fabric crimped into metal edging strip.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 3100 for duct construction and pressure class.

END OF SECTION

SECTION 23 3423
HVAC POWER VENTILATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Ceiling exhaust fans.

1.02 REFERENCE STANDARDS

- A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program; 2015.
- B. AMCA 99 - Standards Handbook; 2016.
- C. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2005.
- D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2016.
- E. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; 2014.
- F. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2014.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.

PART 2 PRODUCTS

2.01 POWER VENTILATORS - GENERAL

- A. Manufacturers:
 - 1. Carnes, a division of Carnes Company Inc: www.carnes.com/#sle.
 - 2. Greenheck Fan Corporation: www.greenheck.com/#sle.
 - 3. PennBarry, Division of Air System Components: www.pennbarry.com/#sle.
 - 4. or approved equal.
- B. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.
- C. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.
- D. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.
- E. Fabrication: Comply with AMCA 99.
- F. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide backdraft dampers on outlet from cabinet and ceiling exhausters fans and as indicated.

END OF SECTION

SECTION 23 8200
CONVECTION HEATING AND COOLING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finned tube radiation.

1.02 REFERENCE STANDARDS

- A. AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI); current edition at www.ahrinet.org.
- B. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; Most Recent Edition Cited by Referring Code or Reference Standard.
- C. 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.
- B. Product Data: Provide typical catalog of information including arrangements.

PART 2 PRODUCTS

2.01 HYDRONIC FINNED TUBE RADIATION

- A. Manufacturers:
 - 1. Modine Manufacturing Company: www.modineHVAC.com/#sle.
 - 2. Slant/Fin Corporation: www.slantfin.com/#sle.
 - 3. Zehnder Rittling: www.rittling.com/#sle.
 - 4. or approved equal.
- B. Required Directory Listing: AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI); current edition at www.ahrinet.org.
- C. Element Hangers: Quiet operating, ball bearing cradle type providing unrestricted longitudinal movement, on enclosure brackets.
- D. Enclosures: 18 gage, 0.0478 inch (1.21 mm) sheet steel up to 18 inches (450 mm) in height, 16 gage, 0.0598 inch (1.52 mm) sheet steel over 18 inches (450 mm) in height, with easily jointed components for wall to wall installation.
- E. Finish: Factory applied baked primer coat.
- F. Damper: Where not thermostatically controlled, provide knob-operated internal damper at enclosure air outlet.
- G. Access Doors: For otherwise inaccessible valves, provide factory-made permanently hinged access doors, 6 by 7 inch (150 by 175 mm) minimum size, integral with cabinet.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are suitable for installation.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's recommendations.
- B. Finned Tube Radiation:
 - 1. Locate on outside walls and run cover continuously wall-to-wall unless otherwise indicated.
 - 2. Center elements under window with elements of equal length centered under each window for multiple windows.
 - 3. Install wall angles and end caps where units butt against walls.

3.03 CLEANING

- A. After construction and painting is completed, clean exposed surfaces of units.
- B. Vacuum clean coils and inside of units.

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 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that abandoned wiring and equipment serve only abandoned facilities.
- B. Demolition drawings are based on casual field observation and existing record documents.
- C. Beginning of demolition means installer accepts existing conditions.

3.02 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.

3.03 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 2 PRODUCTS

1.01 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.

1.02 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.

END OF SECTION

SECTION 26 0526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 467 - Grounding and Bonding Equipment; 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 GROUNDING AND BONDING REQUIREMENTS

- A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
- B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
 - 1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:
 - 1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
 - 1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 - 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.

3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Make grounding and bonding connections using specified connectors.
 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- D. Identify grounding and bonding system components in accordance with Section 26 0553.

END OF SECTION

SECTION 26 0529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- 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.
- 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.

1.04 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 the 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. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

1.06 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 with a minimum safety factor of 3. 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. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
6. 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. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
 - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - d. 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.
 1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Single Conduit up to 1 inch (27 mm) trade size: 1/4 inch (6 mm) diameter.
 - b. Single Conduit larger than 1 inch (27 mm) trade size: 3/8 inch (10 mm) diameter.
 - c. Trapeze Support for Multiple Conduits: 3/8 inch (10 mm) diameter.
 - d. Outlet Boxes: 1/4 inch (6 mm) diameter.
- F. 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 preset concrete inserts, 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 or machine bolts.
 7. Wood: Use wood screws.
 8. Plastic and lead anchors are not permitted.
 9. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - a. Comply with MFMA-4.
 - b. Channel Material: Use galvanized steel.
 - c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

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. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
- I. Secure fasteners according to manufacturer's recommended torque settings.
- J. Remove temporary supports.
- K. Identify independent electrical component support wires above accessible ceilings (only where specifically indicated or permitted) with color distinguishable from ceiling support wires in accordance with NFPA 70.

3.03 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 26 0533.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical metallic tubing (EMT).
- B. Conduit fittings.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2015.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2015.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.
- E. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- H. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- I. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

2.02 CONDUIT REQUIREMENTS

- A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.
- B. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Minimum Conduit Size, Unless Otherwise Indicated:
 - 1. Branch Circuits: 1/2 inch (16 mm) trade size.
 - 2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.

3. Control Circuits: 1/2 inch (16 mm) trade size.
- E. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:
 1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 2. Material: Use steel or malleable iron.
 3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
 2. Republic Conduit: www.republic-conduit.com/#sle.
 3. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com/#sle.
 4. or approved equal.
- B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C. Fittings:
 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 2. Material: Use steel or malleable iron.
 3. Connectors and Couplings: Use compression (gland) or set-screw type.
 - a. Do not use indenter type connectors and couplings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- 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. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Conduit Support:
 1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- E. Connections and Terminations:
 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 3. Use suitable adapters where required to transition from one type of conduit to another.
 4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.

5. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
 6. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- F. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 4. Conceal bends for conduit risers emerging above ground.
 5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
 6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
 8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- G. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 2. Where conduits are subject to earth movement by settlement or frost.
- H. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- I. Provide grounding and bonding in accordance with Section 26 0526.

END OF SECTION

SECTION 26 0533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches (1,650 cu cm), including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches (1,650 cu cm).

1.02 RELATED REQUIREMENTS

- A. Section 26 0529 - Hangers and Supports for Electrical Systems.
- B. Section 26 2726 - Wiring Devices:
 - 1. Wall plates.

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. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.
- J. UL 514A - Metallic Outlet Boxes; 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 cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 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.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- 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. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Box Supports:
 1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
- E. Install boxes plumb and level.
- F. Flush-Mounted Boxes:
 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch (6 mm) or does not project beyond finished surface.
 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.

- 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch (3 mm) at the edge of the box.
- G. Install boxes as required to preserve insulation integrity.
- H. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- I. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- J. Close unused box openings.
- K. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- L. Provide grounding and bonding in accordance with Section 26 0526.

END OF SECTION

SECTION 26 0533.23
SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface raceway systems.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 5 - Surface Metal Raceways and Fittings; Current Edition, Including All Revisions.
- D. UL 5A - Nonmetallic Surface Raceways and Fittings; Current Edition, Including All Revisions.
- E. UL 111 - Outline of Investigation for Multioutlet Assemblies; 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 including dimensions, knockout sizes and locations, materials, fabrication details, finishes, service condition requirements, and accessories.
 - 1. Surface Raceway Systems: Include information on fill capacities for conductors and cables.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 RACEWAY REQUIREMENTS

- A. Provide all components, fittings, supports, and accessories required for a complete raceway system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Do not use raceways for applications other than as permitted by NFPA 70 and product listing.

2.02 SURFACE RACEWAY SYSTEMS

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell.com/#sle.
 - 2. MonoSystems, Inc: www.monosystems.com/#sle.
 - 3. Wiremold, a brand of Legrand North America, Inc: www.legrand.us/#sle.
 - 4. or approved equal.
- B. Surface Metal Raceways: Listed and labeled as complying with UL 5.
- C. Surface Nonmetallic Raceways: Listed and labeled as complying with UL 5A.
- D. Multioutlet Assemblies: Listed and labeled as complying with UL 111.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes and conduit terminations are installed in proper locations and are properly sized in accordance with NFPA 70 to accommodate raceways.
- C. Verify that mounting surfaces are ready to receive raceways and that final surface finishes are complete, including painting.

- D. 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. Install raceways plumb and level.
- D. Secure and support raceways in accordance with Section 26 0529 at intervals complying with NFPA 70 and manufacturer's requirements.
- E. Close unused raceway openings.
- F. Provide grounding and bonding in accordance with Section 26 0526.

3.03 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.04 PROTECTION

- A. Protect installed raceways from subsequent construction operations.

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.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

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:
 - 2. 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 0583
WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical connections to equipment.

1.02 REFERENCE STANDARDS

- A. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R2015).
- B. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2016.
- C. 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.
- B. Product Data: Provide wiring device manufacturer's catalog information showing dimensions, configurations, and construction.

1.04 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
 - 1. Colors: Comply with NEMA WD 1.
 - 2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
 - 3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

2.02 EQUIPMENT CONNECTIONS

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION

SECTION 26 0923
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Occupancy sensors.
- B. Lighting contactors.
- C. 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. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- D. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2016.
- E. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000, with Errata (2008).
- F. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices; 2017.
- G. NEMA ICS 6 - Industrial Control and Systems: Enclosures; 1993 (Reaffirmed 2016).
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 60947-1 - Low-Voltage Switchgear and Controlgear - Part 1: General Rules; Current Edition, Including All Revisions.
- J. UL 60947-4-1 - Low-Voltage Switchgear and Controlgear - Part 4-1: Contactors and Motor-starters - Electromechanical Contactors and Motor-starters; Current Edition, Including All Revisions.

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. Occupancy Sensors: Include detailed motion detection coverage range diagrams.
- C. Shop Drawings:
 - 1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.
- D. Field Quality Control Reports.

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.

- C. Products for Switching of Electronic Ballasts/Drivers: Tested and rated to be suitable for peak inrush currents specified in NEMA 410.

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 as approved.
- 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. 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.
 - c. Provide field selectable setting for disabling LED motion detector visual indicator.
 - d. Occupancy sensor to be field selectable as either manual-on/automatic-off or automatic on/off.
 - e. Finish: White unless otherwise indicated.
- D. 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.

2.03 LIGHTING CONTACTORS

- A. Manufacturers:
1. ABB/GE; _____: www.geindustrial.com/#sle.
 2. Eaton Corporation; _____: www.eaton.com/#sle.
 3. Rockwell Automation Inc; Allen-Bradley Products; _____: ab.rockwellautomation.com/#sle.
 4. Schneider Electric; Square D Products; _____: www.schneider-electric.us/#sle.
 5. Siemens Industry, Inc; _____: www.usa.siemens.com/#sle.
 6. or as approved.
- B. Description: Magnetic lighting contactors complying with NEMA ICS 2, and listed and labeled as complying with UL 60947-1 and UL 60947-4-1; noncombination type unless otherwise indicated; ratings, configurations and features as indicated on the drawings.
- C. Short Circuit Current Rating:

1. Provide contactors with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- D. Enclosures:
 1. Comply with NEMA ICS 6.
 2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1 or Type 12.
 3. Finish: Manufacturer's standard unless otherwise indicated.

2.04 ACCESSORIES

- A. Auxiliary Contacts:
 1. Comply with NEMA ICS 5.
 2. Provide number and type of contacts indicated or required to perform necessary functions, including holding (seal-in) circuit and interlocking, plus one normally open (NO) and one normally closed (NC) spare contact for each lighting contactor, minimum.

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 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

END OF SECTION

SECTION 26 2726
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Wall dimmers.
- C. Receptacles.
- D. Wall plates.

1.02 RELATED REQUIREMENTS

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

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; Revision H, 2014.
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Revision G, 2014.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R2015).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2016.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- K. UL 1472 - Solid-State Dimming Controls; 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. Wall Dimmers: Include derating information for ganged multiple devices.
 - 2. Surge Protection Receptacles: Include surge current rating, voltage protection rating (VPR) for each protection mode, and diagnostics information.
- C. Operation and Maintenance Data:
 - 1. Wall Dimmers: Include information on operation and setting of presets.
 - 2. GFCI Receptacles: Include information on status indicators.
 - 3. Surge Protection Receptacles: Include information on status indicators.

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.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

2.02 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.

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 DIMMERS

- A. Manufacturers:
1. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 2. Lutron Electronics Company, Inc; Maestro Series: www.lutron.com/#sle.
 3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
 4. or approved equal.
- B. Wall Dimmers - General Requirements: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1472; types and ratings suitable for load controlled as indicated on the drawings.

2.05 RECEPTACLES

- A. Manufacturers:
1. Hubbell Incorporated: www.hubbell.com/#sle.
 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 3. Lutron Electronics Company, Inc; Designer Style: www.lutron.com/#sle.
 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
 5. or approved equal.
- B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 2. NEMA configurations specified are according to NEMA WD 6.

2.06 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 dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- K. Do not share neutral conductor on branch circuits utilizing wall dimmers.
- L. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- M. 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.
- N. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

3.03 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust presets for wall dimmers according to manufacturer's instructions as directed by Architect.

END OF SECTION

SECTION 26 2816.13
ENCLOSED CIRCUIT BREAKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Enclosed circuit breakers.

1.02 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- E. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- F. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for circuit breakers, enclosures, and other installed components and accessories.

1.04 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.05 FIELD CONDITIONS

- A. Maintain ambient temperature between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C) during and after installation of enclosed circuit breakers.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Eaton Corporation: www.eaton.com.
- B. General Electric Company: www.geindustrial.com.
- C. Schneider Electric; Square D Products: www.schneider-electric.us.
- D. Siemens Industry, Inc: www.usa.siemens.com.
- E. or approved equal.

2.02 ENCLOSED CIRCUIT BREAKERS

- A. Description: Units consisting of molded case circuit breakers individually mounted in enclosures.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet (2,000 m).
 - 2. Ambient Temperature: Between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C).
- D. Short Circuit Current Rating:
 - 1. Provide enclosed circuit breakers with listed short circuit current rating not less than the available fault current at the installed location indicated on the drawings.
- E. Conductor Terminations: Suitable for use with the conductors to be installed.
- F. Provide solidly bonded equipment ground bus in each enclosed circuit breaker, with a suitable lug for terminating each equipment grounding conductor.
- G. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.

1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:

H. Provide externally operable handle with means for locking in the OFF position.

2.03 MOLDED CASE CIRCUIT BREAKERS

- A. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
- B. Interrupting Capacity:
 1. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 2. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
- C. Conductor Terminations:
 1. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
- D. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that the ratings of the enclosed circuit breakers are consistent with the indicated requirements.
- B. Verify that mounting surfaces are ready to receive enclosed circuit breakers.
- 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. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Install enclosed circuit breakers plumb.

3.03 FIELD QUALITY CONTROL

- A. Test GFCI circuit breakers to verify proper operation.
- B. Correct deficiencies and replace damaged or defective enclosed circuit breakers.

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. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.
- B. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015, with Errata (2017).
- C. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.
- D. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- 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:
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
 - b. Include IES LM-79 test report upon request.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

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

2.02 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.

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

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. Install lamps in each luminaire.

END OF SECTION

SECTION 26 5561
THEATRICAL LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Stage lighting units and lamps.
- B. Dimmers and control units.

1.02 REFERENCE STANDARDS

- A. IES LM-63 - IESNA Standard File Format for Electronic Transfer of Photometric Data and Related Information; 2002 (Reaffirmed 2008).
- 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.
- B. Shop Drawings: Indicate layout of rack-mounted equipment and details and diagrams of interconnecting wiring.
- C. Product Data: Provide for each item of equipment, showing sizes and ratings.
 - 1. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IES LM-63 standard format upon request.
- D. Operation Data:
 - 1. Instructions for operating lighting control system.
 - 2. Instructions for operating system under unusual conditions when emergency life safety conditions exist.
 - 3. Identify limits beyond which operation would result in hazardous or unsafe conditions or in equipment damage.
 - 4. Document ratings of system and of each major component.

1.04 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience and with service facilities within 100 miles of Project.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Altman Lighting Co., Inc: www.altmanltg.com/#sle.
- B. ETC/Electronic Theatre Controls: www.etcconnect.com/#sle.
- C. Strand Lighting: www.strandlighting.com/#sle.
- D. or approved equal.

2.02 LIGHTING CONTROL COMPONENTS

- A. Lighting Dimming and Control System: For stage area and house lighting.
 - 1. Dimmers: Integral with control console.
 - 2. Lighting Circuit Connections: Permanently, to dedicated dimmers.
- B. Control Console: Fixed, with integral dimmers.
 - 1. Controls:
 - a. Grand master.
- C. Dimmers: Portable dimming unit suitable for mounting at lighting unit.

2.03 STAGE LIGHTING UNITS AND ACCESSORIES

- A. Manufacturers:
 - 1. Altman Lighting Co., Inc: www.altmanltg.com/#sle.
 - 2. ETC/Electronic Theatre Controls: www.etcconnect.com/#sle.
 - 3. Strand Lighting: www.strandlighting.com/#sle.
 - 4. or approved equal.
- B. Stage Light: Fresnel spot.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install components in accordance with manufacturer's instructions.
- B. Aim and adjust luminaires as indicated on Drawings.
- C. Clean electrical parts to remove conductive and harmful materials.
- D. Remove dirt and debris from enclosure.
- E. Clean photometric control surfaces as recommended by manufacturer.
- F. Clean finishes and touch up damage.

END OF SECTION

SECTION 27 5116
PUBLIC ADDRESS SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Amplifier and control equipment.
- B. Input equipment.
- C. Sound system cable.
- D. Accessories.

1.02 REFERENCE STANDARDS

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

1.03 SYSTEM DESCRIPTION

- A. Public address system for voice and music.
- B. Input components:
 - 1. Compact disc player.
 - 2. Microphone.

1.04 SUBMITTALS

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

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70 and Federal Communications Commission.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Bogen Communications, Inc: www.bogen.com/#sle.
- B. Toa Electronics, Inc: www.toaelectronics.com/#sle.
- C. or approved equal.

2.02 AMPLIFICATION AND CONTROL EQUIPMENT

- A. Microphone Inputs: Two low impedance inputs with 600 microvolt sensitivity and noise level at least 55 dB below rated output.

2.03 COMPONENTS

- A. Microphone: Desk type low impedance microphone with push-to-talk switch.

END OF SECTION

SECTION 28 4600
FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Section 23 3300 - Air Duct Accessories: Smoke dampers monitored and controlled by fire alarm system.

1.03 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. NFPA 72 - National Fire Alarm and Signaling Code; 2016.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Inspection and Test Reports:
 - 1. Submit documentation of satisfactory inspections and tests.
- C. 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.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer, with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction.
- B. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
 - 1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
 - 2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
 - 3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.

1.06 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 SAFETY SYSTEMS INTERFACES

- A. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
 - 1. Duct smoke detectors.
- B. HVAC:
 - 1. Duct Smoke Detectors: shut down air handler.

2.02 COMPONENTS

- A. General:
 - 1. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.
- B. Initiating Devices:

1. Duct Smoke Detectors.
 - a. Provide 1 extra.
- C. Locks and Keys: Deliver keys to Owner.
- D. 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. Obtain approval of Owner prior to mounting; mount in location acceptable to Owner.
 2. Provide extra copy with operation and maintenance data submittal.

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.
- C. Obtain Owner's approval of locations of devices, before installation.
- D. Install instruction cards and labels.

3.02 INSPECTION AND TESTING FOR COMPLETION

- A. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- B. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.
- C. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.
- D. Provide all tools, software, and supplies required to accomplish inspection and testing.
- E. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
- F. 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.
- B. Substantial Completion of the project cannot be achieved until inspection and testing is successful and:
 1. Approved operating and maintenance data has been delivered.

END OF SECTION

SECTION 31 2316 EXCAVATION

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. Excavating and backfilling for paving, site structures, and underground storage tank.
- B. Dewatering.
- C. Preparing subgrades for footings, walks, pavements, seeded areas, and stairs.
- D. Drainage course for sidewalks, stairs, and curbs.
- E. Subbase course for concrete walks and pavements.
- F. Subbase and base course for asphalt paving.
- G. Final grading

1.3 RELATED REQUIREMENTS

- A. Section 32 1216 - Asphalt Paving.

1.4 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Field Quality Control Submittals: Document visual inspection of load-bearing excavated surfaces.
- C. Product Data: For the following:
 - 1. Each type of fill material.
 - 2. Each type of plastic warning tape.
 - 3. Controlled low-strength material, including design mixture.
- D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
 - 1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
 - 2. Laboratory compaction curves according to ASTM D 698 for each on-site or borrow soil material proposed for fill and backfill.
- E. Pre-excavation Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

1.5 ALLOWANCES

- A. Section not applicable for this project.

1.6 DEFINITIONS

- A. Excavation: Removal of material encountered above subgrade elevations.
 - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Owner's Representative and Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for allowances.
 - 2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
 - 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Owner's Representative. Unauthorized excavation, as

well as remedial work directed by Owner's Representative, shall be without additional compensation.

- B. Excavation is "unclassified" and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered, pavements and other obstructions visible on ground surface, underground structures, utilities and other items indicated to be demolished and removed, together with earth and other materials, including rock.
- C. Backfill: Soil material or controlled low-strength material used to fill an excavation.
- D. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.
- E. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
- F. Drainage Fill: Layer supporting concrete pavement and stairs used to minimize capillary flow of pore water.
- G. Fill: Soil materials used to raise existing grades.
- H. Select/Controlled Fill: Soil material to raise existing grades supporting footings, walls and slabs.
- I. Structures: footings, slabs, or curbs, or other man-made stationary features constructed above or below the ground surface.
- J. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- K. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- L. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.7 SUBMITTALS (Refer also to Section 01 1300)

- A. Product Data: For the following:
- B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
 - 1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
 - 2. Laboratory compaction curves according to ASTM D 698 for each on-site or borrow soil material proposed for fill and backfill.
 - 3. Optimum moisture-maximum density curve for each soil material.
- C. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

1.8 QUALITY ASSURANCE

- A. Section 01 3000 - Administrative Requirements for Project Meetings.
 - 1. Before commencing earthwork, meet with Owner's Representative, Architect, and independent testing agency, and other concerned entities. Review earthwork procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least 3 working days prior to convening conference. Record discussions and agreements and furnish a copy to each participant.
- B. Codes and Standards: Perform earthwork complying with requirements of State New York Uniform Fire and Building Code and authorities having jurisdiction.
- C. Testing and Inspection Service: Owner will employ and pay for a qualified independent geotechnical testing and inspection laboratory to perform soil testing and inspection service during earthwork operations to include but not be limited to the following:
 - 1. Verification of suitability of each footing subgrade material, in accordance with specified requirements.

- a. Field reports; in-place soil density tests.
- b. One optimum moisture-maximum density curve for each type of soil encountered.
- c. Inspections and certifications shall be performed by a licensed engineer registered in the State of New York.

1.9 PROJECT CONDITIONS

- A. Verify existing grades and notify Owner's Representative of differing conditions.
- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner's Representative and then only after arranging to provide temporary utility services have been provided.
 1. Notify Owner's Representative and Architect not less than two days in advance of proposed utility interruptions.
 2. Do not proceed with utility interruptions without Owner's Representative's written permission.
- C. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Excavations General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.
 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Backfill and Fill: Satisfactory soil materials.
- E. Subbase: Naturally or artificially graded mixture of crushed gravel and crushed stone.
- F. Select/Controlled Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, natural or crushed sand free of debris and organic matter, and with maximum particle size of two (2") inches and between ten (10%) and seventy (70%) percent, by weight, passing the standard No. 40 sieve size and less than ten (10%) percent passing a No. 200 sieve.
- G. Drainage Fill: Washed crushed stone; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.
- H. Bedding Course:
 1. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.
- I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and 0 to 5 percent passing a No. 4 sieve.
- J. Topsoil : Friable loam; local borrow.
 1. Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds and roots; minimum pH value of 5.4 and maximum 7.0.
 2. Graded.
 3. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds and foreign matter.
 4. Furnish a certified analysis, made by a recognized authority, of any topsoil furnished to complete the work of planting. Test reports shall match the format listed below:

	<u>Passing</u>	<u>Retained On Percentage</u>
a.	1" screen	100%
b.	1" screen 1/4" screen (Gravel)	Not more than 3%
c.	1/4" screen No. 100 (Sand)	40% - 60%
d.	No. 100 (Very fine sand, silt and clay)	40% - 60%

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a very stiff state.

2.2 CONTROLLED LOW-STRENGTH MATERIAL

- A. Produce low-density, controlled low-strength material with the following physical properties:
1. As-Cast Unit Weight: 36 to 42 lb./cu.ft. at point of placement, when tested according to ASTM C 138/C 138M.
 2. Compressive Strength: 80 psi, when tested according to ASTM C 495.

2.3 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:
1. Red: Electric.
 2. Yellow: Gas, oil, steam, and dangerous materials.
 3. Orange: Telephone and other communications.
 4. Blue: Water systems.
 5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 TOPSOIL STRIPPING AND STOCKPILING

- A. Stripping and Stockpiling of Topsoil: Strip topsoil from areas to be excavated or filled, areas within proposed building limits and paving areas and stockpile where shown on the plans. Stockpiled topsoil shall be free of subsoil, stones, clods of hard earth, plants or their roots, sticks or other matter not conducive to plant growth. Stockpiling shall be coordinated by the Contractor and shall comply with the requirements of Section 01 5713 - Temporary Erosion and Sediment Control.
- B. Refer to Section 02 0026 - Underground Storage Tank Removal and Decommissioning for stockpiling requirements for material excavated from tank removal.

3.2 EXAMINATION

- A. Verify that survey bench mark and intended elevations for the work are as indicated.
- B. Call 1-811- OR 1-800-272-4480, OR call811.com "Call Before You Dig", and register before beginning any excavation at least two (2) working days prior to the start of construction.
1. Locate and identify existing underground and overhead services and utilities within the Contract Limits. Provide adequate means of protection of utilities and services designated to remain. Repair utilities damaged during site work operations.
- C. Arrange for disconnection, disconnect and seal or cap all utilities and services designated to be removed before start of site work operations. Perform all work in accordance with the requirements of the applicable utility company or agency involved.

3.3 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect utilities that remain and protect from damage.
- C. Protect existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

- D. Protect plants, lawns, rock outcroppings, and other features to remain.
- E. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the architect.
- F. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- G. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.
- H. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- I. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrade, and from flooding Project site, and surrounding area.
- J. Protect subgrade from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
- K. The General Construction Contractor shall provide, maintain and operate pumps of adequate capacity required to maintain excavations, pits, trenches and depressions within the Contract Limit Lines as well as the Buildings free of water accumulated at any time and as necessary to permit the proper installation of the work required under all contracts. Disposal of pumped water shall be done with due respect to the rights of adjoining buildings. All costs in connection with the removal of water as above provided for shall be borne by the Contractor

3.4 EXCAVATING GENERAL

- A. Notify Owner's Representative of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- B. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
- C. Do not interfere with 45 degree bearing splay of foundations.
- D. Cut utility trenches wide enough to allow inspection of installed utilities.
- E. Hand trim excavations. Remove loose matter.
- F. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 2323.
- G. Provide temporary means and methods, as required, to remove all water from excavations until directed by the architect. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.
- H. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.
- I. Remove excavated material that is unsuitable for re-use from site.
- J. Stockpile excavated material to be re-used in area designated on site.
- K. Remove excess excavated material from site.

3.5 CLASSIFIED EXCAVATION

- A. Excavation for this project shall be "classified" earth.
- B. Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, soil materials, and obstructions, excluding rock
- C. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials. Backfill removed from existing building foundation is not suitable for backfilling and shall not be used.

- D. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
 - 1. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
- E. If Rock is encountered Refer to Section 01 2100 - Allowances
- F. Bottom of these excavations shall be provided with 12" of compacted drainage fill for footings and piers and 6" for manholes to eliminate differential settlement..
- G. Pipes and conduits shall be provided with 6" of Pipe Zone Bedding material to eliminate differential settlement.
- H. Do not remove rock until quantities have been verified by the Owner's Representative

3.6 STABILITY OF EXCAVATIONS

- A. Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace, where sloping is not possible because of space restrictions or stability of material excavated, to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

3.7 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.8 EXCAVATION FOR WALKS AND PAVEMENTS

- A. See Section 32 1313 - Concrete Paving for excavation and backfilling requirements. Construct to indicated cross sections, elevations, and grades.
- B. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades

3.9 EXCAVATION FOR ASPHALT PAVING AND WALKS

- A. See Section 32 1216 - Asphalt Paving for excavation and backfilling requirements. Construct to indicated cross sections, elevations, and grades.

3.10 SUBGRADE INSPECTION

- A. Notify Owner's Representative, Architect, and Testing Laboratory when excavations have reached required subgrade.
- B. If Testing Laboratory determines that unsatisfactory soil is present or contaminated, notify the Owner's Representative prior to proceeding. At the direction of the Owner's Representative and Testing Laboratory continue excavation and replace with compacted backfill or fill material as directed.
 - 1. Authorized additional excavation and replacement material will be paid for according to Contract provisions for allowances.

3.11 UNAUTHORIZED EXCAVATION

- A. Unauthorized additional excavation and replacement material will not be paid for.
- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.12 STORAGE OF SOIL MATERIALS

- A. Stockpile borrows material and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Provide tarp or erosion control fabric on stockpile material and a silt fence around stockpiled material.
 - 2. Material stockpiled outside the contract area shall be in locations approved by the Owner. If areas are not available store material off site at contractor's expense.

3.13 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Removing concrete formwork.
 - 2. Removing trash and debris.
 - 3. Removing temporary shoring, bracing, and sheeting.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.14 FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
 - 2. Under walks and pavements, use satisfactory soil material.
 - 3. Under steps and ramps, use select fill.
 - 4. Under building footings, foundations and slabs on grade, use select fill.
 - 5. Under roadways and paved areas, use select fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.15 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.16 COMPACTION OF BACKFILLS AND FILLS

- A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
 - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill material at 98 percent.
 - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 98 percent.
 - 3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 95 percent.

3.17 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.18 GRADING

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - 1. Lawn or Unpaved Areas: Plus or minus 1 inch .
 - 2. Walks: Plus or minus 1/2 inch .
 - 3. Pavements: Plus or minus 1/2 inch .

3.19 FINISH GRADING

- A. Before Finish Grading:
 - 1. Verify subgrade has been contoured and compacted.
 - 2. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.
 - 3. Where topsoil is to be placed, scarify surface to depth of 3 inches.
 - 4. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches.

3.20 SUBBASE AND BASE COURSES

- A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.
- B. Under pavements and walks, place subbase course on prepared subgrade and as follows:
- C. follows:
 - 1. When thickness of compacted subbase or base course is 6 inches or less, place materials in a single layer.
 - 2. When thickness of compacted subbase or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches (150 mm) thick or less than 3 inches thick when compacted.
 - 3. Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 98 percent of maximum dry unit weight according to ASTM D 1557

3.21 DRAINAGE FILL

- A. Under slabs-on-grade, pavements, walks, ramps, and stairs place drainage course on prepared subgrade and as follows:
 - 1. When compacted thickness of drainage course is 6 inches or less, place materials in a single layer.

2. When compacted thickness of drainage course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches (150 mm) thick or less than 3 inches thick when compacted.
3. Compact each layer of drainage course to required cross sections and thicknesses to not less than 98 percent of maximum dry unit weight according to ASTM D 698.
4. Refer to Section 32 1216 - Asphalt Paving for subbase requirements.

3.22 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Provide for visual inspection of load-bearing excavated surfaces before placement of foundations.
- C. Testing Agency: The Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- D. Allow testing agency to inspect and test the following:
 1. Confirmation of existing structure, foundation depths and undisturbed soil levels.
 2. Compaction of in place soil.
 3. Supply and compaction of select fill.
 4. Subgrade and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- E. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
 1. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Owner's Representative.
 2. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
- F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.23 PROTECTION

- A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- C. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- D. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- E. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- F. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
- G. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.24 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

SECTION 31 2323

FILL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Filling and compacting for paving.
- B. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.02 REFERENCE STANDARDS

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2010.
- B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)); 2012.
- C. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN m/m³)); 2012.
- D. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Compaction Density Test Reports.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. When necessary, store materials on site in advance of need.

PART 2 PRODUCTS

2.01 FILL MATERIALS

- A. General Fill:
 - 1. Conforming to ASTM D2487 Group Symbol CL.
- B. Structural Fill:
 - 1. Conforming to ASTM D2487 Group Symbol CL.
- C. Granular Fill - Washed Gravel : Pit run washed stone; free of shale, clay, friable material and debris.
 - 1. Graded in accordance with ASTM D2487 Group Symbol GW.
- D. Sand - Fill: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter.
 - 1. Grade in accordance with ASTM D2487 Group Symbol SW.
- E. Topsoil:
 - 1. Select.
 - 2. Graded.
 - 3. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds and foreign matter.
 - 4. Acidity range (pH) of 5.5 to 7.5.
 - 5. Containing a minimum of 4 percent and a maximum of 25 percent inorganic matter.
 - 6. Conforming to ASTM D2487 Group Symbol OH.
 - 7. Limit decaying matter to 5% percent of total content by volume.

2.02 SOURCE QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of soil material.
- B. If tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Identify required lines, levels, contours, and datum locations.

- B. Verify areas to be filled are not compromised with surface or ground water.

3.02 PREPARATION

- A. Scarify and proof roll subgrade surface to a depth of 6 inches to identify soft spots.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 FILLING

- A. Fill to contours and elevations indicated using unfrozen materials.
- B. Employ a placement method that does not disturb or damage other work.
- C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- F. Correct areas that are over-excavated.
 - 1. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.
- G. Compaction Density Unless Otherwise Specified or Indicated:
- H. Reshape and re-compact fills subjected to vehicular traffic.
- I. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Engineer. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.04 TOLERANCES

- A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor"), ASTM D1557 ("modified Proctor"), or AASHTO T 180.
- C. If tests indicate work does not meet specified requirements, remove work, replace and retest.
- D. Frequency of Tests: 100 cu yd.

3.06 CLEANING

- A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.
- B. Leave unused materials in a neat, compact stockpile.

END OF SECTION

SECTION 32 1216
ASPHALT PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aggregate base course.
- B. Single course bituminous concrete paving.
- C. Double course bituminous concrete paving.
- D. Surface sealer.

1.02 REFERENCE STANDARDS

- A. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types; 2015.
- B. AI MS-19 - A Basic Asphalt Emulsion Manual; Fourth Edition.

1.03 QUALITY ASSURANCE

- A. Perform Work in accordance with State of New York DOT Highways standard.
- B. Mixing Plant: Conform to State of New York DOT Highways standard.
- C. Obtain materials from same source throughout.

1.04 REGULATORY REQUIREMENTS

- A. Conform to applicable code for paving work on public property.

1.05 FIELD CONDITIONS

- A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F (4 degrees C), or surface is wet or frozen.
- B. Place bitumen mixture when temperature is not more than 15 F degrees (8 C degrees) below bitumen supplier's bill of lading and not more than maximum specified temperature.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Aggregate for Base Course: In accordance with State of New York DOT Highways standards.
- B. Aggregate for Binder Course: In accordance with State of New York DOT Highways standards.
- C. Aggregate for Wearing Course: In accordance with State of New York DOT Highways standards.
- D. Fine Aggregate: In accordance with State of New York DOT Highways standards.
- E. Primer: In accordance with State of New York DOT Highways standards.
- F. Tack Coat: In accordance with State of New York DOT Highways standards.

2.02 ASPHALT PAVING MIXES AND MIX DESIGN

- A. Base Course: 3.0 to 6 percent of asphalt cement by weight in mixture in accordance with AI MS-2.
- B. Binder Course: 4.5 to 6 percent of asphalt cement by weight in mixture in accordance with AI MS-2.
- C. Wearing Course: 5 to 7 percent of asphalt cement by weight in mixture in accordance with AI MS-2.

2.03 SOURCE QUALITY CONTROL

- A. Test mix design and samples in accordance with AI MS-2.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

3.02 BASE COURSE

- A. Place and compact base course.

3.03 PREPARATION - TACK COAT

- A. Apply tack coat in accordance with manufacturer's instructions.
- B. Apply tack coat on asphalt or concrete surfaces over subgrade surface at uniform rate of 1/3 gal/sq yd (1.5 L/sq m).

3.04 PLACING ASPHALT PAVEMENT - SINGLE COURSE

- A. Install Work in accordance with State of New York DOT Highways standards.
- B. Place asphalt within 24 hours of applying primer or tack coat.
- C. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.
- D. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

3.05 PLACING ASPHALT PAVEMENT - DOUBLE COURSE

- A. Place asphalt binder course within 24 hours of applying primer or tack coat.
- B. Place wearing course within two hours of placing and compacting binder course.
- C. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.
- D. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.06 SEAL COAT

- A. Apply seal coat to surface course and asphalt curbs in accordance with AI MS-19.

3.07 TOLERANCES

- A. Flatness: Maximum variation of 1/4 inch (6 mm) measured with 10 foot (3 m) straight edge.
- B. Compacted Thickness: Within 1/4 inch (6 mm) of specified or indicated thickness.
- C. Variation from True Elevation: Within 1/2 inch (12 mm).

3.08 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for quality control.
- B. Provide field inspection and testing. Take samples and perform tests in accordance with AI MS-2.

3.09 PROTECTION

- A. Immediately after placement, protect pavement from mechanical injury for 2 days or until surface temperature is less than 140 degrees F (60 degrees C).

END OF SECTION

**SECTION 32 1217
TRUE AND LEVEL**

PART 1 - GENERAL

1.1 GENERAL

- 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. The contractor shall true and level existing asphaltic pavement designated on the drawings and as directed by the Owner's Representative.
- B. The intent of this work is to create a uniform grade on the existing asphaltic pavement surface to permit application of a reasonably uniform asphalt overlay by removing high and low areas within the existing surface leveling course.
- C. Work shall include cleaning the areas, applying a tack coat and filling in designated areas with asphalt concrete to match adjacent asphalt surface and feathering at edges to the extent practicable.
- D. Related Sections
 - 1. Section 31 2316 – Excavation, for excavation, backfill and grading requirements.
 - 2. Section 32 1216 - Asphalt Paving, for additional requirements.

PART 2 - PRODUCTS

2.1 MATERIAL

- A. Bituminous tack coat and asphalt concrete shall be as described in Section 32 1216 - Asphalt Paving.

PART 3 - EXECUTION

3.1 CLEANING

- A. Surface of area shall be cleaned using compressed air, mechanical sweeper, hand brooms or other effective means until the surface is free of all materials which might interfere with bond between the existing surface and the truing and leveling material. All cleaning equipment and procedures shall be approved by the Engineer prior to use. Cleaning shall continue until adequate cleaning results.

3.2 TACK COAT

- A. Apply tack coat conforming to Section 32 1216 - Asphalt Paving at a rate of 0.1 to 0.25 gal./sq.yd. on the cleaned surface.

3.3 TRUING AND LEVELING

- A. Apply asphalt concrete to the prepared areas in variable thickness to achieve the objective described in Part 2.1/A above.
- B. Thoroughly compact using rollers, hand vibrators, compactors or other equipment described in Section 401 of the Standard Specifications and as approved by the Engineer.
- C. Finished surface shall match existing adjacent pavement, be free draining and have no variations in grade.

END OF SECTION

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SECTION 32 9219

SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preparation of subsoil.
- B. Placing topsoil.
- C. Seeding, mulching and fertilizer.
- D. Maintenance.

1.02 DEFINITIONS

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.03 SUBMITTALS

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

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

PART 2 PRODUCTS

2.01 SEED MIXTURE

- A. Seed Mixture:

2.02 SOIL MATERIALS

- A. Topsoil: Type Surfacing Material as specified.

2.03 ACCESSORIES

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.
- B. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.
- C. Erosion Fabric: Jute matting, open weave.
- D. Stakes: Softwood lumber, chisel pointed.

2.04 TESTS

- A. Provide analysis of topsoil fill under provisions of Section 01 4000.
- B. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.
- C. Submit minimum 10 oz sample of topsoil proposed. Forward sample to approved testing laboratory in sealed containers to prevent contamination.
- D. Testing is not required if recent tests are available for imported topsoil. Submit these test results to the testing laboratory for approval. Indicate, by test results, information necessary to determine suitability.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared soil base is ready to receive the work of this Section.

3.02 PREPARATION

- A. Prepare subgrade and place topsoil in accordance with the Specifications.

3.03 SEEDING

- A. Apply seed at a rate of 2-3 lbs per 1000 sq ft evenly in two intersecting directions. Rake in lightly.
- B. Do not seed areas in excess of that which can be mulched on same day.
- C. Do not sow immediately following rain, when ground is too dry, or during windy periods.
- D. Immediately following seeding and compacting, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.
- E. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.
- F. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches.

3.04 MAINTENANCE

- A. Provide maintenance at no extra cost to Owner; Owner will pay for water.
- B. See Section 01 70 00 - Execution Requirements, for additional requirements relating to maintenance service.
- C. Maintain seeded areas immediately after placement until grass is well established and exhibits a vigorous growing condition.
- D. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.
- E. Neatly trim edges and hand clip where necessary.
- F. Immediately remove clippings after mowing and trimming.
- G. Water to prevent grass and soil from drying out.
- H. Roll surface to remove minor depressions or irregularities.
- I. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- J. Immediately reseed areas that show bare spots.
- K. Protect seeded areas with warning signs during maintenance period.

END OF SECTION