PROJECT MANUAL
FOR THE
TWO RIVER THEATER COMPANY
21 BRIDGE AVENUE
RED BANK, NEW JERSEY

Architectural: Kaplan Gaunt DeSantis Architects, LLC
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PART 1 GENERAL

1.01 PROJECT
   A. Project Name: Two River Theater
   B. Owner's Name: Two River Theater
   C. Owner’s Representative: Greyhawk, Construction Managers
   D. Architect's Name: Kaplan Gaunt DeSantis Architects LLC
   E. The Project consists of an addition and alterations to the Two River Theater, Red Bank, NJ.

1.02 CONTRACT DESCRIPTION
   A. Contract Type: A single prime contract based on a Stipulated Price as described in the construction documents prepared by Kaplan Gaunt DeSantis Architects.

1.03 WORK BY OWNER
   A. Items noted NIC (Not in Contract) will be supplied and installed by Owner after Substantial Completion. Items include, but are not limited to:
      1. Movable cabinets.
      2. Furnishings and small equipment.
      3. Artwork.

1.04 CONTRACTOR USE OF SITE AND PREMISES
   A. Construction Operations: Limited to areas directly related to the Construction Area as noted on Drawings.

   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.
      2. Do not obstruct roadways, sidewalks, or other public ways without permit.

1.07 WORK SCHEDULE
   A. The detailed construction schedule is to be developed by the Contractor and will be reviewed and approved by the Owner, the Owner’s Representative, and Architect.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION
SECTION 01 2000

PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.
C. Change procedures.
D. Correlation of Contractor submittals based on changes.
E. Procedures for preparation and submittal of application for final payment.

1.02 SCHEDULE OF VALUES

A. Form to be used: AIA Document G703. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval. Forms filled out by hand will not be accepted.
B. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization.
C. Revise schedule to list approved Change Orders, with each Application For Payment.

1.03 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.
B. Form to be used: AIA Document G702. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval. Forms filled out by hand will not be accepted.
C. Execute certification by signature of authorized officer.
D. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
E. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.
F. Submit three copies of each Application for Payment.
G. Include the following with the application:
   1. Transmittal letter as specified for Submittals in Section 01 3000.
   2. Construction progress schedule, revised and current as specified in Section 01 3000.
   3. Partial release of liens from major Subcontractors and vendors (submitted prior to payment.)
   4. Affidavits attesting to off-site stored products.

1.04 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Price or Contract Time, Architect will issue instructions directly to Contractor.
B. For changes for which advance pricing is desired, Architect will issue a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 5 working days.
C. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
   2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.

D. Substantiation of Costs: Provide full information required for evaluation.
   1. On request, provide following data:
      a. Quantities of products, labor, and equipment.
      b. Insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. For Time and Material work, if authorized, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

E. Execution of Change Orders: Architect will issue Change Orders for signatures of the Owner, Contractor and Architect.

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

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

H. Promptly enter changes in Project Record Documents.

1.05 APPLICATION FOR FINAL PAYMENT

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

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01 7000.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 PROJECT COORDINATION

A. Coordinate with the Owner and Architect the allocation of mobilization areas of site and building; public access to portions of the building remaining in operation, traffic, and parking of vehicles relating to the construction.
B. Make the following types of submittals to Architect:
   1. Requests for interpretation (RFI).
   2. Requests for substitution (RFS).
   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. Construction and progress schedules.
   8. Coordination drawings.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Architect will schedule a pre-construction meeting after the Contractor has received the Notice of Contract Award.
B. Attendance Required:
   1. Owner.
   3. Construction Manager
   4. Contractor, Primary Sub-Contractors.
C. Tentative Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates by the Contractor.
   4. Submission of list of Subcontractors, list of Products, schedule of values, construction schedule, and list of submittals.
   5. Designation and contact information of personnel representing the Contractor, Owner, Construction Manager and Architect.
   6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
7. Scheduling.

D. Architect will record minutes and distribute copies within five working days after meeting to participants, with copies to Owner, Contractor, participants, and those affected by decisions made.

3.02 SITE MOBILIZATION MEETING

A. Architect will schedule a meeting at the Project site prior to Contractor occupancy.

B. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Architect.
   4. Construction Manager
   5. Consultants.
   6. Contractor’s Superintendent.
   7. Major Subcontractors.

C. Tentative Agenda:
   1. Use of premises by Owner and Contractor.
   2. Construction facilities and controls provided by Contractor.
   3. Temporary utilities provided by Contractor.
   5. Schedules.
   6. Application for payment procedures.
   7. Procedures for maintaining record documents.
   8. Requirements for start-up of equipment.
   9. Inspection and acceptance of equipment put into service during construction period.

D. Architect will record minutes and distribute copies within five working days after meeting to participants, with copies to Owner, Contractor, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

A. Architect will schedule and administer meetings throughout progress of the Work at maximum monthly intervals.

B. Architect will make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.

C. Attendance Required: Job superintendent, major Subcontractors actively involved at time of meeting, and suppliers, Owner, Architect, as appropriate to agenda topics for each meeting.

D. Tentative 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. Maintenance of quality and work standards.
   11. Effect of proposed changes on progress schedule and coordination.
   12. Other business relating to Work.
E. Architect will record minutes and distribute copies within five working days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.04 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days after date of the Agreement, submit a schedule defining planned operations for the Construction Period.

B. If the schedule requires revision after review, submit revised schedule within 5 days.

C. Submit updated schedule with each Application for Payment.

3.05 PROGRESS PHOTOGRAPHS

A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.

B. Photography Type: Digital; electronic files.

C. Views:
   1. Consult with Architect for instructions on views required.
   2. Provide factual presentation.
   3. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

D. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
   1. Delivery Medium: Via email or Compact Disk.
   2. File Naming: Include project identification, date and time of view, and view identification.
   3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.
   4. Hard Copy: Printed hardcopy (grayscale) of PDF file and point of view sketch.

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.

B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed only for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7000 – EXECUTION AND 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.

B. Submit for Architect’s knowledge as contract administrator or for Owner. 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. Release of Liens.
   5. Record drawings (as-built documents).
   4. Other types as indicated.

B. Submit for Owner's benefit during and after project completion.

3.09 NUMBER OF COPIES OF SUBMITTALS

A. Documents for Review:
   1. Small Size Sheets, Not Larger than 11 x 17 inches: Submit the number of copies that Contractor requires, plus two copies that will be retained by Architect.
   2. Larger Sheets, Not Larger than 24 x 36 inches: Submit the number of reproductions the Contractor requires, plus two copies that will be retained by Architect.

B. Documents for Information only: Submit two copies.

C. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.10 SUBMITTAL PROCEDURES

A. Transmit each submittal with contractor form approved by Architect.

B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.

C. Identify Project, Contractor, Subcontractor or Supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

D. 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.

E. Deliver submittals to Architect electronically.

F. Schedule submittals to expedite the Project, and coordinate submission of related items.

G. Allow 10 days for each submittal for review by Architect.

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 Architect review stamps.

J. When revised for resubmission, graphically identify all changes made since previous submission.

K. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

END OF SECTION
SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES:
A. Quality assurance submittals.
B. Control of installation.
C. Tolerances.
D. Manufacturers' Field Services.
E. Defect Assessment.

1.02 SUBMITTALS

A. Testing Agency Qualifications:
   1. Contractor shall employ and pay for services of an independent testing agency to perform testing. Prior to start of Work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.

B. Design Data: Submit for Contractor and Architect's knowledge for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.

C. Test Reports: After each test/inspection, promptly submit two copies of report to Construction Manager, Architect 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 Construction Manager or Architect, provide interpretation of results.

   2. Test report submittals are for Contractor and Architect's knowledge as for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.

   Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.

3. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

4. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

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

E. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
   1. Submit report in duplicate within 15 days of observation to Architect 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.

F. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.

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 Architect 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 TOLERANCES
A. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
B. Adjust products to appropriate dimensions; position before securing products in place.

3.03 MANUFACTURERS' FIELD SERVICES
A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance of equipment as applicable, and to initiate instructions when necessary.
B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

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

END OF SECTION
PART 1 GENERAL

1.01 SUMMARY

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

B. Other definitions are included in individual specification sections.

1.02 DEFINITIONS

A. Furnish: To supply, deliver, unload, and inspect for damage.

B. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.

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

D. Project Manual: The book-sized volume that includes the procurement requirements (if any), the contracting requirements, and the specifications.

E. Provide: To furnish and install.

F. Supply: Same as Furnish.

G. Not In Contract (NIC): Labor and/or material provided by the Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION
SECTION 01 4533
CODE-REQUIRED SPECIAL INSPECTIONS

PART 1  GENERAL

1.01  RELATED REQUIREMENTS

A.  Section 01 3000 - Administrative Requirements:  Submittal procedures.
B.  Section 01 4000 - Quality Requirements.
C.  Section 01 6000 - Product Requirements:  Requirements for material and product quality.

1.02  REFERENCE STANDARDS

A.  ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2016).
C.  ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2015ae1.
J.  AWS D1.3 - Structural Welding Code - Sheet Steel; 2008.
K.  AWS D1.4 - Structural Welding Code - Reinforcing Steel; 2011.
M.  IAS AC291 - Accreditation Criteria for Special Inspection Agencies; 2012.

1.03  TESTING AND INSPECTION AGENCIES

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

1.04  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.
C.  Copies of Documents at Project Site:  Maintain at the project site a copy of each referenced document.
PART 2  PRODUCTS - NOT USED
PART 3  EXECUTION

3.01  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.
   2. Periodic Special Inspection: Special Inspection Agency shall be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

3.02  SPECIAL INSPECTIONS FOR CONCRETE CONSTRUCTION

A. Reinforcing Steel, Including Prestressing of Tendons and 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 and ACI 318, Section 3.5.2; periodic.
C. Design Mix: Verify plastic concrete complies with the design mix in approved contract documents and with ACI 318, Chapter 4 and 5.2; periodic.
D. Concrete Sampling Concurrent with Strength Test Sampling: Each time fresh concrete is sampled for strength tests, verify compliance with, ASTM C31 and ACI 318, Sections 5.6 and 5.8 and record the following, continuous:
   1. Slump.
   2. Air content.
   3. Temperature of concrete.
E. Specified Curing Temperature and Techniques: Verify compliance with approved contract documents and ACI 318, Sections 5.11 through 5.13; periodic.
F. Concrete Strength in Situ: Verify concrete strength complies with approved contract documents and ACI 318, Section 6.2, for the following.
G. Formwork Shape, Location and Dimensions: Verify compliance with approved contract documents and ACI 318, Section 6.1.1; periodic.

3.03  SPECIAL INSPECTIONS FOR SPRAYED FIRE RESISTANT MATERIALS

A. Sprayed Fire Resistant Materials, General:
   1. Verify compliance of sprayed-fire resistant materials with specific fire-rated assemblies indicated in approved contract documents, and with applicable requirements of the building code.
   2. Perform special inspections after rough installation of electrical, mechanical, plumbing, automatic fire sprinkler and suspension systems for ceilings.
B. Physical and visual tests: Verify compliance with fire resistance rating.
   1. Condition of substrates; periodic.
   2. Thickness of sprayed fire resistant material; periodic.
   3. Density of sprayed fire resistant material in pounds per cubic foot (kg per sq m); periodic.
   4. Bond strength (adhesion and cohesion); periodic.
   5. Condition of finished application; periodic.
C. Structural member surface conditions:
   1. Inspect structural member surfaces before application of sprayed fire resistant materials; periodic.
   2. Verify preparation of structural member surfaces complies with approved contract documents and manufacturer's written instructions; periodic.
D. Application:
   1. Ensure minimum ambient temperature before and after application complies with the manufacturer's written instructions; periodic.
2. Verify area where sprayed fire resistant material is applied is ventilated as required by the manufacturer's written instructions during and after application; periodic.

E. Thickness: Verify that no more than 10 percent of thickness measurements taken from sprayed fire resistant material are less than thickness required by fire resistance design in approved contract documents. In no case shall the thickness of the sprayed fire resistant material be less than the minimum below.

1. Minimum Allowable Thickness: Tested according to ASTM E605, periodic.
   a. Design thickness 1 inch or greater: Design thickness minus 1/4 inch.
   b. Design thickness greater than 1 inch: Design thickness minus 25 percent.

2. Structural Members: Test according to ASTM E605. Test no less than 25 percent of structural members on each story of the structure or portion thereof; periodic.
   a. Beams and girders: Make nine thickness measurements around beam or girder at each end of a 12 inch by 12 inch length.
   b. Wide flanged columns: Make twelve thickness measurements around column at each end of a 12 inch by 12 inch length.

F. Density: Verify density of sprayed fire resistant material is no less than density required by the fire resistance design in the approved contract documents.

1. Beams, Girders, Trusses and Columns: Test according to ASTM E605 with no less than one sample per 2,500 square feet of sprayed area on each story of the structure or portion thereof; periodic.

3.04 SPECIAL INSPECTIONS FOR MASTIC AND INTUMESCENT FIRE RESISTANT COATINGS

A. Verify mastic and intumescent fire resistant coatings comply with AWCI 117 and the fire resistance rating indicated on approved contract documents.

3.05 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

A. Special Inspection Agency shall:
   1. Verify samples submitted by Contractor comply with the referenced standards and the approved contract documents.
   3. Perform specified sampling and testing of products in accordance with specified reference standards.
   5. Promptly notify Architect and Contractor of observed irregularities or non-conformance of work or products.
   6. Perform additional tests and inspections required by Architect.
   7. 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 Architect.

D. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.
3.06 TESTING AGENCY DUTIES AND RESPONSIBILITIES

A. Testing Agency Duties:
1. Test samples submitted by Contractor.
3. Perform specified sampling and testing of products in accordance with specified standards.
4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
5. Promptly notify Architect and Contractor of observed irregularities or non-conformance of work or products.
6. Perform additional tests and inspections required by Architect.
7. Submit reports of all tests or inspections specified.

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 Architect.

D. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

3.07 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 Architect and laboratory 24 hours prior to expected time for operations requiring testing or inspection services.
5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

END OF SECTION
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:
   1. Section 01 1000 "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to: Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Owner will pay sewer-service use charges for sewer usage by all entities for construction operations.

C. Water Service: Owner will pay water-service use charges for water used by all entities for construction operations.

D. Electric Power Service: Owner will pay electric-power-service use charges for electricity used by all entities for construction operations.

E. Water and Sewer Service from Existing System: Water from Owner’s existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

F. Electric Power Service from Existing System: Electric power from Owner’s existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.

D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.

F. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
   1. Locations of dust-control partitions at each phase of work.
   2. HVAC system isolation schematic drawing.
   3. Location of proposed air-filtration system discharge.
   5. Other dust-control measures.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.


1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2 inch, 0.148 inch thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8 inch OD line posts and 2-7/8 inch OD corner and pull posts, with 1-5/8 inch OD top rails.

B. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors.

C. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats minimum 36 by 60 inches.
D. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, Construction Manager, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4 foot square tack and marker boards.
3. Drinking water and private toilet.
4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
5. Lighting fixtures capable of maintaining average illumination of 50 fc at desk height.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 01 7000.

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.
PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

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

3.2 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

   1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

   1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

   1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

F. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.

G. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.
   a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
   b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.

3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead unless otherwise indicated.

2. Connect temporary service to Owner's existing power source, as directed by Owner.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

J. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install Wifi cell phone access equipment and land-based telephone line(s) for each field office.

1. At each telephone, post a list of important telephone numbers.
   a. Police and fire departments.
   b. Ambulance service.
   c. Contractor's home office.
   d. Contractor's emergency after-hours telephone number.
   e. Architect's office.
   f. Engineers' offices.
   g. Owner's office.
   h. Principal subcontractors' field and home offices.

3.4 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:
1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.

2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
3. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 321216 "Asphalt Paving."

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Use designated parking areas for construction personnel.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
   a. Provide temporary, directional signs for construction personnel and visitors.
3. Maintain and touch up signs so they are legible at all times.
H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 7000.

I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
   1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

J. Temporary Elevator Use: Use of elevators is not permitted unless otherwise noted.

K. Existing Elevator Use: Use of Owner’s existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.
   1. Do not load elevators beyond their rated weight capacity.
   2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

L. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

M. Existing Stair Usage: Use of Owner’s existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
   1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

N. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
   1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
   1. Comply with work restrictions specified in Section 011000 "Summary."
C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion and sedimentation-control drawings or requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.

G. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.

1. Extent of Fence: As directed by Architect to enclose entire Project site or portion determined sufficient to accommodate construction operation (as indicated on drawings).
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

J. Temporary Egress: Maintain temporary egress from existing occupied facilities as required by authorities having jurisdiction.

K. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.

1. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
2. Paint and maintain appearance of walkway for duration of the Work.
L. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

M. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side, or
2. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6 mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.

a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.

3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
4. Insulate partitions to control noise transmission to occupied areas.
5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
6. Protect air-handling equipment.
7. Provide walk-off mats at each entrance through temporary partition.

N. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these
operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

3. Indicate methods to be used to avoid trapping water in finished work.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard and replace stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
   a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
   b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
   c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.7 OPERATION, TERMINATION, AND REMOVAL

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

B. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.

2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 7000.

END OF SECTION
SECTION 01 5213
FIELD OFFICES AND SHEDS

PART 1 GENERAL

1.01 RELATED REQUIREMENTS
   A. Section 01 1000 - Summary: use of premises and responsibility for providing field offices.
   B. Section 01 5000: Parking and access to field offices.

1.02 USE OF EXISTING FACILITIES
   A. Existing facilities shall not be used for field offices.

1.03 USE OF PERMANENT FACILITIES
   A. Permanent facilities shall not be used for field offices, unless otherwise directed.

PART 2 PRODUCTS

2.01 MATERIALS, EQUIPMENT, FURNISHINGS
   A. Materials, Equipment, Furnishings: Serviceable, new or used, adequate for required purpose.

2.02 CONSTRUCTION of Field Offices
   A. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely
      fixed to foundations, with steps and landings at entrance doors.
   B. Construction: Structurally sound, secure, weather tight enclosures for office. Maintain during
      progress of Work; remove when no longer needed.
   C. Temperature Transmission Resistance of Floors, Walls, and Ceilings (Insulation): Compatible
      with occupancy requirements.
   D. Exterior Materials: Weather resistant, finished in one color.
   E. Interior Materials in Offices: Sheet type materials for walls and ceilings, prefinished or painted;
      resilient floors and bases.
   F. Lighting for Offices: 50 fc at desk top height, exterior lighting at entrance doors.
   G. Fire Extinguishers: Appropriate type fire extinguisher at each office.

2.03 ENVIRONMENTAL CONTROL
   A. Heating, Cooling, and Ventilating: Automatic equipment to maintain comfort conditions.

2.04 CONTRACTOR OFFICE AND FACILITIES
   A. Size: For Contractor's needs and to provide space for project meetings, with 10 person
      minimum seated at table.
   B. Telephone: As specified in Section 01 5000.
   C. Furnishings in Meeting Area: Conference table and chairs to seat at least eight persons; racks
      and files for Contract Documents, submittals, and project record documents.
   D. Other Furnishings: Contractor's option.
   E. Equipment: Six adjustable band protective helmets for visitors and one 10 inch outdoor
      weather thermometer.

2.05 OWNER AND ARCHITECT/ENGINEER OFFICE
   A. Separate space for sole use of Owner and Architect, with separate entrance door with new lock
      and two keys.
   B. Area: At least 150 sq ft, with minimum dimension of 8 ft. wide.
   C. Windows: At least three, with minimum total area equivalent to 10 percent of floor area, with an
      operable sash and insect screen. Locate to provide views of construction area.
   D. Electrical Distribution Panel: Two circuits minimum, 110 volt, 60 hz service.
   E. Minimum four 110 volt duplex convenience outlets, one on each wall.
F. Telephone: As specified in Section 01 5000.
G. Sanitary Facilities: As specified in Section 01 5000.
H. Drinking Fountain: Convenient access by workers.
I. Furnishings:
   1. One desk 54 by 30 inch, with three drawers.
   2. One drafting table 36 by 72 inch, with one equipment drawer and a 48 inch wide parallel straight edge.
   3. One computer workstation with 24 by 48 inch, work surface, CPU shelf, retractable keyboard tray, and space for computer monitor and 11 by 17 inch printer.
   4. One metal, double-door storage cabinet under table.
   5. Plan rack to hold working Drawings, shop drawings, and record documents.
   6. One standard four-drawer legal size metal filling cabinet with locks and two keys per lock.
   7. Six linear ft of metal bookshelves.
   8. Two swivel arm chairs.
   9. Two straight chairs.
   10. One drafting table stool.
   11. One tackboard 36 by 30 inch.
   12. One waste basket per desk and table.

PART 3 EXECUTION
3.01 PREPARATION
   A. Fill and grade sites for temporary structures to provide drainage away from buildings.

3.02 INSTALLATION
   A. Install office spaces ready for occupancy 15 days after date fixed in Notice to Proceed.
   B. Parking: Two hard surfaced parking spaces for use by Owner and Architect, connected to office by hard surfaced walk.
   C. Employee Residential Occupancy: Not allowed on Owner's property.

3.03 MAINTENANCE AND CLEANING
   A. Weekly janitorial services for offices; periodic cleaning and maintenance for offices.
   B. Maintain approach walks free of mud, water, and snow.

3.04 REMOVAL
   A. At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

END OF SECTION
SECTION 01 5813
TEMPORARY PROJECT SIGNAGE

PART 1  GENERAL

1.01  SECTION INCLUDES
   A. Project identification sign.
   B. Project informational signs.

1.02  RELATED REQUIREMENTS
   A. Section 01 1000 - Summary: Responsibility to provide signs.

1.03  QUALITY ASSURANCE
   A. Design sign and structure to withstand 80 miles/hr wind velocity.
   B. Sign Painter: Experienced as a professional sign painter for minimum three years.
   C. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

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

PART 2  PRODUCTS

2.01  SIGN MATERIALS
   A. Structure and Framing: New, wood, structurally adequate.
   B. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inch thick, standard large sizes to minimize joints.
   C. Rough Hardware: Galvanized.
   D. Paint and Primers: Exterior quality, two coats.
   E. Lettering: Exterior quality paint, contrasting colors.

2.02  PROJECT IDENTIFICATION SIGN
   A. One painted sign of construction, design, and content indicated on drawings, location designated.
   B. One painted sign, 48 sq ft area, bottom 6 feet above ground.
   C. Content:
      1. Project number, title, logo and name of Owner as indicated on Contract Documents.
      2. Names and titles of authorities.
      4. Name of Prime Contractor and major Subcontractors.
   E. Lettering: Standard Alphabet Series C, as specified in FHWA (SHS).

2.03  PROJECT INFORMATIONAL SIGNS
   A. Painted informational signs of same colors and lettering as Project Identification sign, or standard products; size lettering to provide legibility at 100 foot distance.
   B. Provide at each field office, storage shed, and directional signs to direct traffic into and within site. Relocate as Work progress requires.
   C. Provide municipal traffic agency directional traffic signs to and within site.

2.04  SIGNS, SIGNALS, AND DEVICES
   A. Stock Post Mounted and Wall Mounted Traffic Control and Informational Signs:
      1. Products:
b. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install project identification sign within 30 days after date fixed by Notice to Proceed.
B. Erect at designated location.
C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.
D. Install sign surface plumb and level, with butt joints. Anchor securely.
E. Paint exposed surfaces of sign, supports, and framing.

3.02 MAINTENANCE

A. Maintain signs and supports clean, repair deterioration and damage.

3.03 REMOVAL

A. Remove signs, framing, supports, and foundations at completion of Project and restore the area.

END OF SECTION
SECTION 01 6000

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.
B. Re-use of existing products.
C. Transportation, handling, storage and protection.
D. Product option requirements.
E. Substitution limitations and procedures.
F. Procedures for Owner-supplied products.
G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 30 days after date of Agreement.
B. Product Data Submittals: Submit manufacturer’s standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers’ standard data to provide information specific to this Project.
C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer’s standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.
B. Do not use products having any of the following characteristics:
   1. Made using or containing CFC's or HCFC's.

2.02 PRODUCT OPTIONS

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

2.03 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
B. Deliver to Project site; obtain receipt prior to final payment.
PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.

B. Architect will consider requests for substitutions only within 30 days after date of Agreement.

C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

D. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level and performance criteria of the specified product.
   2. Will provide the same warranty for the substitution as for the specified product.
   3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.
   5. Will reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Substitution Submittal Procedure:
   1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
   2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
   3. The Architect will notify Contractor in writing of decision to accept or reject request.

3.02 TRANSPORTATION AND HANDLING

A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time, potential damage to stored materials, and disruption of Library operations.

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

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

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

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

3.03 STORAGE AND PROTECTION

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

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

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.

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

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

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

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

END OF SECTION
SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Examination, preparation, and general installation procedures.
   B. Pre-installation meetings.
   C. Cutting and patching.
   D. Cleaning and protection.
   E. Starting of systems and equipment.
   F. Demonstration and instruction of Owner personnel.
   G. Closeout procedures, except payment procedures.
   H. General requirements for maintenance service.

1.02 SUBMITTALS
   A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
      1. Structural integrity of any element related to Project.
      2. Efficiency, maintenance, or safety of any operational element.
   C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.03 QUALIFICATIONS
   A. For design of temporary shoring and bracing, employ a Professional Engineer experienced in
t      design of this type of work and licensed in New Jersey.

1.04 PROJECT CONDITIONS
   A. Dust Control: Execute work by methods to minimize raising dust from construction operations.
      Provide positive means to prevent air-borne dust from dispersing into atmosphere and over
      adjacent properties.
   B. Noise Control: Provide methods, means, and facilities to minimize noise produced by
      construction operations.
   C. Pollution Control: Provide methods, means, and facilities to prevent contamination of water,
      and atmosphere from discharge of noxious, toxic substances, and pollutants produced by
      construction operations. Comply with federal, state, and local regulations.

1.05 COORDINATION
   A. 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 and periods of excessively noisy
      operations.
   B. Notify affected utility companies and comply with their requirements.
   C. 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.
D. 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.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

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

G. After completion of the work, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner’s activities.

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. 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 conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

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

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

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. 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 pre-installation 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 Architect and Owner’s Representative at least five 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 three days after meeting to participants, with two copies to Architect, Owner, Owner’s Representative, 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 Architect and Owner’s Representative of any discrepancies discovered.
C. Contractor shall locate and protect survey control and reference points.
D. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
F. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:

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 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.
D. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
E. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
F. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material, to full thickness of the penetrated element.
I. 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.

3.07 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, 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 as required to maintain a clean space and legally dispose off-site; do not burn or bury.

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

3.09 SYSTEM STARTUP
A. Coordinate schedule for start-up of various equipment and systems.
B. Notify Architect and owner seven days prior to start-up of each item.
C. Verify that each piece of equipment or system has been checked for proper operation and for conditions that may cause damage.
D. Verify tests and specified electrical characteristics agree with those required by the equipment or system manufacturer.
E. Verify that wiring and support components for equipment are complete and tested.
F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

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

3.12 FINAL CLEANING
A. Execute final cleaning prior to final project assessment.
B. Use cleaning materials that are nonhazardous.
C. Clean interior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

F. Clean filters of operating equipment.

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

3.13 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Architect, Owner's Representative and Owner.

B. Accompany Owner, Owner’s Representative and Architect on preliminary inspection to determine items to be listed for completion or correction in Contractor's Notice of Substantial Completion.

C. Notify Architect and Owner’s Representative when work is considered ready for Substantial Completion.

D. 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 Architect's review.

E. Correct items of work listed in executed Certificates of Substantial Completion and comply with requirements for access to Owner-occupied areas.

F. Accompany Architect and Owner’s Representative on preliminary and final inspections.

G. Complete items of work determined by Architect’s and Owner’s Representative’s final inspection and notify both parties when work is considered finally complete.

3.14 MAINTENANCE

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

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

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

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

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

END OF SECTION
SECTION 01 7419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1  GENERAL

1.01  WASTE MANAGEMENT REQUIREMENTS
A. Owner 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. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
   1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
   2. Submit Report on a form acceptable to Owner.
   3. Landfill Disposal: Include the following information:
      a. Identification of material.
      b. Amount, in tons or cubic yards (cubic meters), 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 (cubic meters), 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 (cubic meters), 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 (cubic meters).
      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 PROCEDURES
A. See Section 01 3000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.
B. See Section 01 5000 for additional requirements related to trash/waste collection and removal facilities and services.
C. See Section 01 6000 for waste prevention requirements related to delivery, storage, and handling.
D. See Section 01 7000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

2.02 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 Construction Manager, each subcontractor, Owner, and Architect.
C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
D. Meetings: Discuss trash/waste management goals and issues at project meetings.
   1. Pre-bid meeting.
   2. Pre-construction meeting.
   3. Regular job-site meetings.
E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
   1. Provide containers as required.
   2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
   3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION
SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Project Record Documents.
   B. Operation and Maintenance Data.
   C. Warranties and bonds.

1.02 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: Specific requirements for operation and maintenance data.
   D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS
   A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
   B. Operation and Maintenance Data:
      1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
      2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
      3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
      4. Submit two sets of revised final documents in final form within 10 days after final inspection.
   C. Warranties and Bonds:
      1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
      2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
      3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

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 Owner.
   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. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured depths of foundations in relation to finish first floor datum.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
4. Field changes of dimension and detail.
5. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA
A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES
A. For Each Product, Applied Material, and Finish:
1. Product data, with catalog number, size, composition, and color and texture designations.
2. Information for re-ordering custom manufactured products.
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.
D. Additional information as specified in individual product specification sections.
E. 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.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS
A. For Each Item of Equipment and Each System:
1. Description of unit or system, and component parts.
2. Identify function, normal operating characteristics, and limiting conditions.
3. Include performance curves, with engineering data and tests.
4. Complete nomenclature and model number of replaceable parts.
B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
D. Include color coded wiring diagrams as installed.
E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
G. Provide servicing and lubrication schedule, and list of lubricants required.
H. Include manufacturer's printed operation and maintenance instructions.
I. Include sequence of operation by controls manufacturer.
J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
K. Provide control diagrams by controls manufacturer as installed.
L. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.
M. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
N. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
O. Include test and balancing reports.
P. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS
A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
C. Binders: Commercial quality, 8-1/2 by 11 inch, three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
J. Arrangement of Contents: Organize each volume in parts as follows:
1. Project Directory.
2. Table of Contents, of all volumes, and of this volume.
3. Operation and Maintenance Data: Arranged by system, then by product category.
   a. Source data.
   b. Product data, shop drawings, and other submittals.
   c. Operation and maintenance data.
d. Field quality control data.
e. Photocopies of warranties and bonds.

4. Design Data: To allow for addition of design data furnished by Architect or others, provide a tab labeled “Design Data” and provide a binder large enough to allow for insertion of at least 20 pages of typed text.

3.06 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 Owner’s permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

END OF SECTION
SECTION 01 7900
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

1.02 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 Architect.
   2. Submit one copy to the Architect, not to be returned.
   3. Make commissioning submittals on time schedule specified by Architect.
   4. Submittals indicated as "Draft" are intended for the use of the Architect and Owner, in preparation of overall Training Plan; submit in editable electronic format, Microsoft Word.

1.03 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

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 Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
   1. Footings.
   2. Foundation walls.
   3. Slabs-on-grade.
   4. Suspended slabs.

1.3 DEFINITIONS
A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product indicated.
B. 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.
C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
   1. Location of construction joints is subject to approval of the Architect.
E. Samples: For waterstops vapor retarder.

1.5 INFORMATIONAL SUBMITTALS
A. Qualification Data: For manufacturer and testing agency.
B. Welding certificates.
C. 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. Fiber reinforcement.
6. Waterstops.
7. Curing compounds.
8. Floor and slab treatments.
10. Adhesives.
11. Vapor retarders.
12. Semirigid joint filler.

D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
   1. Aggregates.

E. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

F. Field quality-control reports.

G. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
   1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
   2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code - Reinforcing Steel."

F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
   1. ACI 301, "Specifications for Structural Concrete,"
   2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.7 DELIVERY, STORAGE, AND HANDLING
A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS
A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
   1. Plywood, metal, or other approved panel materials.
   2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
      a. High-density overlay, Class 1 or better.
      b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
      c. Structural 1, B-B or better; mill oiled and edge sealed.
      d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
C. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.
D. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
F. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
G. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
H. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
   1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
   2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
   3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.
2.2 STEEL REINFORCEMENT

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.


2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I/II., Supplement with the following:
   a. Fly Ash: ASTM C 618, Class F.
   b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Water: ASTM C 94.

2.5 ADMIXTURES

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494, Type A.
2. Retarding Admixture: ASTM C 494, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494, Type C.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Axim Italcementi Group, Inc.; CATEXOL CN-Cl.
   b. BASF Construction Chemicals - Building Systems; Rheocrete CNI.
   c. Euclid Chemical Company (The), an RPM company.;
   d. Grace Construction Products, W. R. Grace & Co.; DCI.
   e. Sika Corporation; Sika CNI.

D. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. BASF Construction Chemicals - Building Systems; Rheocrete 222+.
   b. Cortec Corporation; MCI-.
   c. Grace Construction Products, W. R. Grace & Co.; DCI-S.
   d. Sika Corporation; FerroGard 901.

2.6 WATERSTOPS

A. Flexible Rubber Waterstops: CE CRD-C 513, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Greenstreak.
   b. Williams Products, Inc.

2. Profile: Flat, dumbbell with center bulb.

2.7 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer’s recommended adhesive or pressure-sensitive tape.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   b. Fortifiber Building Systems Group; Moistop Ultra.
   d. Insulation Solutions, Inc.; Viper VaporCheck.
   e. Meadows, W. R., Inc.; Perminator.
   f. Raven Industries Inc.; Vapor Block.
   g. Reef Industries, Inc.; Griffolyn.
   h. Stego Industries, LLC; Stego Wrap.

   B. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils thick.

   C. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

   D. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch sieve, 10 to 30 percent passing a No. 100 sieve, and at least 5 percent passing No. 200 sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

2.8 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Axim Italcementi Group, Inc.; CATEXOL CimFilm.
      b. BASF Construction Chemicals - Building Systems; Confilm.
      c. ChemMasters; SprayFilm.
      d. Conspec by Dayton Superior; Aquafilm.
      e. Dayton Superior Corporation; Sure Film (J-74).
      f. Edoco by Dayton Superior; BurkeFilm.
      g. Euclid Chemical Company (The), an RPM company; Eucobar.
      h. Kaufman Products, Inc.; Vapor-Aid.
      i. Lambert Corporation; LAMBCO Skin.
      j. L&M Construction Chemicals, Inc.; E-CON.
      k. Meadows, W. R., Inc.; EVAPRE.
      l. Metalcrete Industries; Waterhold.
      m. Nox-crete Products Group; MONOFILM.
      n. Sika Corporation; SikaFilm.
      o. SpecChem, LLC; Spec Film.
      p. Symons by Dayton Superior; Finishing Aid.
      q. TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.
      r. Unitec; PRO-FILM.
      s. Vexcon Chemicals, Inc.; Certi-Vex Envio Set.

   B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

   C. Water: Potable.
2.9 RELATED MATERIALS


B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

C. Reglets: Fabricate reglets of not less than 0.022-inch-thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

D. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.10 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109.

2.11 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
5. Silica Fume: 10 percent.
6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.
   1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
   2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
   3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
   4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

E. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: 3000 psi at 28 days.
   2. Maximum Water-Cementitious Materials Ratio: 0.50.
   3. Slump Limit: 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
   4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

B. Foundation Walls: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: 3000 psi at 28 days.
   2. Maximum Water-Cementitious Materials Ratio: 0.50.
   3. Slump Limit: 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
   4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

C. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: 3000 psi at 28 days.
   3. Slump Limit: 4 inches, plus or minus 1 inch.
   4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

D. Suspended Slabs: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: 3000 psi at 28 days.
   3. Slump Limit: 4 inches, plus or minus 1 inch.
   4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
2.13 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.
   1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
   1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
   2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
   3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Construct forms tight enough to prevent loss of concrete mortar.

D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
   1. Install keyways, reglets, recesses, and the like, for easy removal.
   2. Do not use rust-stained steel form-facing material.

E. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

F. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

G. Chamfer exterior corners and edges of permanently exposed concrete.

H. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.

2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder according to manufacturer's written instructions.
3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
   1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
   1. Weld reinforcing bars according to AWS D1.4, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
   1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
   2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
   3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
   4. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
   5. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
   6. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
   1. Sawed Joints: Form 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 concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 07 9200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.7 WATERSTOPS
A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.
B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.8 CONCRETE PLACEMENT
A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
   1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
   1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
   2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
   3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.9 FINISHING FORMED SURFACES
A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view.

C. 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.

3.10 FINISHING FLOORS AND SLABS
A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots.
Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
   a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
   b. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
   c. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.
   d. Specified overall values of flatness, F(F) 45; and of levelness, F(L) 35; with minimum local values of flatness, F(F) 30; and of levelness, F(L) 24.

3. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft. long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.

3.11 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:
   1. Coordinate sizes and locations of concrete bases with actual equipment provided.
   2. Construct concrete bases 4 inches high unless otherwise indicated; and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
   3. Minimum Compressive Strength 3000 psi at 28 days.
   4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
   5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete substrate.
   6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.
D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.12 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
   a. Water.
   b. Continuous water-fog spray.
   c. Absorpive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorpitive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
   a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.13 JOINT FILLING
A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
   1. Defeer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.
B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS
A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
   1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
   2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
   3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
   1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
   2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.

5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

A. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

B. Inspections:
   1. Steel reinforcement placement.
   2. Steel reinforcement welding.
   3. Headed bolts and studs.
   4. Verification of use of required design mixture.
   5. Concrete placement, including conveying and depositing.
   6. Curing procedures and maintenance of curing temperature.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
   1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
   2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
   3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.

5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

   a. Cast and laboratory cure three sets of two standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C 39; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
   a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
   b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.

3.16 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 03 3000
SECTION 03 3511
CONCRETE FLOOR FINISHES

PART 1  GENERAL

1.01  SECTION INCLUDES
A. Surface treatments for concrete floors and slabs.

1.02  RELATED REQUIREMENTS
A. Section 03 3000 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing. Curing compounds that also function as sealers.

1.03  ADMINISTRATIVE REQUIREMENTS
A. Coordinate the work with concrete floor placement and concrete floor curing.

1.04  SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.
C. Maintenance Data: Provide data on maintenance and renewal of applied finishes.

1.05  MOCK-UP
A. For coatings, construct mock-up area under conditions similar to those that will exist during application, with coatings applied.
B. Mock-Up Size: 10 feet square.
C. Locate where directed.
D. Mock-up may remain as part of the work.

1.06  DELIVERY, STORAGE, AND HANDLING
A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.07  FIELD CONDITIONS
A. Maintain light level equivalent to a minimum 200 W light source at 8 feet above the floor surface over each 20 foot square area of floor being finished.
B. Do not finish floors until interior heating system is operational.
C. Maintain ambient temperature of 50 degrees F minimum.

PART 2  PRODUCTS

2.01  CONCRETE FLOOR FINISH APPLICATIONS
A. Unless otherwise indicated, all concrete floors are to be finished using liquid densifier/hardener.

2.02  SURFACE TREATMENTS
A. Troweling Aid, Densifier and Curing Agent: Liquid reactive colloidal silica-based topical treatment, spray-applied to wet concrete and floated or troweled into the surface.
   1. Product:
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.03  DENSIFIERS AND HARDENERS
A. Liquid Densifier/Hardener: Penetrating chemical compound that reacts with concrete, filling the pores and dustproofing; for application to concrete after set.
   1. Composition: Sodium silicate.
2. Products:
   b. Concrete Sealers USA; www.concretesealersusa.com.
   d. Euclid Chemical Company; EUCOSIL: www.euclidchemical.com/#sle.
   e. Euclid Chemical Company; EUCO DIAMOND HARD: www.euclidchemical.com/#sle.
   f. Kaufman Products Inc; Silicure: www.kaufmanproducts.net.
   g. Kaufman Products Inc; SureHard: www.kaufmanproducts.net.
   m. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that floor surfaces are acceptable to receive the work of this section.
   B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.02 GENERAL
   A. Apply materials in accordance with manufacturer's instructions.

3.03 COATING APPLICATION
   A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
   B. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.
   C. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.
   D. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.

3.04 CONCRETE POLISHING
   A. Execute using materials, equipment, and procedures specified by manufacturer, using manufacturer approved installer.
      1. Final Polished Sheen: Satin finish; other sheens are included as comparison to illustrate required sheen; final sheen is before addition of any sealer or coating, regardless of whether that is also specified or not.
      2. Satin Finish: Reflecting images from side lighting.
   B. Protect finished surface as required and as recommended by manufacturer of polishing system.
SECTION 04 2000
UNIT MASONRY

PART 1  GENERAL

1.01  SECTION INCLUDES
A. Concrete Block.
B. Common Brick.
C. Mortar and Grout.
D. Reinforcement and Anchorage.
E. Flashings.
F. Lintels.
G. Accessories.

1.02  RELATED REQUIREMENTS
A. Section 03 3000 - Concrete Reinforcing: Reinforcing steel for grouted masonry.
B. Section 05 5000 - Metal Fabrications: Loose steel lintels.
C. Section 06 1000 - Rough Carpentry: Nailing strips built into masonry.
D. Section 07 2100 - Thermal Insulation: Insulation for cavity spaces.
E. Section 07 6200 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.
F. Section 07 8400 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.
G. Section 07 9200 - Joint Sealants: Sealing control and expansion joints.

1.03  REFERENCE STANDARDS
J. ASTM C140 - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2016.


Y. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.


AA. BIA Technical Notes No. 9A – Specifications for and Classification of Brick. 2007.


1.04 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meeting: Convene a pre-installation meeting one week before starting work of this section; require attendance by all relevant installers.

1.05 SUBMITTALS

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

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

C. Samples: Submit six samples of masonry unit types that illustrate color, texture, and extremes of color range.

D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

E. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.

F. Test Reports: Concrete masonry manufacturer's test reports for units with integral water repellent admixture.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 6000 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.

1. Maintain one copy of each document on project site.

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

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least ten years of documented experience.
1.07 MOCK-UP
   A. Construct a masonry wall as a mock-up panel sized 8 feet long by 6 feet high; include mortar,
      accessories, structural backup, and flashings (with lap joint, corner, and end dam) in mock-up.
   B. Locate where directed.
   C. If mock-up is located within building configuration, it may remain as part of the Work if approved
      by Owner, Owner’s Representative and Architect.

1.08 DELIVERY, STORAGE, AND HANDLING
   A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and
      contamination by other materials.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS
   A. Concrete Block: Comply with referenced standards and as follows:
      1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths
         as indicated on the drawings for specific locations.
      2. Special Shapes: Provide non-standard blocks configured for corners.
      3. Load-Bearing Units: ASTM C90, normal weight.
         a. Hollow block, as indicated.
         a. Hollow block, as indicated.
         b. Lightweight.

2.02 BRICK UNITS
   A. Manufacturers:
      1. McAvoy Brick; www.mcavoybrick.com:
   B. Facing Brick: ASTM C216, Type FBS Smooth
      1. Size: Norman 2 ¼" x 11 5/8".
      2. Color: Two River Blend (Jamestown IS [90%] & Valley Forge IS [10%])

2.03 MORTAR AND GROUT MATERIALS
   A. Masonry Cement: ASTM C91, Type N.
   B. Portland Cement: ASTM C150, Type I; color as required to produce approved color sample.
   C. Hydrated Lime: ASTM C207, Type S.
   D. Mortar Aggregate: ASTM C144.
   E. Grout Aggregate: ASTM C404.
   F. Water: Clean and potable.
   G. Accelerating Admixture: Non-chloride type for use in cold weather.
   H. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity.
   I. Integral Water Repellent Admixture for Mortar and Grout: Polymeric liquid admixture added to
      mortar and grout at the time of manufacture.
      1. Use only in combination with masonry units manufactured with integral water repellent
         admixture.
      2. Use only water repellent admixture for mortar and grout from the same manufacturer as
         water repellent admixture in masonry units.
      3. Meet or exceed performance specified for water repellent admixture used in masonry
         units.
   J. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime,
      and sand; complying with ASTM C387 and capable of producing mortar of the specified
      strength in accordance with ASTM C270 with the addition of water only.
      1. Type: Type N.
2. Color: WR2906 Olde Colony
3. Manufacturers:
   a. Workrite Mortar; www.workrite-cements.com

K. Packaged Dry Material for Mortar for Repointing: Premixed Portland cement, hydrated lime, and graded sand; capable of producing Type O mortar in accordance with ASTM C270 with the addition of water only.
   1. Manufacturers
      a. Workrite Mortar; www.workrite-cements.com

L. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.
   1. Manufacturers:
      a. Workrite Mortar; www.workrite-cements.com

2.04 REINFORCEMENT AND ANCHORAGE

A. Manufacturers:
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi) deformed billet bars; galvanized.

C. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.

D. Single Wythe Joint Reinforcement: Truss or ladder type; ASTM A1064 steel wire, mill galvanized to ASTM A641, Class 3; 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.

E. Multiple Wythe Joint Reinforcement: Truss type; fabricated with moisture drip; ASTM A1064 steel wire, hot dip galvanized after fabrication to ASTM A153, Class B; 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.

F. Adjustable Multiple Wythe Joint Reinforcement: Truss type with adjustable ties or tabs spaced at 16 in on center and fabricated with moisture drip; ASTM A1064 steel wire, hot dip galvanized after fabrication to ASTM A153, Class B; 0.1875 inch side rods with 0.1483 inch cross rods and adjustable components of 0.1875 inch wire; width of components as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from each masonry face.
   1. Vertical adjustment: Not less than 2 inches.
   2. Seismic Feature: Provide lip, hook, or clip on extended leg of wall ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch diameter.
   3. Insulation Clips: Provide clips at tabs or ties designed to secure insulation against outer face of inner wythe of masonry.

G. 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, hot dip galvanized to ASTM A 153, Class B.

H. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.
1. Steel frame: Crimped wire anchors for welding to frame, 0.25 inch thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A153, Class B.

I. Wall Ties: Corrugated formed sheet metal, 7/8 inch wide by 0.05 inch thick, hot dip galvanized to ASTM A153, Class B, sized to provide not more than 1 inch and not less than 1 inch of mortar coverage from masonry face.

J. Two-Piece Wall Ties: Formed steel wire, 0.1875 inch thick, adjustable, eye and pintle type, hot dip galvanized to ASTM A153, Class B, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face and to allow vertical adjustment of up to 1-1/4 in.

K. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A153, Class B.
   1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
   2. Vertical adjustment: Not less than 3-1/2 inches.
   3. Seismic Feature: Provide lip, hook, or clip on end of wire ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch diameter.

L. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws; corrosion resistant finish or hot dip galvanized to ASTM A153.
   1. Manufacturers:
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.05 FLASHINGS

A. Metal Flashing Materials: Lead Coated Copper, as specified in Section 07 6200.

B. Plastic Flashings: Sheet polyolefin laminated to polypropylene; 40 mil thick.
   1. Manufacturers:
      b. Substitutions: See Section 01 6000 - Product Requirements.

C. Prefabricated Metal Flashing: Smooth fabricated 12 oz/sq ft lead-coated copper flashing for surface mounted conditions.
   1. Manufacturers:

D. Factory-Fabricated Flashing Corners and Ends: Lead coated copper.
   1. Manufacturers:
      b. Substitutions: See Section 01 6000 - Product Requirements.

E. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.
   1. Manufacturers, Synthetic Rubber Products:
      b. Substitutions: See Section 01 6000 - Product Requirements.
   2. Manufacturers, Modified Polyether Products:
      c. Substitutions: See Section 01 6000 - Product Requirements.

2.06 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
   1. Manufacturers:
B. Hohmann & Barnard, Inc; www.h-b.com/sle.
D. Substitutions: See Section 01 6000 - Product Requirements.

B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; in maximum lengths available.
1. Manufacturers:
   c. Substitutions: See Section 01 6000 - Product Requirements.

C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
1. Full-Height Airspace Maintenance and Drainage Material: Mesh panels, fitted between masonry ties.
   a. Manufacturers:
      2) CavClear/Archovations, Inc; CavClear Masonry Mat: www.cavclear.com.
      4) Substitutions: See Section 01 6000 - Product Requirements.

D. Building Paper: ASTM D226, Type I (“No.15”) asphalt felt.
E. Termination Bars: Stainless steel; compatible with membrane and adhesives.
F. Drip Edge: Stainless steel; compatible with membrane and adhesives.
G. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.

H. Weeps:
1. Type: Polyester mesh.
2. Manufacturers:
   d. Substitutions: See Section 01 6000 - Product Requirements.

I. Cavity Vents:
1. Type: Polyethylene tubing.
2. Manufacturers:
   b. Substitutions: See Section 01 6000 - Product Requirements.

J. Drainage Fabric: Polyester or polypropylene mesh.
1. Manufacturers:
   d. Substitutions: See Section 01 6000 - Product Requirements.

K. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.07 LINTELS
A. Precast Concrete Lintels: As indicated on structural drawings.
B. Prefabricated Steel Lintels:
1. Manufacturers: As indicated on structural drawings.
   b. Substitutions: See Section 01 6000 - Product Requirements.

2.08 MORTAR AND GROUT MIXES
   A. Mortar for Unit Masonry:  ASTM C270, using the Proportion Specification.
      1. Masonry below grade and in contact with earth:  Type S.
      2. Exterior, non-loadbearing masonry:  Type N.
      3. Interior, loadbearing masonry:  Type N.
      4. Interior, non-loadbearing masonry:  Type O.
   B. Grout:  ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less;  coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
   C. Admixtures:  Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.
   D. Mixing:  Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

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

3.02 PREPARATION
   A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
   B. Provide temporary bracing during installation of masonry work.  Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS
   A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
   B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

3.04 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.
   D. Brick Units:
      1. Bond:  Running.
      2. Coursing:  Three units and three mortar joints to equal 8 inches.
      3. Mortar Joints:  Match configuration of existing mortar..

3.05 PLACING AND BONDING
   A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
   B. Lay hollow masonry units with face shell bedding on head and bed joints.
   C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
   D. Remove excess mortar and mortar smears as work progresses.
E. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.

F. Interlock intersections and external corners, except for units laid in stack bond.

G. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

H. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

I. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.

J. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.06 WEEPS/CAVITY VENTS
A. Install weeps in veneer and cavity walls at 24 inches on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.

B. Install cavity vents in veneer and cavity walls at 32 inches on center horizontally below shelf angles and lintels and near top of walls.

3.07 CAVITY MORTAR CONTROL
A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.

B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.

C. Install cavity mortar control panels continuously throughout full height of exterior masonry cavities during construction of exterior wythe, complying with manufacturer's installation instructions. Verify that airspace width is no more than 3/8 inch greater than panel thickness. Install horizontally between joint reinforcement. Stagger end joints in adjacent rows. Fit to perimeter construction and penetrations without voids.

D. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.08 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.

3.09 REINFORCEMENT AND ANCHORAGE - SINGLE WYTHE MASONRY
A. Install horizontal joint reinforcement 8 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.

3.10 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER
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. Masonry Back-Up: Embed anchors to bond veneer at maximum 16 inches on center vertically and 36 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

F. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 24 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

G. Seismic Reinforcement: Connect veneer anchors with continuous horizontal wire reinforcement before embedding anchors in mortar.

3.11 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
   1. Extend flashings full width at such interruptions and at least 6 inches minimum, into adjacent masonry or turn up at least 8 inches), minimum, to form watertight pan at non-masonry construction.
   2. Remove or cover protrusions or sharp edges that could puncture flashings.
   3. Seal lapped ends and penetrations of flashing before covering with mortar.

B. Extend metal flashings to within 1/4 inch of exterior face of masonry.

C. Extend plastic, laminated, EPDM, and metal flashings to within 1/4 inch of exterior face of masonry.

D. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

3.12 LINTELS

A. Install precast concrete lintels over openings.

B. 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.

C. Maintain minimum 8 inch bearing on each side of opening.

3.13 GROUTED COMPONENTS

A. Reinforce bond beams with 2, No. 4 bars, 1 inch from bottom web, unless otherwise noted.

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.

E. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.14 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.
B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
C. Size control joints as indicated on drawings; if not shown, 3/4 inch wide and deep.
D. Form expansion joint as detailed on drawings.

3.15 BUILT-IN WORK
A. As work progresses, install built-in metal door frames and other items to be built into the work and furnished under other sections.
B. Install built-in items plumb, level, and true to line.
C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
   1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
D. Do not build into masonry construction organic materials that are subject to deterioration.

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

3.17 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.

3.18 PARGING
A. Dampen masonry walls prior to parging.
B. Scarify each parging coat to ensure full bond to subsequent coat.
C. Where indicated on drawings, parge masonry walls in two uniform coats of mortar to a total thickness of 3/4 inch.
D. Steel trowel surface smooth and flat with a maximum surface variation of 1/8 inch per foot.
E. Strike top edge of parging at 45 degrees.

3.19 FIELD QUALITY CONTROL
A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.
B. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140 for conformance to requirements of this specification.
C. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

3.20 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.

3.21 PROTECTION

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

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES

A. Calcium silicate masonry units.

1.02 RELATED SECTIONS

A. Section 04 8500 – Masonry Anchors & Accessories
B. Section 07 9500 – Joint Sealants.

1.03 REFERENCES

A. TMS 402 ACI 530-/ASCE 5-Building Code Requirements for Masonry Structures.
B. TMS 602/ACI 530.1/ASCE 6, Specifications for Masonry Structures.
C. ASTM C73-Standard Specification for Calcium Silicate Face Brick.

1.04 SAMPLES

A. Samples: Three full size samples, illustrating color and texture.

1.05 TEST REPORTS

A. Submit test reports as specified.
B. Test Reports: test results prepared by an independent testing agency, indicating tested material characteristics as part of a source quality control program, current within the past five (5) years.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: manufacturer having sufficient plant facilities to produce the shapes, quantities and size of Products required in accordance with the project schedule.
B. Installer: Company or person specializing in commercial masonry work with five years documented experience.
C. Mock-up: Supply sufficient quantity of full size calcium silicate masonry units for use in constructing mock-up panel, as specified.

1.07 DELIVERY, STORAGE AND HANDLING

A. Refer to Section 01 1000 and 01 6000.
B. Deliver calcium silicate masonry units in protective film. Prevent damage to units.
C. Lift skids with proper and sufficiently long slings or forks with protection to prevent damage to units. Protect edges and corners.
D. Store units in a manner designed to prevent damage and staining of units.
E. Stack units on timbers or platforms at least 3 inches above grade.

F. Place polyethylene or other plastic film between wood and other finished surfaces of units when stored for extended periods of time.

G. Cover stored units with protective enclosure if exposed to weather.

H. Do not use salt or calcium-chloride to remove ice from masonry surfaces.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Refer to Section 04 2000.

B. Conform to requirements of ACI 530.1/ASCE 6/TMS 602, Specifications for Masonry Structures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers of calcium silicate masonry units having Products considered acceptable for use:

2.02 MATERIALS

A. Calcium Silicate Masonry Units (Georgia): to ASTM C73, Grade SW; solid units that have been pressure formed and autoclaved; 3-5/8" bed depth; special shapes as indicated; and as follows:
   1. Modular Size: 7-5/8" high, 23-5/8" long, 5-1/8" with a chamfer as indicated on Drawings;
   2. Texture: smooth finish on exposed faces and ends;
   3. Color: as selected by Architect;


C. Grout: maximum 6,500 psi at 28 days.

D. Wall Ties and Anchorages: as specified

E. Joint Sealants and Backer Rods: non-staining type, as specified.

F. Flashing, Vents, and Masonry Accessories: as specified.

2.03 FABRICATION TOLERANCES

A. Fabricate calcium silicate masonry units to the following tolerances:
   1. Unit Length: plus or minus 1/16".
   2. Unit Height: plus or minus 1/16".
   3. Deviation from Square: plus or minus 1/16", with measurement taken using the longest edge as the base.
   4. Bed Depth: plus or minus 1/8".
   5. Custom Unit Dimensions: plus or minus 1/8".
2.04 SOURCE QUALITY CONTROL
A. Test calcium silicate masonry units as specified in Section 01 1000 or 01 4000.
B. Test compressive strength and absorption from specimens selected at random from plant production.

PART 3 EXECUTION
3.01 EXAMINATION
A. Verify site conditions are ready to receive work.
B. Inspect materials for fit and finish prior to installation. Do not set unacceptable units.
C. Beginning of installation means acceptance of existing conditions.

3.02 CUTTING MASONRY UNITS
A. Cut masonry units with wet-saw.
B. Pre-soak units using clean water prior to cutting.
C. Clean cut units using a stiff fiber brush and clean water. Allow units to surface dry prior to placement.
D. Finish cut edges to match face when exposed in wall.

3.03 WETTING MASONRY UNITS
A. Where the ambient air temperature exceeds 100°F or exceeds 90°F with a wind velocity greater than 8 mph, pre-wet masonry units.
B. Lay wetted units when surface dry.

3.04 COURSING
A. Place masonry to lines and levels indicated.
B. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.
C. Lay masonry units to match existing coursing (third-running) bond.
D. Course one masonry unit and one mortar joint to match existing.
E. Maintain mortar joint thickness of 3/8 inch.
F. Tool joints when thumbprint hard, to a concave finish (to match existing).

3.05 PLACING AND BONDING
A. Lay masonry in full bed of mortar, properly jointed with other work. Buttering corners of joints, and deep or excessive furrowing of mortar joints are not permitted.
B. Fully bond intersections, and external corners.
C. Do not adjust masonry units after laying. Where resetting of masonry is required, remove, clean units and reset in new mortar.
D. Install loose steel lintels as scheduled.
E. Install wall ties and anchorages as specified in Section 04 8500.
F. Install flashings, vents, and masonry accessories as specified in Section 04 8500.
G. Construct movement joints as indicated on drawings.

3.06 SITE TOLERANCES

A. Erect masonry within the tolerances described in TMS 602/ACI 530.1/ASCE 6, Specifications for Masonry Structures, PART 3.3G.

3.07 FIELD QUALITY CONTROL

A. Perform inspection and testing as specified.

B. Architect Inspection: Architect will inspect installed masonry and reject masonry that is chipped, cracked, or blemished (streaked, stained or otherwise damaged), as described below.
   1. Masonry will be inspected to be free of cracks or other blemishes on the finished face or front edges of the masonry units exceeding 3/8 inch or that can be seen from a distance of 10 feet.
   2. Units shall exhibit a texture approximately equal to the approved sample when viewed under diffused daylight illumination at a 20 foot distance.
   3. Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips shall not be obvious under diffused daylight illumination from a 20 foot distance.
   4. Efflorescence will not be cause for rejection.

C. Make Good rejected masonry as directed by Architect.

3.08 ADJUSTING AND CLEANING

A. Repair chips on smooth finished units with patch kits furnished by manufacturer.

B. Clean masonry units as specified in Section 04 2000.

C. Use alternative cleaning solutions and methods for difficult to clean masonry only after consultation with masonry unit manufacturer.

3.09 PROTECTION

A. Protect units from damage resulting from subsequent construction operations.

B. Use protection materials and methods which will not stain or damage units.

C. Remove protection materials upon Substantial Completion, or when risk of damage is no longer present.
SECTION 04 8500
MASONRY ANCHORS AND ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Masonry veneer anchors and ties.

1.2 RELATED SECTIONS

A. Section 04 2000 - Unit Masonry

1.3 REFERENCES


1.4 SUBMITTALS

A. Submit under provisions of Section 01 3000.

B. Product Data: Manufacturer's data on each type of product furnished.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Basis for Design:: Heckmann Building Products Inc.,
   1501 N. 31st Avenue, Melrose Park, IL 60160
   800-621-4140 or 708-865-2403 FAX: 708-865-2640
   Email: info@heckmannanchors.com
   Website: www.heckmannanchors.com.

B. Requests for substitutions will be considered in accordance with provisions of Section 01 6000.

C. Substitutions: Not permitted.

2.2 APPLICATIONS

A. Provide anchoring systems that comply with ACI 530.1/ASCE 6/TMS 602.

B. Masonry Anchors:

   1. Anchors to Concrete: No. 75: Heckmann "Pos-I-Tie®" Concrete/CMU Screw.
   2. Anchors to Masonry Backup: No. 75: Heckmann "Pos-Itie ®" Concrete/CMU Screw.
   4. Anchors to Structural Steel: No. 75: Heckmann "Pos-ITie®" Dril-It® Screw.
   5. Anchors to Wood Stud Backup: No. 75: Heckmann "Pos-ITie®" Concrete/CMU Screw.
C. **Pos-I-Tie® Thermal Clip:**

1. One-Piece Snap-On Proprietary plastic clip for barrel loop of Original Pos-I-Tie® to create a thermal break between the wire tie in veneer and the barrel in the backup. (Optional)

D. **Masonry Ties:**

1. Masonry Veneer Ties: Provide minimum 2 inches embedment in mortar.
   - Wire 3/16 inch diameter x Length
2. For use with original Pos-I-Tie® without thermal clip
   - No. 75 Pos-I-Tie® Triangle Wire Tie
   - No. 75 Pos-I-Tie® Single Wire Tie
3. For use with Original Pos-I-Tie® with thermal clip
   - No. 282-N Pintle Wire Tie for Thermal Clips
4. Other Applications: Where details or installation conditions require, provide ties fabricated of shape and size to suit conditions and provide adequate anchorage.
5. Masonry Veneer Seismic Ties: Continuous wire in mortar joint, anchored to Pos-I-Tie® Triangle Tie with welded No. 370 Seismic clip.

E. Material for Ties in Exterior Walls: Stainless steel.

F. Material for Ties in Exterior Walls: Hot-dip galvanized.

G. Material for Ties Exposed to Air in Exterior Walls: Hotdip galvanized.

### 2.3 MATERIALS

A. Barrel Materials

Heckmann "No. 75 Pos-I-Tie®": One-Piece Screw consisting of a 92% Zamac 2 Zinc barrel 3/8” in diameter, washer, flanged head and eye to receive Pos-I-Tie® wire tie; designed to seat barrel directly on structural portion of backup, with flanged head covering fastener hole.

1. Provide barrel shaft length 3 inch, and screws to suit substrate.

B. Wire Tie Materials

1. Stainless Steel: Type 304.
   - Wire: 3/16 inch diameter ASTM A 580.
   - Wire: 3/16 inch diameter.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

A. **Pos-I-Tie® Screws**

1. **Self-Drilling Screw:** Use a standard drill with a variable clutch adjustment and a Pos-I-Tie® Chuck Adapter. Place the barrel end of the screw in the chuck adapter; drill through the gypsum board and into the metal stud.

2. **Concrete/CMU Screw:** Use a standard hammer drill and a Pos-I-Tie® Sleeve Tool with a Pos-I-Tie Chuck Adapter on the end. Set Drill to Hammer, slide off the chuck adapter sleeve and drill a 2" deep hole into the backup with a 3/16" masonry drill bit. Replace the sleeve/chuck adapter, switch the hammer mode off, and place the barrel end of the screw in the chuck adapter. Drill the screw into the hole.
3. Dril-It® Screw: Use a standard drill with a variable clutch adjustment and a Pos-I-Tie® Chuck Adapter. Place the barrel end of the screw in the chuck adapter, and drill the screw into the structural member. (Some structural steel may require predrilling a pilot hole).

B. Thermal Clips
   1. From the underside of the barrel loop, insert the tab of the thermal clip into the barrel loop and fold until you hear the distinct “snap” of the engagement.

C. Wire Ties
   1. Configure ties to prevent flow of water to anchor and to transfer lateral loads without excess mechanical play or deformation.

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 Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Structural steel.
   2. Field-installed shear connectors.

B. Related Requirements:
   1. Section 05 3100 "Steel Decking" for field installation of shear connectors through deck.
   2. Section 05 5000 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame.
   3. Section 09 9000 "Painting and Coating"

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.

C. Protected Zone: Structural members or portions of structural members indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.

D. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.4 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
B. Coordinate installation of 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.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. Identify members and connections of the Seismic-Load-Resisting System.
6. Indicate locations and dimensions of protected zones.
7. Identify demand critical welds.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand critical welds.

D. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer in the state of New Jersey responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installer and fabricator testing agency.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural steel, including chemical and physical properties.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shear stud connectors.
5. Shop primers.

F. Source quality-control reports.
G. Field quality-control and special inspection reports.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector.

C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 or to SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

E. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.
PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, in the state of New Jersey, to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC 360.
2. Use Allowable Stress Design; data are given at service-load level.

B. Moment Connections: Type FR, fully restrained.

C. Construction: Special Steel, Moment frame.

2.2 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M.

B. Channels, Angles-Shapes: ASTM A 36.

C. Plate and Bar: ASTM A 36.

D. Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

E. Steel Pipe: ASTM A 53, Type E or Type S, Grade B.

1. Weight Class: Standard.
2. Finish: Black except where indicated to be galvanized.

F. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.

B. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.

1. Finish: Hot-dip or mechanically deposited zinc coating.
2. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with mechanically deposited zinc coating finish.

C. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.
D. Unheaded Anchor Rods: ASTM F 1554, and Grade 36 ASTM F 1554, Grade 55, weldable.
   4. Washers: ASTM F 436, Type 1, hardened carbon steel.
   5. Finish: Plain.

E. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
   3. Washers: ASTM F 436, Type 1, hardened carbon steel.

   2. Washers: ASTM F 436, Type 1, hardened carbon steel.
   3. Finish: Plain.

G. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.


2.4 PRIMER
A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Primer: Comply with Section 09 9000 "Painting and Coating".

C. Primer: SSPC-Paint 25, Type I, zinc oxide, alkyd, linseed oil primer.

D. Primer: SSPC-Paint 23, latex primer.

E. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

F. Galvanizing Repair Paint: ASTM A 780.

2.5 GROUT
A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
2.6 FABRICATION


1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning."

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Welded Door Frames: Build up welded door frames attached to structural-steel frame. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches o.c. unless otherwise indicated.

H. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.7 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened or Pretensioned as required for moment connections.

B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.8 SHOp PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
4. Surfaces to receive sprayed fire-resistant materials (applied fireproofing).
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
5. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning."
6. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
7. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
8. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
9. SSPC-SP 8, "Pickling."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

2.9 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123.

1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize lintels and shelf angles attached to structural-steel frame and located in exterior walls.
### 2.10 SOURCE QUALITY CONTROL

A. **Testing Agency:** Engage a qualified testing agency to perform shop tests and inspections.

   1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. **Bolted Connections:** Inspect and test shop-bolted connections according to RCSC’s "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. **Welded Connections:** Visually inspect shop-welded connections according to AWS D1.1 and the following inspection procedures, at testing agency's option:
   1. Liquid Penetrant Inspection: ASTM E 165.
   2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
   4. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:
   1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
   2. Conduct tests according to requirements in AWS D1.1 on additional shear connectors if weld fracture occurs on shear connectors already tested.

E. Prepare test and inspection reports.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

   1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 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.

   1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.
3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

   1. Set plates for structural members on wedges, shims, or setting nuts as required.
   2. Weld plate washers to top of baseplate.
   3. Snug-tighten Pretension 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 plate before packing with grout.
   4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure.

C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
   1. Level and plumb individual members of structure.
   2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Snug tightened Pretensioned as required for moment connections.

B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
   1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
   2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Visually inspect field welds according to AWS D1.1.

   1. In addition to visual inspection, test and inspect field welds according to AWS D1.1 and the following inspection procedures, at testing agency’s option:
      a. Liquid Penetrant Inspection: ASTM E 165.
      b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
      c. Ultrasonic Inspection: ASTM E 164.
      d. Radiographic Inspection: ASTM E 94.

E. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:

   1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
   2. Conduct tests according to requirements in AWS D1.1 on additional shear connectors if weld fracture occurs on shear connectors already tested.

3.6 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

   1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

C. Touchup Painting: Cleaning and touchup painting are specified in Section 09 9000 "Painting and Coating".

END OF SECTION 05 1200
SECTION 05 3100
STEEL DECKING

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. Roof deck.
   2. Composite floor deck.
B. Related Requirements:
   1. Section 03 3000 "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
   2. Section 05 1200 "Structural Steel Framing" for shop- and field-welded shear connectors.
   3. Section 05 5000 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
   4. Section 09 9000 "Painting and Coating" for repair painting of primed deck and finish painting of deck.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of deck, accessory, and product indicated.
B. LEED Submittals:
   1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Laboratory Test Reports for Credit EQ 4: For primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
C. Shop Drawings:
   1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS
A. Welding certificates.
B. Product Certificates: For each type of steel deck.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
   1. Power-actuated mechanical fasteners.
   2. Acoustical roof deck.

D. Evaluation Reports: For steel deck.

E. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

C. Electrical Raceway Units: Provide UL-labeled cellular floor-deck units complying with UL 209 and listed in UL’s "Electrical Construction Equipment Directory" for use with standard header ducts and outlets for electrical distribution systems.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.
   1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

C. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
2.2 ROOF DECK

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ASC Profiles, Inc.; a Blue Scope Steel company.
2. Canam United States; Canam Group Inc.
3. CMC Joist & Deck.
5. Cordeck.
6. DACS, Inc.
8. Marlyn Steel Decks, Inc.
9. New Millennium Building Systems, LLC.
11. Roof Deck, Inc.
12. Valley Joist; Subsidiary of EBSCO Industries, Inc.
14. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:

1. Galvanized-Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 33, G60 zinc coating.
2. Deck Profile: Type WR, wide rib.
3. Profile Depth: As indicated.
4. Design Uncoated-Steel Thickness: As indicated.
5. Span Condition: Triple span or more.
6. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.3 COMPOSITE FLOOR DECK

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ASC Profiles, Inc.; a Blue Scope Steel company.
2. Canam United States; Canam Group Inc.
3. CMC Joist & Deck.
5. Cordeck.
6. DACS, Inc.
8. Marlyn Steel Decks, Inc.
9. New Millennium Building Systems, LLC.
11. Roof Deck, Inc.
13. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

B. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
1. Galvanized-Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 40, G60 zinc coating.
2. Profile Depth: As indicated on plans.
3. Design Uncoated-Steel Thickness: As indicated on plans.
4. Span Condition: Triple span or more.

2.4 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.

I. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick, with factory-punched hole of 3/8-inch minimum diameter.

J. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.

K. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch-wide flanges and level recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.

L. Galvanizing Repair Paint: ASTM A 780.

M. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:

2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds 12 inches apart in the field of roof and 6 inches apart in roof corners and perimeter, based on roof-area definitions in FMG Loss Prevention Data Sheet 1-28.
3. Weld Washers: Install weld washers at each weld location.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 18 inches, and as follows:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
2. Mechanically clinch or button punch.
3. Fasten with a minimum of 1-1/2-inch-long welds.
C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:

1. End Joints: Lapped 2 inches minimum.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches apart with at least one fastener at each corner.

1. Install reinforcing channels or zees in ribs to span between supports and weld or mechanically fasten.

E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 FLOOR-DECK INSTALLATION

A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:

2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches apart.
3. Weld Spacing: Space and locate welds as indicated.
4. Weld Washers: Install weld washers at each weld location.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches, and as follows:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
2. Mechanically clinch or button punch.
3. Fasten with a minimum of 1-1/2-inch-long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:

1. End Joints: Lapped.

D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.

E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.
3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor’s expense, will be performed to determine compliance of corrected work with specified requirements.

3.6 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A780 and manufacturer’s written instructions.

B. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 09 9000 “Painting and Coating”.

C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 3100
SECTION 05 4000
COLD-FORMED METAL FRAMING

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. Load-bearing wall framing.
2. Exterior non-load-bearing wall framing.
3. Roof rafter framing.
4. Soffit framing.

B. Related Requirements:

1. Section 05 5000 "Metal Fabrications" for masonry shelf angles and connections.
2. Section 09 2116 "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of cold-formed steel framing product and accessory.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Delegated-Design Submittal: For cold-formed steel framing.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.

1. Steel sheet.
Two River Theater  
Additions and Alterations

2. Expansion anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

D. Research Reports: For non-standard cold-formed steel framing, from ICC-ES.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1, "Structural Welding Code - Steel."
   2. AWS D1.3, "Structural Welding Code - Sheet Steel."

D. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. ClarkWestern Building Systems, Inc.
   2. Dietrich Metal Framing; a Worthington Industries Company.
   3. MarinoWARE.
   4. SCAFCO Corporation.
   5. Steel Network, Inc. (The).

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, in the state of New Jersey, as defined in Section 01 4000 "Quality Requirements," to design cold-formed steel framing.
B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on plans.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
   a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/600 of the wall height.
   b. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/600.
   c. Roof Rafter Framing: Vertical deflection of 1/240 of the horizontally projected span for live loads.
3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
   a. Upward and downward movement of 1/2 inch.
5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Cold-Formed Steel Framing Design Standards:

2. Wall Studs: AISI S211.
3. Headers: AISI S212.

D. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

E. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.3 COLD-FORMED STEEL FRAMING, GENERAL

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: As required by structural performance.
2. Coating: G60

B. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.
2. Coating: G60.

2.4 LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: 0.0428 inch.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:
   1. Minimum Base-Metal Thickness: 0.0428 inch.

C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: 0.0428 inch.

2.5 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: 0.0428 inch.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: 0.0428 inch.

C. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. ClarkWestern Building Systems, Inc.
      b. Dietrich Metal Framing; a Worthington Industries company.
      c. MarinoWARE.
      d. Steel Network, Inc. (The).

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
1. Minimum Base-Metal Thickness: 0.0677 inch.
2. Flange Width: 1 inch plus the design gap for one-story structures.

### 2.6 ROOF-RAFTER FRAMING

A. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch.

### 2.7 SOFFIT FRAMING

A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.

### 2.8 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
9. Joist hangers and end closures.

### 2.9 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36, zinc coated by hot-dip process according to ASTM A 123.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153, Class C.J.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
   1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.10 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780.

B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.

D. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.11 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
   1. Fabricate framing assemblies using jigs or templates.
   2. Cut framing members by sawing or shearing; do not torch cut.
   3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.
   4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistant materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.
C. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
B. Install cold-formed steel framing according to AISI S200 and to manufacturer’s written instructions unless more stringent requirements are indicated.
C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
   1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
   a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
   b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

H. Install insulation, specified in Section 07 2100 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

J. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 LOAD-BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:

1. Anchor Spacing: To match stud spacing.

B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:


C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.
D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.

F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.

2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.

1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.

I. Install horizontal bridging in stud system, spaced vertically as indicated on Shop Drawings. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches deep.

2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

C.  Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D.  Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1.  Install single deep-leg deflection tracks and anchor to building structure.
2.  Install double deep-leg deflection tracks and anchor outer track to building structure.
3.  Connect vertical deflection clips to bypassing studs and anchor to building structure.
4.  Connect drift clips to cold-formed metal framing and anchor to building structure.

E.  Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1.  Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
   a.  Install solid blocking at 96-inch centers.
2.  Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
3.  Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
4.  Bridging: Proprietary bridging bars installed according to manufacturer’s written instructions.

F.  Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.6  JOIST INSTALLATION

A.  Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.

B.  Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.

1.  Install joists over supporting frame with a minimum end bearing of 1-1/2 inches.
2.  Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.

C.  Space joists not more than 2 inches from abutting walls, and as follows:

1.  Joist Spacing:  16 inches As indicated.

D.  Frame openings with built-up joist headers consisting of joist and joist track, or another combination of connected joists if indicated.
E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on Shop Drawings.

1. Install web stiffeners to transfer axial loads of walls above.

F. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each joist intersection as follows:

1. Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.

G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.

H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.7 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 4000
SECTION 05 5000
METAL FABRICATIONS

PART 1  GENERAL

1.01  SECTION INCLUDES
A. Shop fabricated steel and aluminum items.
B. Prefabricated ladders and ship ladders.

1.02  RELATED REQUIREMENTS
A. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.
B. Section 05 1200 - Structural Steel Framing: Structural steel column anchor bolts.
C. Section 05 4000 – Cold Formed Metal Framing: Structural joist bearing plates, including anchorage.
D. Section 05 3100 - Steel Decking: Bearing plates for metal deck bearing, including anchorage.
E. Section 05 5100 - Metal Stairs.
F. Section 05 5213 - Pipe and Tube Railings.
G. Section 07 7123 - Manufactured Gutters and Downspouts: Downspout boots.

1.03  REFERENCE STANDARDS
B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2013.
K. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
M. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
T. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
V. AWS D1.2 - Structural Welding Code - Aluminum; 2008.
W. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc; 2011.
X. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. 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.
C. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.
D. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.05 QUALITY ASSURANCE
A. Design shall be under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.
B. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172 with documented experience for a minimum of five years.

PART 2 PRODUCTS
2.01 MATERIALS - STEEL
A. Steel Sections: ASTM A36.
B. Steel Tubing: ASTM A501 hot-formed structural tubing.
C. Plates: ASTM A283.
D. Pipe: ASTM A53, Grade B Schedule 40, black finish.
E. Slotted Channel Framing: ASTM A653, Grade 33.
F. Slotted Channel Fittings: ASTM A1011.
G. Bolts, Nuts, and Washers: plain.
H. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
I. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.
2.02 MATERIALS - ALUMINUM
   A. Extruded Aluminum: ASTM B221, 6063 alloy, T6 temper.
   B. Sheet Aluminum: ASTM B209, 5052 alloy, H32 or H22 temper.
   C. Bolts, Nuts, and Washers: Stainless steel.
   D. Welding Materials: AWS D1.2; type required for materials being welded.

2.03 FABRICATION
   A. Fit and shop assemble items in largest practical sections, for delivery to site.
   B. Fabricate items with joints tightly fitted and secured.
   C. Continuously seal joined members by intermittent welds and plastic filler.
   D. 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.
   E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
   F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FABRICATED ITEMS
   A. Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; prime paint finish.
     1. Side Rails: 3/8 x 2 inches members spaced at 20 inches.
     2. Rungs: one inch diameter solid round bar spaced 12 inches on center.
     3. Space rungs 7 inches from wall surface.
   B. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
   C. Joist Hangers: Strap anchors, fabricated with sheet steel, 18 gage, 0.0478 inch minimum base metal thickness; galvanized finish.
   D. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking; prime paint finish.
   E. Lintels: As detailed; prime paint finish.
   F. Door Frames for Overhead Door Openings, Wall Openings, and Door Openings: Channel sections; prime paint finish.
   G. Recessed Mat Frames: As detailed; steel, galvanized finish.
   H. Elevator Hoistway Divider Beams: Beam sections; prime paint finish.
   I. Slotted Channel Framing: Fabricate channels and fittings from structural steel complying with the referenced standards; factory-applied, rust-inhibiting thermoset acrylic enamel finish.

2.05 DOWNSPOUT BOOTS
   A. Downspout Boots: Smooth interior without boxed corners or choke points; include integral lug slots, integral cleanout, cleanout cover, and tamper proof fasteners.
     2. Material: Cast iron; ASTM A48; casting thickness 3/8 inch, minimum.
     3. Finish: Manufacturer's standard factory applied powder coat finish.
     4. Color: To be selected by Architect from manufacturer's standard range.
     5. Accessories: Manufacturer's standard stainless steel fasteners, stainless steel building wall anchors, integral neoprene gaskets, and rubber coupling.

6. Manufacturers:
c. Substitutions: See Section 01 6000 - Product Requirements.

2.06 FINISHES - STEEL
A. Prime paint steel items.
   1. Exceptions: Galvanize items to be embedded in concrete, items to be imbedded in masonry, and items specified for powder coated finish.
   2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
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: Two coats.
E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123 requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123 requirements.

2.07 FINISHES - ALUMINUM
A. High Performance Organic Coating System: AAMA 2604 multiple coat, thermally cured fluoropolymer system; color as scheduled.
   1. Manufacturers:
      b. Substitutions: See Section 01 6000 - Product Requirements.
B. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

2.08 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
3.01 EXAMINATION
A. Verify that field conditions are acceptable and are ready to receive work.

3.02 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.

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

3.04 TOLERANCES

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

END OF SECTION
SECTION 05 5100
METAL STAIRS

PART 1  GENERAL

1.01  SECTION INCLUDES
A. Stairs with concrete treads.
B. Structural steel stair framing and supports.
C. Handrails and guards.

1.02  RELATED REQUIREMENTS
A. Section 03 3000 - Cast-in-Place Concrete: Concrete fill in stair pans; mesh reinforcement for landings.
B. Section 03 3000 - Cast-in-Place Concrete: Placement of metal anchors in concrete.
C. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.
D. Section 05 5000 - Metal Fabrications.
E. Section 05 5213 - Pipe and Tube Railings: Metal handrails for the stairs specified in this section.
F. Section 09 9000 – Painting and Coating: Paint finish.

1.03  REFERENCE STANDARDS
G. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
I. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
M. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
Q. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
   2. Include the design engineer's stamp or seal on each sheet of shop drawings.
C. Delegated Design Data: As required by authorities having jurisdiction.
D. Welders' Certificates.
E. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is certified under AISC 201.

1.05 QUALITY ASSURANCE
A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.
B. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.
C. Fabricator Qualifications:
   1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.
   2. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

PART 2 PRODUCTS
2.01 MANUFACTURERS
A. Factory Fabricated Stair Treads and Nosings:
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 METAL STAIRS - GENERAL
A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
   1. Regulatory Requirements: Provide stairs and railings complying with the most stringent requirements of local, state, and federal regulations; where requirements of the contract documents exceed those of regulations, comply with the contract documents.
   2. Handrails: Comply with applicable accessibility requirements of ADA Standards.
   3. Structural Design: Provide complete stair and railing assemblies complying with the applicable local code.
      a. Stair Capacity: Uniform live load of 100 lb/sq ft and a concentrated load of 300 lb with deflection of stringer or landing framing not to exceed 1/360 of span.
      b. Railing Assemblies: Comply with ASTM E985.
   4. Dimensions: As indicated on drawings.
   5. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
   6. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
   7. Separate dissimilar metals using paint or permanent tape.
B. Metal Jointing and Finish Quality Levels:
   1. Commercial: Exposed joints as inconspicuous as possible, whether welded or mechanical; underside of stair not covered by soffit IS considered exposed to view.
      a. Welded Joints: Intermittently welded on back side, filled with body putty, and sanded smooth and flush.
      b. Welds Exposed to View: Ground smooth and flush.
      c. Mechanical Joints: Butted tight, flush, and hairline.
      d. Bolts Exposed to View: Countersunk flat or oval head bolts; no exposed nuts.
      e. Exposed Edges and Corners: Eased to small uniform radius.
      f. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for satin or matte finish.
   C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
   D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.03 METAL STAIRS WITH CONCRETE TREADS
   A. Jointing and Finish Quality Level: Commercial, as defined above.
   B. Risers: Closed.
   C. Treads: Metal pan with precast concrete tread.
      1. Precast Concrete Tread Thickness: 1-1/2 inches, minimum.
      2. Precast Concrete Treads:
         a. Concrete Strength: 5,000 psi at 28 days, minimum.
         b. Air Content: 4 to 6 percent.
         c. Cement Color: Natural gray.
         d. Aggregate Color: As required to make finished product match Architect's sample.
         e. Abrasive Strip: Contrasting color, embedded into surface 1/2 inch back of point of nosing.
         f. Anchorage to Tread Pan: Epoxy adhesive.
      3. Tread Pan Material: Steel sheet.
      4. Tread Pan Thickness: As required by design; 14 gage, 0.075 inch minimum.
      5. Pan Anchorage to Stringers: Continuously welded, from top or bottom.
      6. Concrete Finish: For resilient floor covering.
   D. Risers: Same material and thickness as tread pans.
      1. Riser/Nosing Profile: Sloped riser with rounded nosing of minimum radius.
      2. Nosing Depth: Not more than 1-1/2 inch overhang.
   E. Stringers: Rolled steel channels.
      1. Stringer Depth: 10 inches.
      2. End Closure: Sheet steel of same thickness as risers welded across ends.
   F. Landings: Same construction as treads, supported and reinforced as required to achieve design load capacity.
   G. Railings: Steel pipe railings.

2.04 HANDRAILS AND GUARDS
   A. Wall-Mounted Rails: Round pipe or tube rails unless otherwise indicated.
      1. Outside Diameter: 1-1/4 inch, minimum, to 1-1/2 inches, maximum.
   B. Guards:
      1. Top Rails: Round pipe or tube rails unless otherwise indicated.
         a. Outside Diameter: 1-1/4 inch, minimum, to 1-1/2 inches, maximum.
      2. Infill at Picket Railings: Vertical pickets.
         a. Horizontal Spacing: Maximum 4 inches on center.
         b. Material: Solid steel bar.
c. Shape: Square.
d. Size: 1/4 inch square.
e. Top Mounting: Welded to underside of top rail.
f. Bottom Mounting: Welded to top surface of stringer.

3. End and Intermediate Posts: Same material and size as top rails.
a. Horizontal Spacing: As indicated on drawings.
b. Mounting: Welded to top surface of stringer.

2.05 MATERIALS
A. Steel Sections: ASTM A36.
B. Steel Tubing: ASTM A500 or ASTM A501 structural tubing, round and shapes as indicated.
C. Steel Plates: ASTM A6 or ASTM A283.
D. Pipe: ASTM A53, Grade B Schedule 40, black finish.
E. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
   1. Hot-Rolled Steel Sheet: ASTM A1011, Designation CS (commercial steel).
   2. Cold-Rolled Steel Sheet: ASTM A1008, Designation CS (commercial steel).
F. Galvanized Steel Sheet: ASTM A653, Structural Steel (SS) Grade 33/230 with G40/Z120 coating.

2.06 ACCESSORIES
A. Steel Bolts, Nuts, and Washers: ASTM A325, Type 1, and galvanized to ASTM A153 where connecting galvanized components.
B. Welding Materials: AWS D1.1; type required for materials being welded.
C. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
D. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.07 SHOP FINISHING
A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
B. Do not prime surfaces in direct contact with concrete or where field welding is required.
C. Prime Painting: Use specified shop- and touch-up primer.
   1. Preparation of Steel: In accordance with SSPC-SP 2, Hand Tool Cleaning.
   2. Number of Coats: Two.
D. Galvanizing: Hot-dip galvanize to minimum requirements of ASTM A123.
   1. Touch up abraded areas after fabrication using specified touch-up primer for galvanized surfaces.

PART 3 EXECUTION
3.01 EXAMINATION
A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION
A. When field welding is required, clean and strip primed steel items to bare metal.
B. Supply items required to be cast into concrete and embedded in masonry with setting templates.

3.03 INSTALLATION
A. Install components plumb and level, accurately fitted, free from distortion or defects.
B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.
C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

D. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1.

E. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.

F. Obtain approval prior to site cutting or creating adjustments not scheduled.

G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.04 TOLERANCES

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

END OF SECTION
SECTION 05 5213
PIPE AND TUBE RAILINGS

PART 1  GENERAL

1.01  SECTION INCLUDES
   A. Wall mounted handrails.
   B. Stair railings and guardrails.
   C. Free-standing railings at steps.
   D. Balcony railings and guardrails.

1.02  RELATED REQUIREMENTS
   A. Section 03 3000 - Cast-in-Place Concrete: Placement of anchors in concrete.
   B. Section 04 2000 - Unit Masonry: Placement of anchors in masonry.
   C. Section 05 5100 - Metal Stairs: Handrails other than those specified in this section.
   D. Section 05 5100 - Metal Stairs: Attachment plates for handrails specified in this section.
   E. Section 08 8000 - Glazing: Glass baluster infill.
   F. Section 09 2116 - Gypsum Board Assemblies: Placement of backing plates in stud wall construction.
   G. Section 09 9000 – Painting and Coating: Paint finish.

1.03  REFERENCE STANDARDS
   C. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
   G. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

1.04  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 two, 12 inch long samples of handrail. Submit two samples of elbow, wall bracket, and end stop.

PART 2  PRODUCTS

2.01  MANUFACTURERS
   A. Handrails and Railings:
      4. Substitutions: See Section 01 6000 - Product Requirements.
2.02 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 E935.

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 E935.

D. Allow for expansion and contraction of members and building movement without damage to connections or members.

E. Dimensions: See drawings for configurations and heights.
   1. Top Rails and Wall Rails: 1-1/2 inches diameter, round.
   4. Balusters: 1/2 inch square solid bar.

F. 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 masonry, provide brackets to be embedded in masonry, for bolting anchors.
   3. For anchorage to stud walls, provide backing plates, for bolting anchors.

G. Provide slip-on non-weld mechanical 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.

2.03 STEEL RAILING SYSTEM

A. Steel Tube: ASTM A500, Grade B cold-formed structural tubing.

B. Steel Pipe: ASTM A53, Grade B Schedule 80, black finish.

C. Non-Weld Mechanical Fittings: Slip-on, galvanized malleable iron castings, for Schedule 40 pipe, with flush setscrews for tightening by standard hex wrench, no bolts or screw fasteners.

D. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.

E. Exposed Fasteners: No exposed bolts or screws.

F. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.04 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure.

B. Fit and shop assemble components in largest practical sizes for delivery to site.

C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

D. Welded Joints:
   1. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
   2. Interior Components: Continuously seal joined pieces by intermittent welds and plastic filler.
3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

2.05 **ALUMINUM FINISHES**

**PART 3 EXECUTION**

**3.01 EXAMINATION**
A. Verify that field conditions are acceptable and are ready to receive work.

**3.02 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 or embedded in masonry with setting templates, for installation as work of other sections.

**3.03 INSTALLATION**
A. Install in accordance with manufacturer's instructions.
B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
C. Install railings in compliance with ADA Standards for accessible design at applicable locations.
D. Anchor railings securely to structure.
E. Field weld anchors as indicated on drawings. Touch-up welds with primer. Grind welds smooth.
F. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

**3.04 TOLERANCES**
A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
B. Maximum Offset From True Alignment: 1/4 inch.

**END OF SECTION**
SECTION 05 7500
FORMED METAL PIPE COVERS

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. Section Includes:
      1. Pipe system covers. Custom fabrication by sheet-metal construction.

1.3 PERFORMANCE REQUIREMENTS
   A. Sheet metal contractor shall coordinate with mechanical contractor for required sizes and locations of pipe services covers. Final sizes and locations will be predicated on slab core locations and insulated pipe sizes overall. In general pipe enclosures shall extend from floor or top of fin-tube radiation cover as determined per room application and shall terminate just above existing ceiling.

1.4 SUBMITTALS
   A. Product Data: For each type of product indicated. Include finishing materials.
   B. Shop Drawings: Show fabrication and installation details for formed metal.
      1. Include plans, elevations, component details, and attachments to other work.
      2. Indicate materials and profiles of each decorative formed metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.
   C. Qualification Data: For qualified Installer and fabricator.
   D. Prefabrication and pre-installation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING
   A. Deliver formed metal products wrapped in protective coverings and strapped together in suitable packs or in heavy-duty cartons. Remove protective coverings before they stain or bond to finished surfaces.
   B. Store products on elevated platforms in a dry location.
1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls, columns, beams, and other construction contiguous with formed metal by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION

A. Coordinate installation of anchorages for formed metal items. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, anchor bolts, or masonry. Deliver such items to Project site in time for installation.

B. Coordinate installation of formed metal with adjacent construction to ensure that wall assemblies, flashings, trim, and joint sealants, are protected.

PART 2 - PRODUCTS

2.1 SHEET METAL

A. General: Provide sheet metal without pitting, seam marks, roller marks, stains, discolorations, or other imperfections where exposed to view on finished units.

B. Zink-Steel Sheet: with pre-finished galvalume (grip finish) ASTM-A527 CLASS 90 ASA. Suitable base for finish coat painting. Color as selected by Architect from standard and custom colors

2.2 MISCELLANEOUS MATERIALS

A. Sealants, Interior: Non-sag, paintable, non-staining, latex sealant complying with ASTM C 834; of type and grade required to seal joints in decorative formed metal; and as recommended in writing by decorative formed metal manufacturer.

1. Use sealant that has a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Fasteners: Fabricated from same basic metal and alloy as fastened metal unless otherwise indicated. Do not use metals that are incompatible with materials joined.

1. Provide concealed fasteners for interconnecting formed metal items and for attaching them to other work or surfaces.

2. Provide Phillips oval-head machine screws for exposed fasteners unless otherwise indicated.

2.3 FABRICATION, GENERAL

A. Shop Assembly: Preassemble formed metal items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
B. Coordinate dimensions and attachment methods of formed metal items with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned unless otherwise indicated.

C. Form metal to profiles as required, in maximum lengths to minimize joints. Produce flat, flush surfaces without cracking or grain separation at bends. Fold back exposed edges of unsupported sheet metal to form a 1/2-inch-wide hem on the concealed side, or ease edges to a radius of approximately 1/32 inch and support with concealed stiffeners.

D. Build in straps, plates, and brackets as needed to support and anchor fabricated items to adjoining construction. Reinforce formed metal items as needed to attach and support other construction.

E. Provide support framing, mounting and attachment clips, splice sleeves, fasteners, and accessories needed to install formed metal items.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of formed metal.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Locate and place formed metal items level and plumb and in alignment with adjacent construction. Perform cutting, drilling, and fitting required to install formed metal.

1. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.

B. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as required.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.
3.4 PROTECTION

A. Protect finishes of formed metal items from damage during construction period. Remove temporary protective coverings at time of Substantial Completion.

END OF SECTION 05 7500
SECTION 06 1000
ROUGH CARPENTRY

PART 1  GENERAL

1.01  SECTION INCLUDES
A. Structural dimension lumber framing
B. Non-structural dimension lumber framing
C. Preservative treated wood materials
D. Fire retardant treated wood materials
E. Miscellaneous framing and sheathing
F. Communications and electric room mounting boards
G. Miscellaneous wood nailers, furring and grounds

1.02  RELATED REQUIREMENTS
A. Section 03 3000 - Cast-in-Place Concrete: Setting anchors in concrete.
B. Section 05 1200 - Structural Steel Framing: Prefabricated beams and columns for support of wood framing.
C. Section 05 5000 - Metal Fabrications: Miscellaneous steel connectors and support angles for wood framing.
D. Section 07 2500 - Weather Barriers: Air barrier over sheathing.
E. Section 07 2500 - Weather Barriers: Water-resistive barrier over sheathing.
F. Section 07 6200 - Sheet Metal Flashing and Trim: Sill flashings.
G. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.

1.03  REFERENCE STANDARDS
C. ASTM A653- Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
S. ICC-ES AC310 - Water-resistive Membranes Factory-bonded to Wood-based Structural Sheathing, Used as Water-Resistive Barriers; 2015.
U. SPIB (GR) - Grading Rules; 2014.
V. WWPA G-5 - Western Lumber Grading Rules; 2011.

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.
C. Samples: For rough carpentry members that will be exposed to view, submit two samples, 12 by 18 inch in size illustrating wood grain, color, and general appearance.
D. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.
E. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.
F. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
G. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of all contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.
H. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE
A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/sle:
   1. Installer Qualification: Use accredited contractor, certified installers, evaluated materials, and third-party field quality control audit.
   2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

1.06 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.

1.07 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.
PART 2  PRODUCTS

2.01  GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. Species: Douglas Fir-Larch, unless otherwise indicated.
   2. 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.
   3. 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.
   4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

B. Lumber fabricated from old growth timber is not permitted.

2.02  DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).
B. Grading Agency: Western Wood Products Association; WWPA G-5.
C. Sizes: Nominal sizes as indicated on drawings, S4S.
D. Moisture Content: S-dry or MC19.
E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.03  TIMBERS FOR CONCEALED APPLICATIONS

A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).
B. Grading Agency: Western Wood Products Association; WWPA G-5.
C. Sizes: Nominal sizes as indicated on drawings, S4S.
D. Moisture Content: S-dry (23 percent maximum).

2.04  EXPOSED BOARDS

A. Submit manufacturer’s certificate that products meet or exceed specified requirements, in lieu of grade stamping.
B. Moisture Content: Kiln-dry (15 percent maximum).
C. Surfacing: S4S.
D. Species: Douglas Fir.
E. Grade: No. 2, 2 Common, or Construction.

2.05  ACCESSORIES

A. Fasteners and Anchors:
   2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
   3. Anchors: Toggle bolt type for anchorage to hollow masonry.
B. Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions.
   1. For contact with preservative treated wood in exposed locations, provide minimum G185 (Z550) galvanizing complying with ASTM A653.
C. Construction Adhesives:
   1. Products:
b. Substitutions: See Section 01 6000 - Product Requirements.

D. Water-Resistant Barrier: As specified in Section 07 2500.

E. Building Paper: Water resistant Kraft paper.

2.06 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA 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 AWPA standards.

B. Fire Retardant Treatment:
   1. Manufacturers:
      d. Substitutions: See Section 01 6000 - Product Requirements.
   2. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, 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 both before and after accelerated weathering test performed in accordance with ASTM D2898.
      a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
      b. Treat all exterior rough carpentry items.
      c. Do not use treated wood in direct contact with the ground.
   3. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
      a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
      b. Treat rough carpentry items as indicated to be fire-retardant.
      c. Do not use treated wood in applications exposed to weather or where the wood may become wet.

C. Preservative Treatment:
   1. Manufacturers:
      d. Substitutions: See Section 01 6000 - Product Requirements.
      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.
      e. Treat lumber less than 18 inches above grade.
      f. Treat lumber in other locations as indicated.
PART 3  EXECUTION

3.01 PREPARATION
A. Coordinate installation of rough carpentry members specified in other sections.

3.02 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.

3.03 BLOCKING, NAILERS, AND SUPPORTS
A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
F. Provide the following specific non-structural framing and blocking:
   1. Cabinets and shelf supports.
   2. Wall brackets.
   3. Handrails.
   4. Grab bars.
   5. Towel and bath accessories.
   6. Wall-mounted door stops.
   7. Chalkboards and marker boards.
   8. Wall paneling and trim.
   9. Joints of rigid wall coverings that occur between studs.

3.04 ROOF-RELATED CARPENTRY
A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.
B. Provide wood curb at all roof openings except where prefabricated curbs are specified and where specifically indicated otherwise. Form corners by alternating lapping side members.

3.05 SITE APPLIED WOOD TREATMENT
A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer’s instructions.
B. Allow preservative to dry prior to erecting members.

3.06 TOLERANCES
A. Framing Members:  1/4 inch from true position, maximum.
B. Surface Flatness of Floor:  1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.
C. Variation from Plane (Other than Floors):  1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.
3.07 FIELD QUALITY CONTROL
   A. See Section 01 4000 - Quality Requirements, for additional requirements.
   B. Coordination of ABAA Tests and Inspections:
      1. Provide testing and inspection required by ABAA QAP.
      2. Notify in ABAA writing of schedule for air barrier work. Allow adequate time for testing and inspection.
      3. Cooperate with ABAA testing agency.
      4. Allow access to air barrier work areas and staging.
      5. Do not cover air barrier work until tested, inspected, and accepted.

3.08 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 4020
INTERIOR ARCHITECTURAL WOODWORK

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. Plastic-laminate cabinets.
2. Plastic-laminate countertops.
3. Solid-surfacing-material countertops.
4. Closet and utility shelving.

1.3 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

B. Rough carriages for stairs are a part of interior architectural woodwork. Platform framing, headers, partition framing, and other rough framing associated with stairwork are specified in Division 6 Section "Rough Carpentry."

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, including cabinet hardware and accessories, handrail brackets and finishing materials and processes.

B. Product Data: For panel products, high-pressure decorative laminate, adhesive for bonding plastic laminate, solid-surfacing material, fire-retardant-treated materials, cabinet hardware and accessories, handrail brackets and finishing materials and processes.

1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show details full size.
2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in architectural woodwork.
4. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
D. Samples for Initial Selection:
   1. Shop-applied transparent finishes.
   2. Shop-applied opaque finishes.
   4. PVC edge material.
   5. Solid-surfacing materials.

E. Samples for Verification:
   1. Veneer-faced panel products with or for transparent finish, 12 by 12 inches, for each species and cut. Include at least one face-veneer seam and finish as specified.
   2. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish, with 1 sample applied to core material and specified edge material applied to 1 edge.
   3. Solid-surfacing materials, 6 inches square.

F. Product Certificates: For each type of product, signed by product manufacturer.

G. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

H. Qualification Data: For Installer.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products and certified participant in AWI's Quality Certification Program.

B. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers and wood doors with face veneers that are sequence matched with woodwork and transparent-finished wood doors that are required to be of same species as woodwork.

C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
   1. Provide AWI Quality Certification Program labels and certificates indicating that woodwork, including installation, complies with requirements of grades specified.

D. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

E. Forest Certification: Provide interior architectural woodwork produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria."
F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify 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. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

   2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Division 8 Section "Door Hardware (Scheduled by Naming Products)" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 WOODWORK FABRICATORS

A. Available Fabricators: Subject to compliance with requirements, fabricators offering interior architectural woodwork that may be incorporated into the Work include, but are not limited to, the following:

2.2 MATERIALS

A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Products: Comply with the following:

C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering high-pressure decorative laminates that may be incorporated into the Work include, but are not limited to, the following:
   a. Basis for Design: Wilsonart International; Div. of Premark Int'l, Inc.
   b. Arborite; Division of ITW Canada, Inc.
   c. Formica Corporation.
   d. Lamin-Art, Inc.
   e. Nevamar Company, LLC; Decorative Products Div.
   f. Panolam Industries International Incorporated.
   g. Westinghouse Electric Corp.; Specialty Products Div.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this Article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified.

1. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or otherwise defective.
2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
3. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with performance requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Use the following treatment type: (For use in Dye Room 312 only)

1. Interior Type A: Low-hygroscopic formulation.

2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 Section “Door Hardware (Scheduled by Naming Products).”

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening.

C. Back-Mounted Pulls: BHMA A156.9, B02011.

D. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081 and BHMA A156.9, B04102; with shelf brackets, B04112.

E. Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip.
F. Drawer Slides: BHMA A156.9, B05091.
   1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.
   2. Box Drawer Slides: Grade 1HD-100; for drawers not more than 6 inches high and 24 inches wide.
   3. File Drawer Slides: Grade 1HD-100; for drawers more than 6 inches high or 24 inches wide.
   4. Pencil Drawer Slides: Grade 1; for drawers not more than 3 inches high and 24 inches wide.
   5. Keyboard Slides: Grade 1HD-100; for computer keyboard shelves.
   6. Trash Bin Slides: Grade 1HD-100; for trash bins not more than 20 inches high and 16 inches wide.

G. Grommets for Cable Passage through Countertops: 2-inch OD, metal grommets and matching metal caps with slot for wire passage.
   1. Product: Subject to compliance with requirements, provide "MM series" by Doug Mockett & Company, Inc.

H. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
   1. Satin Stainless Steel: BHMA 630.

I. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

A. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

B. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

C. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   1. Wood Glues: 30 g/L.
   2. Contact Adhesive: 250 g/L.

D. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
   1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.6 FABRICATION, GENERAL

A. Interior Woodwork Grade: Unless otherwise indicated, provide Premium-grade interior woodwork complying with referenced quality standard.
B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

D. Fabricate woodwork to dimensions, profiles, and details indicated.

E. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

F. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.

2.7 PLASTIC-LAMINATE CABINETS

A. AWI Type of Cabinet Construction: Reveal overlay.

B. Reveal Dimension: 1/2 inch.

C. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:

1. Horizontal Surfaces Other Than Tops: Grade HGS.
2. Vertical Surfaces: Grade HGS.
3. Edges: Grade HGS.

D. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.
   b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS.
2. Drawer Sides and Backs: Solid-hardwood lumber.
3. Drawer Bottoms: Hardwood plywood.

E. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.
F. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements: See Finish Schedule.

G. Provide dust panels of 1/4-inch plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

2.8 PLASTIC-LAMINATE COUNTERTOPS

A. High-Pressure Decorative Laminate Grade: HGS.

B. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements: See Finish Schedule.

C. Grain Direction: Parallel to cabinet fronts.

D. Edge Treatment: Same as laminate cladding on horizontal surfaces.

E. Core Material: Medium-density fiberboard.

F. Core Material at Sinks: Exterior-grade plywood.

G. Backer Sheet: Provide plastic-laminate backer sheet, Grade BKL, on underside of countertop substrate.


2.9 CLOSET AND UTILITY SHELVING

A. Wood Species: Any closed-grain hardwood.

2.10 SHOP FINISHING

A. Grade: Provide finishes of same grades as items to be finished.

B. General: Shop finish transparent-finished interior architectural woodwork at fabrication shop as specified in this Section. Refer to Division 9 painting Sections for finishing opaque-finished architectural woodwork.

C. General: Drawings indicate items that are required to be shop finished. Finish such items at fabrication shop as specified in this Section. Refer to Division 9 painting Sections for finishing architectural woodwork not indicated to be shop finished.

D. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.
E. Transparent Finish:
   1. Grade: Premium.
   2. AWI Finish System: TR-4 conversion varnish.
   3. Staining: Match approved sample for color.
   4. Wash Coat for Stained Finish: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
   5. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.

C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.

F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
   1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
   2. Maintain veneer sequence matching of cabinets with transparent finish.
   3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
2. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
3. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
4. Caulk space between backsplash and wall with sealant specified in Division 7 Section “Joint Sealants.”

H. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

I. Refer to Division 9 Sections for final finishing of installed architectural woodwork not indicated to be shop finished.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION
SECTION 06 4100
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Specially fabricated cabinet units.
B. Countertops.
C. Cabinet hardware.
D. Factory finishing.
E. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS
A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
B. Section 08 8000 - Glazing: Glass for casework.
C. Section 09 9000 – Painting and Coating: Site finishing of cabinet exterior.

1.03 REFERENCE STANDARDS
A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
D. BHMA A156.9 - American National Standard for Cabinet Hardware; 2010.
G. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
I. WI (CCP) - Certified Compliance Program (CCP); current edition at www.woodworkinstitute.com.

1.04 ADMINISTRATIVE REQUIREMENTS
A. Pre-installation Meeting: Convene a pre-installation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
   2. Provide the information required by AWI/AWMAC/WI (AWS).
   3. Include certification program label.
C. Product Data: Provide data for hardware accessories.
D. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.
E. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.

1.06 QUALITY ASSURANCE
A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum ten years of documented experience.
1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.

B. Quality Certification: Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section.
1. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) requirements for grade or grades specified.
2. Provide designated labels on shop drawings as required by certification program.
3. Provide designated labels on installed products as required by certification program.
4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
5. Replace, repair, or rework all work for which certification is refused.

1.07 MOCK-UP
A. Provide mock-up of typical base cabinet, wall cabinet, and countertop, including hardware, finishes, and plumbing accessories.
B. See Section 01 4000 - Quality Requirements for additional requirements.
C. Locate where directed.
D. Mock-up may remain as part of the Work if approved by Owner and Architect.

1.08 DELIVERY, STORAGE, AND HANDLING
A. Protect units from moisture damage.

1.09 FIELD CONDITIONS
A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS
2.01 CABINETS
A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
B. Wood Veneer Faced Cabinet:
C. Plastic Laminate Faced Cabinets: Custom grade.
D. Breakroom Cabinets: Plastic laminate faced, Custom grade.

2.02 WOOD-BASED COMPONENTS
A. Wood fabricated from old growth timber is not permitted.
B. Provide sustainably harvested wood, certified or labeled as specified in Section 01 6000.
C. Provide wood harvested within a 500 mile radius of the project site.
D. Hardwood Edgebanding: Use solid hardwood edgebanding matching species, color, grain, and grade for exposed portions of cabinetry.

2.03 LAMINATE MATERIALS
A. Manufacturers:
   4. Substitutions: See Section 01 6000 - Product Requirements.
B. High Pressure Decorative Laminate (HPDL) (where indicated): NEMA LD 3, types as recommended for specific applications.

C. Provide specific types as scheduled.
   1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
   2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
   3. Cabinet Liner: CLS, 0.020 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
   4. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

2.04 COUNTERTOPS
   A. Solid Laminated Surfacing: Provide Custom quality hardwood; maple, plain sawn, exposed edge grain; laminated with waterproof adhesives; thickness as recommended by fabricator; suitable for transparent finish.

2.05 ACCESSORIES
   A. Adhesive: Type recommended by fabricator to suit application.
      1. Manufacturers:
         b. Substitutions: See Section 01 6000 - Product Requirements.
   B. Plastic Edge Banding: Extruded PVC, convex shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
      1. Color: As selected by Architect from manufacturer's standard range.
      2. Use at all exposed plywood edges.
      3. Use at all exposed shelf edges.
   C. Glass: Type A as specified in Section 08 8000.
   D. Fasteners: Size and type to suit application.
   E. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and satin chrome-plated finish in exposed locations.
   F. Concealed Joint Fasteners: Threaded steel.
   G. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match adjacent surface.

2.06 HARDWARE
   A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
   B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self-rests, satin chrome finish, for nominal 1 inch spacing adjustments.
   C. Drawer and Door Pulls: "U" shaped wire pull, steel with satin finish, 4 inch centers ("U" shaped wire pull, steel with satin finish, 100 mm centers).
   D. Sliding Door Pulls: Circular shape for recessed installation, steel with satin finish.
   E. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with chrome finish.
   F. Catches: Magnetic.
   G. Drawer Slides:
      1. Type: Extension types as scheduled.
      2. Static Load Capacity: Commercial grade.
      4. Stops: Integral type.
      5. Features: Provide self-closing/stay closed type.
6. Manufacturers:
   c. Hettich America, LP; www.hettich.com/sle.
   e. Substitutions: See Section 01 6000 - Product Requirements.

H. Hinges: European style concealed self-closing type, steel with polished finish.
   1. Manufacturers:
      c. Hettich America, LP; www.hettich.com/sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

I. Sliding Door Track Assemblies: Upper and lower track of satin anodized aluminum, with matching shoe equipped with nylon rollers.

2.07 SHOP TREATMENT OF WOOD MATERIALS
   A. Provide UL (DIR) listed and approved identification on fire retardant treated material.
   B. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

2.08 SITE FINISHING MATERIALS
   A. Stain, Shellac, Varnish, and Finishing Materials: In compliance with AWI/AWMAC/WI (AWS), unless noted otherwise.

2.09 FABRICATION
   A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
   B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
   C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
   D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
      1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
      2. Cap exposed plastic laminate finish edges with material of same finish and pattern.
   E. Matching Wood Grain: Comply with requirements of quality standard for specified Grade and as follows:
      1. Provide center matched panels at each elevation.
   F. Mechanically fasten back splash to countertops as recommended by laminate manufacturer at 16 inches (400 mm) on center.
   G. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.
   H. Shop glaze glass materials using the Interior Dry method as specified in Section 08 8000.

2.10 SHOP FINISHING
   A. Sand work smooth and set exposed nails and screws.
   B. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.
   C. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.
   D. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade specified and as follows:
      1. Transparent:
PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify adequacy of backing and support framing.
   B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION
   A. Install work in accordance with AWI/AWMAC/WI (AWS)) requirements for grade indicated.
   B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
   C. Use fixture attachments in concealed locations for wall mounted components.
   D. Use concealed joint fasteners to align and secure adjoining cabinet units.
   E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
   F. Secure cabinets to floor using appropriate concealed angles and anchorages.
   G. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.
   H. Site glaze glass materials using the Interior Dry method specified in Section 08 8000.

3.03 ADJUSTING
   A. Adjust installed work.
   B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING
   A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION
SECTION 06 4150
COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Countertops for architectural cabinetwork.
   B. Countertops for manufactured casework.

1.02 PRICE AND PAYMENT PROCEDURES
   A. See Section 01 2000 - Allowances, for cash allowances affecting this section.

1.03 REFERENCE STANDARDS
   E. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2003.
   I. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2009.
   M. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
   N. PS 1 - Structural Plywood; 2007.
      O. WI (CCP) - Certified Compliance Program (CCP); current edition at www.woodworkinstitute.com/certification.
      P. WI (MCP) - Monitored Compliance Program (MCP); current edition at www.woodworkinstitute.com/certification.

1.05 SUBMITTALS
   A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   B. Product Data: Manufacturer’s data sheets on each product to be used, including:
      1. Preparation instructions and recommendations.
      2. Storage and handling requirements and recommendations.
      3. Specimen warranty.
C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.

D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.

F. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

G. Installation Instructions: Manufacturer's installation instructions and recommendations.

H. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.06 QUALITY ASSURANCE

A. Fabricator Qualifications: Same fabricator as for cabinets on which tops are to be installed.

B. Quality Certification: Provide AWI Quality Certification Program inspection report and quality certification of completed work.
   1. Provide labels or certificates indicating that the work complies with requirements of AWS Grade or Grades specified.
   2. Prior to delivery to the site provide shop drawings with certification labels.
   3. Provide labels on each product when required by certification program.
   4. Upon completion of installation provide certificate certifying that the installation and products meet the specified requirements.
   5. Arrange and pay for inspections required for certification.
   6. Replace, repair, or rework all work for which certification is refused.

C. Installer Qualifications: Fabricator.

1.07 DELIVERY, STORAGE, AND HANDLING

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

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.08 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOP ASSEMBLIES

A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI Architectural Woodwork Standards.

B. Plastic Laminate Countertops: High pressure decorative laminate sheet bonded to substrate.
   1. Laminate Sheet, Unless Otherwise Indicated: NEMA LD 3 Grade HGS, 0.048 inch nominal thickness.
      a. Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 450, maximum; when tested in accordance with ASTM E 84.
      b. NSF approved for food contact.
      c. Wear Resistance: In addition to specified grade, comply with NEMA LD 3 High Wear Grade requirements for wear resistance.
      d. Laminate Core Color: Same as decorative surface.
      e. Finish: Matte or suede, gloss rating of 5 to 20.
Two River Theater 06 4150 - 3 COUNTERTOPS
Addition and Alterations

f. Surface Color and Pattern: As indicated on drawings.
g. Manufacturers:
   6) Abet Laminati. www.abet laminate.com
   7) Substitutions: See Section 01 6000 - Product Requirements.

2. Exposed Edge Treatment: Square, substrate built up to minimum 1-1/4 inch thick; covered with matching laminate.
3. Back and End Splashes: Same material, same construction.
4. Fabricate in accordance with AWI/AWMAC Quality Standards Illustrated Premium Grade.

C. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
   1. Flat Sheet Thickness: 1/4 inch, minimum.
   2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISSFA-2 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
      a. Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 450, maximum; when tested in accordance with ASTM E 84.
      b. NSF approved for food contact.
      c. Sinks and Bowls: Integral castings; minimum 3/4 inch wall thickness; comply with ANSI Z124.3.
      d. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
      e. Color and Pattern: As indicated on drawings.
      f. Manufacturers:
         5) Substitutions: See Section 01 6000 - Product Requirements.

3. Other Components Thickness: 1/2 inch, minimum.
4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; square edge; use marine edge at sinks.
5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
6. Skirts: As indicated on drawings.

D. Stainless Steel Countertops: ASTM A 666 Type 304 stainless steel sheet; 16 gage, 0.06 inch nominal sheet thickness.
   1. Finish: 4B satin brushed finish.
   2. Edge and Backsplash Sink Details: As indicated on drawings.
   3. Exposed Edge Shape: Straight turndown with return; 1-1/2 inch high face, 1/2 inch return to face of case; reinforced with hardwood or steel.
   4. Back and End Splashes: Same material; welded 1/4 inch radius coved joint to countertop; square top edge with 1 inch wide top surface and minimum 1/2 inch turndown;
   5. Splash Height at Dye Room 312: 6 inch.
   6. Sinks: Same material, same thickness; flush welded to counter; bottom sloped to outlet; radiused interior corners; drain outlet located in back corner.
   7. Troughs: Same material; bottom sloped to outlet.
   8. Associated Reagent Shelves: Same material, with formed raised edges.
   9. Associated Window Sills: Same material, same thickness.
2.03 FABRICATION

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using best method recommended by manufacturer.
   2. Fabricate to overhang fronts and ends of caninets 1 inch except where top butts against
      cabinet or wall.
   3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or
      unnecessary cutouts or fixture holes.

B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise
   indicated.
   1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof
      glue.
   2. Height: 4 inches, unless otherwise indicated.

C. Solid Surfacing: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive
   sealant in accordance with manufacturer’s recommendations and instructions.

D. Stainless Steel: Fabricate tops up to 144 inches long in one piece including nosings and back
   and end splashes; accurately fitted mechanical field joints in lengths over that dimension are
   permitted.
   1. Weld joints; grind smooth and polish to match.
   2. Provide stainless steel hat channel stiffeners, welded or soldered to underside, where
      indicated on drawings.
   3. Provide wall clips for support of back/end splash turndowns.
   4. Sound Deadening: Apply water resistant, fire resistant sound deadening mastic to entire
      bottom surface.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do Not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of
   unsatisfactory preparation before proceeding.

C. Very that wall surfaces have been finished and mechanical and electrical services and outlets
   are installed in proper locations.

3.02 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.

3.03 INSTALLATION

A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level;
   shim where required.

B. Attach plastic laminate countertops using screws with minimum penetration into substrate board
   of 5/8 inch.

C. Attach stainless steel countertops using stainless steel fasteners and clips.

D. Seal joint between back/end splashes and vertical surfaces.
   1. Where applied cove holding is not indicated, use specified sealant.

3.04 TOLERANCES

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COUNTERTOPS
A. Variation from horizontal: 1/8 inch in 10 feet, maximum.
B. Offset from wall, countertops: 1/8 inch maximum, 1/16 inch minimum.
C. Field joints: 1/8 inch wide, maximum.

3.05 CLEANING
A. Clean countertop surfaces thoroughly.

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

3.07 SCHEDULES
A. Refer to drawings.

END OF SECTION
SECTION 07 0812
INTUMESCENT FIRE RESISTIVE MATERIAL

PART 1 - GENERAL

1.1 SCOPE

1.1.1 This specification covers labor, materials, equipment, and application necessary for, and incidental to, the complete and proper installation of intumescent fire protection for application to steel structures and supports in accordance with all applicable requirements of contract documents.

1.1.2 This specification shall be supplemented by the applicable requirements of building codes, insurance rating organizations and all authorities having jurisdiction.

1.2 SECTION INCLUDES

1.2.1 Intumescent fire protection material.

1.2.2 Topcoat protective decorative finish.

1.3 RELATED SECTIONS

1.3.1 Section 05 1200: Structural Steel Framing.

1.3.2 Section 05 5000: Metal fabrications with reference to primer receiving fire protection materials.

1.3.4 Section 07 8400: Firestopping.

1.3.5 Section 09 9000: Painting.

1.4 REFERENCES

1.4.1 Underwriters Laboratories Inc. (UL) Fire Resistance Directory.

1.4.2 Underwriters Laboratories of Canada (ULC) - List of Equipment and Materials.

1.4.3 Underwriters Laboratories Classified CDXA.

1.4.4 Underwriters Laboratories Classified CDYD

1.4.5 Sherwin Williams FIRETEX FX5120 has been certified by Underwriters Laboratories to UL263 and listed by the following designs:

a. Design No. D981
b. Design No. N636
c. Design No. Y623
d. Design No. Y624

1.4.6 Test Standards


C. UL CDYD

D. UL CDXA

  Flame Spread Maximum: 0 and Smoke Developed Maximum: 5. Class A

E. ASTM D2240 – Durometer Hardness: Minimum SHORE “D”- 70

F. ASTM D2794 – Impact Resistance: Direct: 83 in/lb

G. ASTM D4060 – Abrasion Resistance-.2900g/ 1000 Cycles

H. ASTM D4541 – Bond Strength (Type IV). Average: 540 psi.

1.4.4 Steel Structures Painting Council (SSPC) Surface Preparation Standards.

1.4.5 Material manufacturer's current published Product Technical Data Sheet (PDS) and Material Safety Data Sheet (MSDS).


1.5 SYSTEM DESCRIPTION

1.5.1 The intumescent fire protection materials shall be applied at the required thickness to provide the UL fire resistive ratings.

1.5.2 Extrapolated thickness requirements will not be accepted.

1.6 SUBMITTALS

1.6.1 Manufacturer's Data: Submit manufacturer's Product Data Sheet (s), and certifications as may be required to verify material compliance with contract documents.

1.6.2 UL Listed and stamped schedule of fireproofing thickness requirements including the UL design listings upon which they are based.

1.7 QUALITY ASSURANCE

1.7.1 Manufacturer - Company specializing in manufacturing fire protection products.

1.7.2 The intumescent fire resistive material shall be manufactured under the Follow-Up Service program of UL or ULC and bear the UL and/or ULC label (mark).

1.7.3 Product - The product shall be approved by the architect and applicable authorities having jurisdiction. Products shall meet the ASTM E 119 fire standard, be tested at Underwriters Laboratories per UL 263 and meet the requirements of the local authority having jurisdiction.

1.7.4 Applicator - A firm with expertise in the installation of fire resistive or similar materials. Applicator must have applied intumescent fireproofing on projects of similar size and scope.
1.8 DELIVERY, STORAGE AND HANDLING

1.8.1 Deliver materials to the project in manufacturer's unopened packages, fully identified as to trade name, type and other identifying data. Packaged materials shall bear the appropriate labels, seals and UL label (mark) for fire resistive ratings and shall be stored at temperatures between 41°F and 77°F, in a dry interior location away from direct sunlight. DO NOT FREEZE.

1.9 PROJECT/SITE CONDITIONS

1.9.1 When the temperature at the job site is less than 50°F, a minimum substrate and ambient temperature of 50°F shall be maintained prior to, during, and a minimum of 72 hours after application. If necessary for job schedule, the General Contractor shall provide enclosures and heat to maintain proper temperatures and humidity levels in the application areas.

1.9.2 In enclosed areas, ventilation shall not be less than 4 complete air exchanges per hour until the material is dry.

1.9.3 Relative humidity shall not exceed 85% throughout the total period of application and drying for the intumescent fire resistive material, and must not exceed 85% throughout the application and drying for the protective decorative topcoat.

1.10 SEQUENCING AND SCHEDULING

1.10.1 Applicator shall cooperate in the coordination and scheduling of fire protection work to avoid delays in job progress.

1.10.2 The installation of piping, ducts, conduit or other suspended equipment shall not commence until the application of the thin-film fire resistive material is complete in that area.

PART 2 - PRODUCTS

2.1 COMPATIBLE METAL PRIMER

2.1.1 Primer shall be approved by manufacturer and applied in full accordance with the primer manufacturer's written instructions.

2.2 INTUMESCENT FIRE PROTECTION SYSTEM

2.2.1 The intumescent fire resistive material shall be Sherwin-Williams® FIRETEX FX 5120™ as supplied by The Sherwin-Williams Company.

2.2.2 Intumescent fire resistive material shall be applied in accordance with drawings and/or specifications, and shall have been tested in accordance with the procedures of UL 263 and ASTM E119 or CAN/ULC-S101, and reported by Underwriters Laboratories, Inc. or Underwriters Laboratories of Canada.

2.2.3 Thin-Film Fire-Resistive Intumescent Mastic Coating: Factory-mixed formulation.
A. Water-Based Formulation: Approved by manufacturer and authorities having jurisdiction for indicated use.
B. Verify with manufacturer that products selected are suitable for use indicated.
C. UL Fire Tested Designs Only based on UL 263 (ASTM-E119) or UL Classified CDXA.
D. A representative mock-up sprayed Architectural finish sample must be submitted, reviewed, and accepted by the architect in advance.

2.3 **TOPCOATING**

2.3.1 Topcoat materials shall be as required for color-coding, aesthetics or additional surface protection, approved by the thin-film fire resistive material manufacturer and applied in full accordance with the coating manufacturer's written instructions.

**PART 3 - EXECUTION**

3.1 **PREPARATION**

3.1.1 All surfaces to receive thin-film fire resistive material shall be clean, dry and free of oil, grease, loose mill scale, dirt, dust or other materials which would impair bond of the thin-film fire resistive material to the surface.

3.1.2 Confirm compatibility of surfaces to receive thin-film fire resistive material. Steel surfaces shall be primed with a compatible primer approved by the thin-film fire resistive material manufacturer.

3.1.3 Provide masking, drop cloths or other suitable coverings to prevent overspray onto surfaces not intended to be coated with intumescent coating.

3.2 **APPLICATION**

3.2.1 The thin-film fire resistive material shall be applied at the required dry film thickness per the appropriate UL design number guidelines and manufacturers written application instructions.

3.3 **MOCK UP**

3.3.1 Before proceeding with the work, the applicator shall apply the thin-film fire resistive material to a section witnessed by the architect's or owner's representative. The application shall be subject to their approval and shall be used as a guide for texture and thickness of the finished work.

3.4 **CLEAN UP AND REPAIR**

3.4.1 Upon completion of installation, all excess material, overspray and debris shall be cleared and removed from the job site.

3.4.2 Patching and Touch-Up shall be performed by an applicator with expertise in the installation of Intumescent Fire Protection Coatings. Repair shall be in accordance with UL design number guidelines and manufacturers written application instructions.

3.5 **INSPECTION AND TESTING**


3.5.2 The results of the above tests shall be made available to all parties at the completion of each area and approved prior to the application of topcoat.
4.0 COATING SCHEDULE

1. Minimum Surface Preparation: SSPC-SP1 Solvent Cleaning, SP2 Hand Tool Cleaning
   and/or SP3 Power Tool Cleaning as required. For optimum performance, Abrasive Blast
   Clean steel surfaces per SSPC-SP6 Commercial Blast Cleaning.

2. Prime Coat: Kem Kromik Universal Metal Primer #B50Z Series @3.0-4.0 Dry Mils
   (or other compatible primer)

3. Intumescent: FIRETEX FX 5120 Water-based Intumescent Fireproofing
   (Dry Film Thickness refer to UL263 Thickness Tables)

4. Topcoat: Pro Industrial Acrylic @ 2.5-4.0 Dry Mils (or other compatible topcoat)

END OF SECTION
SECTION 07 1326
SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SECTION INCLUDES:

Installation of sheet membrane waterproofing on surfaces indicated on drawings, consisting of preparation of existing and repaired concrete surfaces, sealing of cracks and joints, and application of CCW MiraDRI 860/861 Sheet Membrane Waterproofing.

1.2 RELATED SECTIONS

A. Section 03 3000 - Cast-In-Place Concrete
B. Section 07 9005 - Caulking and Sealants
C. Division 04 - Masonry
D. Division 20 – Mechanical/Floor Drains and Standpipes
E. Division 25 – Electrical/Conduit and other Electrical

1.3 REFERENCES

A. ASTM D 412 Tests for Rubber Properties in Tension
B. ASTM E 154 Puncture Resistance
C. ASTM E 96 (B) Water Vapor Transmission of Materials
D. ASTM D 1970 Self-Adhering Polymer Modified Bituminous Sheet Materials
E. ASTM D 882 Test Method for Tensile Properties
F. ASTM D 3767 Practice for Rubber – Measurement of Dimensions
G. ASTM D 751 Test Method for Coated Fabrics
H. ASTM D 570 Test Method for Water Absorption of Plastics
I. UL 790 Tests for Fire Resistance of Roof Covering Materials

1.4 SYSTEM DESCRIPTION

Product provided by this Section is a self-adhesive membrane of not less than 60 mils thickness, consisting of a rubberized asphalt membrane laminated to a 4 mil cross-laminated polyethylene film.

1.5 SUBMITTALS

A. General: Submit in accordance with Section 01 3000.
B. Product Data: Submit manufacturer's product literature and installation instructions.
C. Subcontractor=s approval by Manufacturer: Submit document stating manufacturer's acceptance of subcontractor as an Approved Applicator for the specified materials.
D. Warranty: Submit a sample warranty identifying the terms and conditions stated in Section 1.7.

1.6 QUALITY ASSURANCE

A. Applicator Qualifications: Applicator shall be experienced in applying the same or similar materials and shall be specifically approved in writing by the membrane manufacturer.
B. Regulatory Requirements: Comply with applicable codes, regulations, ordinances, and laws regarding use and application of products that contain volatile organic compounds (VOC).
C. Pre-Application Conference: Prior to beginning work, convene a conference to review conditions, installation procedures, schedules and coordination with other work.

1.7 WARRANTY

A. Upon completion and acceptance of the work required by this section, the manufacturer will issue a warranty agreeing to promptly replace defective materials for a period of 5 years.

B. The formation or presence of mold or fungi in a building is dependent upon a broad range of factors including, but not limited to, the presence of spores and nutrient sources, moisture, temperatures, climatic conditions, relative humidity, and heating/ventilating systems and their maintenance and operating capabilities. These factors are beyond the control of Carlisle and Carlisle shall not be responsible for any claims, repairs, restoration, or damages relating to the presence of any irritants, contaminants, vapors, fumes, molds, fungi, bacteria, spores, mycotoxins, or the like in any building or in the air, land, or water serving the building.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in original, factory-sealed, unopened containers bearing manufacturer's name and label intact and legible with following information.
   1. Name of material.
   2. Manufacturer's stock number and date of manufacture.

B. Store materials in protected and well ventilated area.

1.9 PROJECT CONDITIONS

A. Do not apply membrane when surface temperature is below or inclement weather conditions conflict with manufacturer's published requirements.

B. Coordinate waterproofing work with other trades. The applicator shall have sole right of access to the specified areas for the time needed to complete the installation.

C. Warn personnel against breathing of vapors and contact of material with skin or eyes. Wear applicable protective clothing and respiratory protection gear.

D. Keep flammable products away from spark or flame. Do not allow the use of spark producing equipment during application and until all vapors have dissipated. Post "NO SMOKING" signs.

E. Maintain work area in a neat and orderly condition, removing empty containers, rags, and rubbish daily from the site.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Provide CCW MiraDRI 860/861 Sheet Membrane Waterproofing as manufactured by Carlisle Coatings and Waterproofing Incorporated, 900 Hensley Lane, Wylie, Texas 75098, Phone: (800) 527-7092 Fax: (972) 442-0076.

2.2 PRODUCTS

A. Self-Adhesive Sheet Membrane Waterproofing: Shall be CCW MiraDRI 860/861 consisting of a 56 mil rubberized asphalt membrane laminated to 4 mil cross-laminated polyethylene film, and shall meet or exceed the following requirements:
   1. Tensile Strength: 325 psi minimum, ASTM D 412
   2. Ultimate Elongation: 350% minimum, ASTM D 412
3. Puncture Resistance: 60 lbs. minimum, ASTM E 154
4. Permeance: 0.05 Perm maximum, ASTM E 96 (B)
5. Low Temperature Flexibility: Unaffected at -45°F, ASTM D 1970, 1" mandrel
6. Tensile to Film: 5000 psi, ASTM D 882
7. Thickness: 60 mils, ASTM D 3767
8. Hydrostatic Head: 230 ft., ASTM D 751
9. Water Absorption: 0.1% by wt., ASTM D 570

B. For application temperatures between 25 and 65°F, use CCW-861 Sheet Membrane and CCW-702. For application temperatures above 40°F use CCW MiraDRI 860 sheet membrane and CCW-702, CCW-714 primer, or CCW-AWP.

2.3 ACCESSORY PRODUCTS

A. Surface Primer: Shall be CCW-702LV Solvent-Based Contact Adhesive, 702WB or Cav-Grip.
B. Mastic: Shall be CCW-704 Mastic.
C. Sealants: Shall be CCW-703 Vertical Grade Liquiseal® Membrane, one component approved sealant by CCW, CCW-201 two-component Polyurethane Sealant or CCW LM-800XL
D. Backing Rod: Shall be closed-cell polyethylene foam rod.
E. Protection Course: Shall be CCW Protection Board-H or CCW 300H for horizontal surfaces or CCW Protection Board-V or CCW 200V for vertical surfaces.
F. Drainage Composite: Shall be CCW MiraDRAIN® as recommended by the manufacturer for each condition.
G. Perimeter Drainage System: Where required shall be CCW QuickDRAIN™.

PART 3 - EXECUTION

3.1 INSPECTION

A. Before any waterproofing work is started the waterproofing applicator shall thoroughly examine all surfaces for any deficiencies. Should any deficiencies exist, the architect, owner, or general contractor shall be notified in writing and corrections made.
B. Condition of Concrete Surfaces:
   1. The concrete surfaces shall be of sound structural grade and shall have a smooth finish, free of fins, ridges, protrusions, rough spalled areas, loose aggregate, exposed course aggregate, voids or entrained air holes. Rough surfaces shall receive a well-adhered parget coat.
   2. Concrete shall be cured by water curing method. Any curing compounds must be of the pure sodium silicate type and be approved by the Carlisle representative.
   3. Concrete shall be cured at least 7 days and shall be sloped for proper drainage.
   4. Voids, rock pockets and excessively rough surfaces shall be repaired with approved non-shrink grout or ground to match the unrepaired areas.
   5. Two-stage drains shall have a minimum 3 inch flange and be installed with the flange flush and level with the concrete surface.
   6. Surfaces at cold joints shall be on the same plane.

3.2 SURFACE PREPARATION

A. The concrete surface must be thoroughly clean, dry and free from any surface contaminates or cleaning residue that may harmfully affect the adhesion of the membrane.
B. Install a 3/4” face, 45 degree cant of CCW-201 Polyurethane Sealant or CCW LM-800XL at all angle changes and inside corners including penetrations through the deck, walls, curbs, etc.
C. All cracks over 1/16" in width and all moving cracks under 1/16" in width shall be routed out to 1/4" minimum in width and depth and filled flush with an approved sealant by CCW or CCW-201 polyurethane sealant.

D. All expansion joints less than 1" wide shall be cleaned, primed, fitted with a backing rod and caulked with CCW-201 Polyurethane Sealant. For larger joints, contact Carlisle representative.

E. Allow all sealant to cure at least overnight.

F. Stir Primer. Apply a thin film of primer 10" wide, centered over sealed cracks and joints, hairline cracks, and cold joints. Apply primer 8" on each side of all corners. Prime concrete around drain flanges. Allow primer to dry per manufacturer’s recommendations.

G. Install an 8" wide strip of CCW MiraDRI 860/861 centered over joints and cracks. Install a 12" wide strip of CCW MiraDRI 860/861 centered over the axis of all corners.

H. Terminate membrane around drains per CCW MiraDRI 860 series details. Terminate the membrane under the clamping ring. Seal all edges with CCW-704 Mastic. Do not interfere with weep holes.

3.3 APPLICATION

A. Priming: Clean surfaces to remove residual dust before priming. Stir primer. Apply by spray or roller at a rate recommended by manufacturer. Allow to dry per manufacturer’s recommendation.

B. Horizontal surfaces: Install sheet membrane from low to high point, so that laps will shed water. Overlap edge seams 2½", end laps 5". Stagger end seams. Roll in place with an 18 to 24" wide, 100 lb. (min.) resilient roller. Ensure that all laps are firmly adhered and that there are no gaps or fishmouths.

C. Vertical Surfaces: Apply in lengths of 8' or less. Overlap edge seams 2½". On walls over 8' high, apply in 8' sections, starting at the lowest point with the higher section overlapping the lower section 5". Roll in place using firm pressure with a hand roller.

D. Terminations: Consult Carlisle 860-9 Details for proper terminations. Roll terminating edges firmly. Apply CCW-704 mastic to all terminations and >T= joints. Apply CCW-704 Mastic or CCW-703-V Liquiseal to laps at angle changes, extending 9" in each direction.

3.4 INTEGRITY TESTING

A. Test is required for all expanded warranties beyond the standard material warranty of horizontal applications.

B. The test can be done with Electronic Vector Mapping or flood testing. Flood testing requires 2" minimum head of water for a period of 24 hours.

3.5 PROTECTION COURSE

A. VERTICAL APPLICATION:
Install CCW QuickDRAIN Perimeter Drainage System as the first course of drainage composite immediately after membrane has been installed on vertical surfaces. Install CCW MiraDRAIN Drainage Composite (consult CCW for recommendation), CCW Protection Board-V Protection Course or CCW 200V on remainder. Stop drainage composite 6" below final grade level.

B. HORIZONTAL APPLICATION:
Install CCW MiraDRAIN Drainage Composite (consult CCW for recommendation) or CCW Protection Board-H Protection Course or CCW 300HV immediately after flood testing on horizontal surfaces. If flood testing is delayed, install a temporary covering to protect the CCW MiraDRI 860/861 membrane from damage by other trades.

END OF SECTION
SECTION 07 2100
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Board insulation and integral vapor retarder at cavity wall construction, perimeter foundation wall, underside of floor slabs, over roof deck, over roof sheathing, and exterior wall behind exterior wall finish.

B. Batt insulation and vapor retarder in exterior wall, ceiling, and roof construction.

C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Field-applied termiticide for concrete slabs and foundations.

B. Section 05 4000 - Cold-Formed Metal Framing: Board insulation as wall sheathing.

C. Section 06 1000 - Rough Carpentry: Supporting construction for batt insulation.

D. Section 07 2500 - Weather Barriers: Separate air barrier and vapor retarder materials.

E. Section 07 5323 - Elastomeric Membrane Roofing: Installation requirements for board insulation over low slope roof deck specified in this section.

F. Section 07 8400 - Firestopping: Insulation as part of fire-rated through-penetration assemblies.

G. Section 09 2116 - Gypsum Board Assemblies: Acoustic insulation inside walls and partitions.

1.03 REFERENCE STANDARDS


1.04 SUBMITTALS

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

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.

D. Manufacturer's Certificate: Certify in writing that products meet or exceed specified requirements.
E. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

F. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.

G. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of all contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.

1.05 QUALITY ASSURANCE

A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/sle:
   1. Installer Qualification: Use accredited contractor, certified installers, evaluated materials, and third-party field quality control audit.
   2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

1.06 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Insulation Under Concrete Slabs on grade: Extruded polystyrene board.
B. Insulation at Perimeter of Foundation: Expanded polystyrene board.
C. Insulation Inside Masonry Cavity Walls: Extruded polystyrene board.
D. Insulation Inside Prefabricated Wall Panels: Extruded polystyrene board.
E. Insulation Over Metal Stud Framed Walls, Continuous: Extruded polystyrene board.
F. Insulation in Metal Framed Walls: Batt insulation with integral vapor retarder.
G. Insulation in Wood Framed Walls: Batt insulation with separate vapor retarder.
H. Insulation Above Lay-In Acoustical Ceilings: Batt insulation with no vapor retarder.
I. Insulation Over Roof Deck: Polyisocyanurate board.

2.02 FOAM BOARD INSULATION MATERIALS

A. Expanded Polystyrene (EPS) Board Insulation: ASTM C578, Type XI; with the following characteristics:
   1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
B. Polyisocyanurate Board Insulation with Facers Both Sides and Water-Resistive Barrier: Rigid cellular foam, complying with ASTM C1289; Type II, Class 2, polymer bonded glass fiber mat both faces.
   1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
   3. Complies with fire resistance requirements shown on the drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
   5. Board Size: 48 by 96 inch.
   6. Thermal Resistance: R-value (RSI-value) as indicated on the drawings.
   8. Water Vapor Permeance: 1.2 perm, maximum, at 1 inch thickness, and when tested in accordance with ASTM E96, desiccant method.
   9. Manufacturers:
2.03 BATT INSULATION MATERIALS

A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used, at Contractor's option.

B. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
   1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
   3. Formaldehyde Content: Zero.
   4. Thermal Resistance: R-value (RSI-value) as indicated on drawings.
   5. Facing: Aluminum foil, flame spread 25 rated; one side.
   6. Manufacturers:
      c. Owens Corning Corporation; EcoTouch PINK FIBERGLAS Insulation: www.ocbuildingspec.com/sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

C. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
   1. Where indicated, provide foil facing on one side; with flame spread index of 25 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
   3. Thermal Resistance: R-value (RSI-value) as indicated on drawings.
   4. Manufacturers:
      c. ROXUL, Inc; ComfortBatt: www.roxul.com/sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

A. Sheet Vapor Retarder: Black polyethylene film reinforced with glass fiber square mesh.
B. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch (50 mm) wide.
C. Tape joints of rigid insulation in accordance with roofing and insulation manufacturers' instructions.
D. Insulation Fasteners: Lengths of unfinished, 13 gage (0.072 inch) high carbon spring steel with chisel or mitered tips, held in place by tension, length to suit insulation thickness and substrate, capable of securely supporting insulation in place.
E. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.
   1. Length as required for thickness of insulation material and penetration of deck substrate.
F. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.
G. Wire Mesh: Galvanized steel, hexagonal wire mesh.
H. Protection Board for Below Grade Insulation: Cementitious, 1/4 inch thick.
I. Adhesive: Type recommended by insulation manufacturer for application.
PART 3  EXECUTION

3.01  EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02  BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Adhere a 6 inch wide strip of polyethylene sheet over construction, control, and expansion joints with double beads of adhesive each side of joint.
   1. Tape seal joints.
   2. Extend sheet full height of joint.

B. Apply adhesive to back of boards as recommended by manufacturer.
   1. Three continuous beads per board length.
   2. Full bed 1/8 inch thick.

C. Install boards horizontally on foundation perimeter.
   1. Place boards to maximize adhesive contact.
   2. Install in running bond pattern.
   3. Butt edges and ends tightly to adjacent boards and to protrusions.

D. Extend boards over expansion joints, unbonded to foundation on one side of joint.

E. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

F. Immediately following application of board insulation, place protective boards over exposed insulation surfaces.
   1. Apply adhesive in five continuous beads per board length.
   2. Install boards horizontally from base of foundation to top of insulation.
   3. Butt boards tightly, with joints staggered from insulation joints.

3.03  BOARD INSTALLATION AT EXTERIOR WALLS

A. Adhere a 6 inch wide strip of polyethylene sheet over expansion joints with double beads of adhesive each side of joint.
   1. Tape seal joints between sheets.
   2. Extend sheet full height of joint.

B. Apply adhesive to back of boards as recommended by manufacturer.
   1. Three continuous beads per board length.
   2. Full bed 1/8 inch thick.

C. Install rigid insulation to exterior grade sheathing at 16 inches on center with manufacturer recommended mechanical fasteners. Tape all joints with manufacturer's minimum 4 inch wide sealant tape; comply with ASTM E2357.

D. Install boards horizontally on walls.
   1. Place boards to maximize adhesive contact.
   2. Install in running bond pattern.
   3. Butt edges and ends tightly to adjacent boards and to protrusions.

E. Extend boards over expansion joints, unbonded to wall on one side of joint.

F. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

G. Place 6 inch wide polyethylene sheet at perimeter of wall openings, from adhesive vapor retarder bed to window and door frames. Tape seal in place to ensure continuity of vapor retarder and air seal.

H. Tape insulation board joints.
3.04 BOARD INSTALLATION AT CAVITY WALLS

A. Secure impale fasteners to substrate at a frequency as follows:
   1. 6 per insulation board.

B. Adhere a 6 inch wide strip of polyethylene sheet over expansion joints with double beads of adhesive each side of joint, as recommended by manufacturer.
   1. Tape seal joints between sheets.
   2. Extend sheet full height of joint.

C. Apply adhesive to back of boards:
   1. Three continuous beads per board length.
   2. Full bed 1/8 inch thick.

D. Install boards to fit snugly between wall ties.
   1. Place membrane surface against adhesive.
   2. Place membrane surface facing out, and tape seal board joints.

E. Install boards horizontally on walls.
   1. Place boards to maximize adhesive contact.
   2. Install in running bond pattern.
   3. Butt edges and ends tightly to adjacent boards and to protrusions.
   4. Place impale fastener locking discs.

F. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

G. Place 6 inch wide polyethylene sheet at perimeter of wall openings, from adhesive vapor retarder bed to window and door frames. Tape seal in place to ensure continuity of vapor retarder and air seal.

3.05 BOARD INSTALLATION UNDER CONCRETE SLABS

A. Place insulation under slabs on grade after base for slab has been compacted.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.06 BATT INSTALLATION

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. Install with factory applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.

F. Staple or nail facing flanges in place at maximum 6 inches on center.

G. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

H. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over member face.

I. Tape seal tears or cuts in vapor retarder.

J. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

K. Coordinate work of this section with requirements for vapor retarder specified in Section 07 2500.

L. Coordinate work of this section with construction of air barrier seal specified in Section 07 2500.
3.07 FIELD QUALITY CONTROL
   A. See Section 01 4000 - Quality Requirements, for additional requirements.
   B. Coordination of ABAA Tests and Inspections:
      1. Provide testing and inspection required by ABAA QAP.
      2. Notify in ABAA writing of schedule for air barrier work.  Allow adequate time for testing and inspection.
      3. Cooperate with ABAA testing agency.
      4. Allow access to air barrier work areas and staging.
      5. Do not cover air barrier work until tested, inspected, and accepted.

3.08 PROTECTION
   A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION
SECTION 07 2129
SPRAYED INSULATION

PART 1  GENERAL

1.01  SECTION INCLUDES
A. Cellulose insulation applied to underside of structure.
B. Surface sealer.

1.02  REFERENCE STANDARDS

1.03  SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on materials, describing insulation properties.
C. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.
D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.04  QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of experience.
C. Products Specified by Flammability or Combustibility Criteria: Listed and classified by Underwriters Laboratories Inc.

1.05  MOCK-UP
A. Provide mock-up, 8 feet long by 8 feet wide, illustrating wall construction and ceiling construction.
B. Locate where directed.
C. Mock-up may remain as part of the Work if approved by Owner and Architect.

1.06  FIELD CONDITIONS
A. Do not install insulation, sealer when ambient and surface temperatures are lower than forty-five degrees F unless otherwise indicated by manufacturer.
B. Maintain acceptable ambient and substrate surface temperatures prior to, during, and after installation of primer and insulation materials and overcoat.

PART 2  PRODUCTS

2.01  MANUFACTURERS
A. Cellulose Fiber:
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02  MATERIALS
A. Cellulose Fiber Insulation: ASTM C739; treated cellulose fiber, white color.
   1. K (ksi) factor: 0.22 K, when tested in accordance with ASTM C177.
2. Density: 2 lb/cu ft., when tested in accordance with ASTM D1622.
3. NRC: 0.75 for 1 inch thickness.
5. Flame Spread and Smoke Developed Index: 10/0, when tested in accordance with ASTM E84.

2.03 ACCESSORIES
A. Primer: As required by insulation manufacturer.
B. Insulation Surface Sealer: Clear, latex base.
C. Overcoat: Cementitious type, spray applied; flame spread and smoke developed index in accordance with ASTM E84.
D. Insulation Stop: Plastic, profiled and sized to suit rafter spacing and wall/sloped roof configuration.

PART 3 EXECUTION
3.01 EXAMINATION
A. Verify that surfaces are clean, dry, and free of matter that may inhibit adhesion.
B. Verify that ceiling hangers and supporting clips have been installed correctly.
C. Verify other work on and within spaces to be insulated is complete prior to application.

3.02 PREPARATION
A. Mask and protect adjacent surfaces from overspray or damage.
B. Apply primer in accordance with manufacturer's instructions.

3.03 INSTALLATION
A. Install insulation in accordance with manufacturer's instructions.
B. Install insulation to a uniform monolithic density without voids.
C. Install to a minimum cured thickness as recommended by manufacturer for surfaces affected.
D. Install to achieve a thermal resistance R-value as indicated on the drawings.
E. Tamp wet insulation surface to improve adhesion and to achieve a smooth surface.
F. Apply overcoat to a uniform minimum thickness as recommended by manufacturer.
   1. Apply overcoat monolithically, without voids to fully cover insulation.
   2. Apply at plenum spaces and to minimize particle disturbance by moving air.

3.04 FIELD QUALITY CONTROL
A. Independent agency field inspection will be provided under provisions of Section 01 4000 - Quality Requirements.
B. Inspection will include verification of insulation and sealer thickness and density.

3.05 PROTECTION
A. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION
PART I    GENERAL

1.01 System Description

A. NVELOP consists of materials and installation for tie-in of dissimilar CCM thermal and moisture protection products. Tie-ins are made with a physical overlap of CCM flashing or membrane to form an air and water tight connection of one CCM product to a neighboring CCM product.

B. Dissimilar CCM thermal and moisture protection products can be joined with NVELOP tie-ins as follows:

1. Below grade waterproofing to above-grade wall air and water resistive barriers.

2. Low-slope roof air & vapor barriers to above-grade wall air and water resistive barriers.

3. Fully-adhered single-ply roofing membranes to above-grade wall air and water resistive barriers.

1.02 Design Considerations

A. The building envelope encompasses the entire surface of a building, including roofs, walls, foundations and floor slabs that separate the conditioned space from the outdoor environment. The main purposes of thermal and moisture protection products of the building envelope are to keep water out and to allow thermal control within the building. Building envelope design is a major factor in determining the amount of energy a building will use in its operation.

B. Continuity of air and water resistive barrier materials is essential for effective building envelope performance. Tie-ins of dissimilar products are often neglected or incorrectly executed. Missing or poor tie-ins are a common source of air and water leakage. NVELOP provides a remedy to this problem.

C. The NVELOP specification provides tie-ins of dissimilar CCM products. The NVELOP tie-ins provide junction of neighboring dissimilar CCM products with an air and water-tight, durable connection, composed of compatible materials.

D. CCM products shall be selected and installed according to the requirements in the respective CCM roofing, waterproofing and wall air & water resistive barrier product literature and specifications.
E. Whenever possible, use CCM’s standard published NVELOP details. If project-specific details are required, these shall be made to mimic the material overlap shown in corresponding published NVELOP details. Project-specific tie-in details shall be approved by CCM in writing before their installation.

F. The building envelope construction at tie-in conditions shall be of sound materials for acceptance of CCM products. Furthermore, these assemblies shall be constructed to deflect and drain moisture from exterior sources such as rain or ground water and to avoid entrapment or accumulation of moisture from interior sources such as humidification and occupancy.

1.03 Quality Assurance

A. Preconstruction meetings shall be held among the trades installing the tie-ins and related construction. Establish each trade’s responsibility and installation sequence for effective installation of tie-ins.

B. Build a mock-up(s) before proceeding with the Work, satisfactory to the Design Professional or Owner’s Representative. Mock-up(s) shall incorporate each type of tie-in.

C. Design Professional or Owner’s Representative shall perform visual inspections of thermal and moisture protection product tie-ins on the Project with sufficient frequency that all Work is inspected before it is covered up.

D. CCM requires the use of Carlisle-supplied products for use in the subject assemblies of the building envelope.

E. There must be no deviations made from Carlisle’s specification or Carlisle’s approved drawings (where applicable) without the PRIOR WRITTEN APPROVAL of Carlisle.

1.04 Submittals

A. Complete the NVELOP or NVELOP PLUS warranty application form as directed in that document.

B. With the warranty application, submit all CCM-approved, project-specific details.

C. Contractor to remit $500 payment to Carlisle Construction Materials Warranty Department for the NVELOP PLUS warranty.

1.05 Warranty

A. Warranty provides for replacement of CCM materials in tie-ins which have exhibited air or water leakage as a result of product manufacturing defects or as a result of chemical incompatibility of neighboring CCM products.

B. NVELOP-PLUS 10-year or 15-year material warranty. The shortest-warranted CCM product of the tie-ins shall be greater than or equal to the duration of the NVELOP-PLUS warranty.
### 1.06 Code Approvals

A. For code approvals achieved with the CCM roofing, waterproofing or air & water resistive barrier systems, refer to the respective CCM product’s literature.

### PART II PRODUCTS

#### 2.01 General

A. Among a long list of products and components offered by CCM, outlined below are the most suited products for the specific applications listed.

B. **Manufacturer:** For assistance with NVELOP, the Carlisle Construction Materials Design Services team can be reached at 800-479-6832. Building envelope products contained in this section are manufactured by these CCM companies:

1. Carlisle Coatings & Waterproofing Incorporated (CCW), 900 Hensley Lane, Wylie, TX 75098, Phone: (800) 527-7092.

2. Carlisle SynTec Systems, P.O. Box 7000, Carlisle, PA 17013, Phone: (800) 453-2554

3. Carlisle WIP Products, P.O. Box 7000, Carlisle, PA 17013, Phone: (888) 717-1440

4. Hunter Panels - A division of Carlisle Construction Materials, LLC, 15 Franklin Street, Portland, ME 04101, Phone (888) 746-1114

5. Insulfoam – A division of Carlisle Construction Materials, LLC, 19727 57th Avenue East, Puyallup, WA 98387, Phone 800-248-5995

#### 2.02 CCW Waterproofing Products for Below-Grade Structures and Above-Grade Decks

<table>
<thead>
<tr>
<th>Application</th>
<th>Main Products</th>
<th>Assembly Description</th>
</tr>
</thead>
</table>
| Self-Adhered Sheet for Vertical Below Grade Wall Waterproofing | Membrane: **MiraDRI 860/861** or **MiraDRI 860 ULT**<br>Engineered Drainage Composite: **MiraDRAIN 6000 series** | • 60-mil (1.5 mm) thick self-adhered sheet waterproofing membrane bonded to substrate treated with approved CCW contact adhesive.  
• Engineered drainage composite placed over membrane.  
• Backfill against drainage composite. |
2.03 CCW Membrane Air and Water Resistive Barriers (WRBs) – For Above-Grade Exterior Walls

| Fluid-Applied, Vapor-Permeable Air and Water Resistive Barrier | Fire-Resist Barritech VP Or Fire-Resist Barritech VP LT | 40-mil (1 mm) dry thickness fluid-applied membrane bonded to substrate. Optional: Exterior insulation installed over membrane. Code compliant exterior cladding system fastened to structure through membrane and insulation |

2.04 CCW Foam Sheathing Continuous Insulation Air and Water Resistive Barriers for Above Grade Exterior Walls

<table>
<thead>
<tr>
<th>Application</th>
<th>Main Products</th>
<th>Assembly Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reinforced Foil-Faced Polyiso with WRB Tape and Flashings</td>
<td>Polyiso Foam Sheathing: R2+ SHEATHE WRB Tape: Foil-GRIP 1402 WRB Flashing: Aluma-GRIP 701</td>
<td>• Polyiso foam sheathing boards fastened to structure. • WRB tape installed over board joints, WRB flashing installed over openings, corners and terminations. • Code compliant exterior cladding system fastened to structure through polyiso foam sheathing. • Code-approved thermal barrier installed between polyiso foam sheathing and interior space</td>
</tr>
</tbody>
</table>

2.05 Carlisle SynTec Systems Roofing Assemblies

Fully-adhered single ply roof membranes are installed with insulation, cover boards, adhesives, edging, flashings and other accessories as specified by Carlisle SynTec Systems in the respective roof system specification. EPDM, TPO and PVC single-ply roofing membranes applicable to the NVELOP specification are listed below:
<table>
<thead>
<tr>
<th>Brand Name</th>
<th>Type</th>
<th>Color</th>
<th>Available Thicknesses</th>
<th>Application Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sure-White FleeceBACK</td>
<td>Fleece-Backed</td>
<td>White</td>
<td>100-mil (2.5 mm)</td>
<td>Low rise foam adhesive</td>
</tr>
</tbody>
</table>

Notes:
*If mechanical fasteners are used to secure membrane, a roof deck air barrier is required for air tightness.

PART III EXECUTION

3.01 Pre-Installation
A. Ambient and substrate conditions shall be acceptable according to CCM product literature.
B. Installers shall have full, safe access to the job and shall follow safety measures indicated on product SDSs and federal, state and local regulations.
C. Establish appropriate storage and handling procedures for hazardous, freeze-sensitive or fragile materials.

3.02 Installation
A. Install products according to instructions in CCM literature and details.
B. Provide tie-ins as shown in NVELOP details or in CCM-approved, project-specific details.
C. Do not cover Work until it has been inspected and approved by the Design Professional or the Owner’s Representative.

3.03 Repair and Protection
A. Protect Work from damage during construction
B. Verify that penetrations made through thermal and moisture protection systems by other trades are sealed
C. Do not allow products to be exposed for longer than recommendations in CCM literature.
D. Repair or replace all damaged materials according to CCM’s instructions.

END OF SECTION
SECTION 07 2500
WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water-Resistive Barrier: Under exterior wall cladding, over sheathing or other substrate; not air tight or vapor retardant.

B. Vapor Retarders: Materials to make exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls water vapor resistant and air tight.

C. Air Barriers: Materials that form a system to stop passage of air through exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Vapor retarder under concrete slabs on grade.

B. Section 05 4000 - Cold-Formed Metal Framing: Water-resistive barrier under exterior cladding.

C. Section 06 1000 - Rough Carpentry: Factory applied weather barrier on sheathing.

D. Section 06 1000 - Rough Carpentry: Sheathing with integral water-resistive and air barrier.

E. Section 07 2100 - Thermal Insulation: Vapor retarder installed in conjunction with batt insulation.

F. Section 07 5323 - Elastomeric Membrane Roofing: Vapor retarder installed as part of roofing system.

G. Section 07 6200 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.

H. Section 07 9005 - Joint Sealants: Sealing building expansion joints.

I. Section 09 2116 - Gypsum Board Assemblies: Water-resistive barrier under exterior cladding.

1.03 DEFINITIONS

A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.

B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.

C. Vapor Retarder: Air tight barrier made of material that is relatively water vapor impermeable, to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.

1. Water Vapor Permeance: For purposes of conversion, 57.2 ng = 1 perm.

D. Water-Resistive Barrier: Water-shedding barrier made of material that is moisture resistant, to the degree specified, intended to be installed to shed water without sealed seams.

1.04 REFERENCE STANDARDS


G. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.


1.05 SUBMITTALS

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

B. Product Data: Provide data on material characteristics.

C. Shop Drawings: Provide drawings of special joint conditions.

D. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.

E. Manufacturer's Installation Instructions: Indicate preparation.

F. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.

G. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of all contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.

H. Testing Agency Qualification Statement.

1.06 QUALITY ASSURANCE

A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/sle:
   1. Installer Qualification: Use accredited contractor, certified installers, evaluated materials, and third-party field quality control audit.
   2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

B. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.07 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 PRODUCTS

2.01 WEATHER BARRIER ASSEMBLIES

A. Water-Resistive Barrier: Provide on exterior walls under exterior cladding.
   1. Use building paper unless otherwise indicated.

B. Air Barrier:
   1. On outside surface of inside wythe of exterior masonry cavity walls use air barrier coating.
   2. On outside surface of sheathing of exterior walls use air barrier coating.

C. Interior Vapor Retarder:
   1. On inside face of studs of exterior walls, under cladding, use mechanically fastened vapor retarder sheet.
   2. On inside face of masonry and concrete walls use vapor retarder coating.
   3. On elevated floors over enclosed soffit space use vapor retarder coating.
D. Exterior Vapor Retarder:
   1. On outside surface of inside wythe of masonry cavity wall use vapor retarder coating.
   2. On outside surface of sheathing use vapor retarder coating.
   3. On under side of elevated floors over enclosed soffit space use vapor retarder coating.

2.02 WATER-RESISTIVE BARRIER MATERIALS (NEITHER AIR BARRIER NOR VAPOR RETARDER)

A. Building Paper: Asphalt-saturated Kraft building paper complying with requirements of ICC-ES AC38 Grade D.
   1. Water Penetration Resistance: Withstand a water head of 21 inches, minimum, for minimum of 5 hours, when tested in accordance with AATCC Test Method 127.
   2. Manufacturers:
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Plastic Sheet: Polymeric-based sheet complying with requirements of ICC-ES AC38 Grade D with 60-minute water-resistance; do not use polyethylene sheet.
   1. Manufacturers:

C. Weather-Resistive Barrier, Composite: Tear-resistant polyester sheet with UV-resistant acrylic coating.
   1. Air Permeance: 0.178 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178.
   2. Water Vapor Permeance: 200 perms, minimum, when tested in accordance with ASTM E96 Procedure A (desiccant procedure).
   3. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for maximum of 210 days weather exposure.
   4. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less (Class A), when tested in accordance with ASTM E84.
   6. Seam and Perimeter Tape: As recommended by sheet manufacturer.
   7. Products:
   b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)

A. Air Barrier Sheet, Mechanically Fastened:
   1. Air Permeance: 0.004 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178.
   2. Water Vapor Permeance: 5 perms, minimum, when tested in accordance with ASTM E96 Procedure A (desiccant procedure).
   3. Water Penetration Resistance: Withstand a water head of 21 inches, minimum, for minimum of 5 hours, when tested in accordance with AATCC Test Method 127.
   4. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for minimum of 180 days weather exposure.
   5. Surface Burning Characteristics: Flame spread index of 25 or less, and smoke developed index of 50 or less, when tested in accordance with ASTM E84.
   7. Seam and Perimeter Tape: Polyethylene self adhering type, mesh reinforced, 2 inches (50 mm) wide, compatible with sheet material; unless otherwise specified.
   8. Products:
b. DuPont Building Innovations; Tyvek Commercial Wrap D with Tyvek Fluid Applied
Flashign - Brush Formulation, Tyvek Fluid Applied Flashing and Joint Compound,
FlexWrap NF, StraightFlash, StraightFlash VF, Tyvek Wrap Caps, and Tyvek Tape:
e. Hohmann & Barnard, Inc; www.h-b.com/sle.
g. Kingspan Insulation LLC; GreenGuard RainDrop Building Wrap:
h. VaproShield, LLC; WrapShield: www.vaproshield.com.
i. Substitutions: See Section 01 6000 - Product Requirements.

B. Air Barrier Sheet, Self-Adhered:
1. Air Permeance: 0.004 cubic feet per minute per square foot maximum, when tested in
accordance with ASTM E2178.
2. Water Vapor Permeance: 10 perms, minimum, when tested in accordance with ASTM
E96/E96M Procedure A (desiccant procedure).
3. Water Penetration Resistance Around Nails: Pass, when tested in accordance with
4. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for
maximum of 150 days weather exposure.
5. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed
index of 450 or less (Class A), when tested in accordance with ASTM E84.
7. Seam and Perimeter Tape: As recommended by sheet manufacturer.
8. Products:
a. Carlisle Coatings and Waterproofing, Inc.; Fire Resist 705 VP:
www.carlisleccw.com/sle.
d. Substitutions: See Section 01 6000 - Product Requirements.

C. Air Barrier, Fluid Applied: Vapor permeable, elastomeric waterproofing.
1. Air Barrier Coating:
b. Acceptable Substrates: 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.
c. Adhesion to Paper and Glass Mat Faced Sheathing: Sufficient to ensure failure due
delamination of sheathing.
d. Dry Film Thickness (DFT): 6 mils, minimum.
e. Air Permeance: 0.004 cubic feet per minute per square foot, maximum, when tested
in accordance with ASTM E2178.
f. Water Vapor Permeance: 5 perms, minimum, when tested in accordance with
ASTM E96, Procedure B.
g. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for
minimum of 4 months weather exposure after application.
h. Elongation: 300 percent, minimum, when tested in accordance with ASTM D412.
i. Surface Burning Characteristics: Flame spread index of 25 or less, smoke
developed index of 450 or less, when tested in accordance with ASTM E84.
k. VOC Content: 100 g per L or less.
l. Code Acceptance: Comply with applicable requirements of ICC-ES AC212.
m. Sealants, Tapes and Accessories: As recommended by coating manufacturer.
n. Products:
1) 3M Company; www.3M.com/construction.
6) Substitutions: See Section 01 6000 - Product Requirements.

2. Air Barrier Membrane:
   b. Acceptable Substrates: 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.
   c. Adhesion to Paper and Glass Mat Faced Sheathing: Sufficient to ensure failure due to delamination of sheathing.
   d. Dry Film Thickness: 30 mils, minimum.
   e. Air Permeance: 0.004 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178.
   f. Water Vapor Permeance: 5 perms, minimum, when tested in accordance with ASTM E96/E96M, Procedure B.
   g. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for minimum of 3 months weather exposure.
   h. Elongation: 300 percent, minimum, when tested in accordance with ASTM D412.
   i. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
   k. VOC Content: 100 g per L or less.
   l. Code Acceptance: Comply with applicable requirements of ICC-ES AC212.
   m. Sealants, Tapes and Accessories: As recommended by coating manufacturer.
   n. Products:
      4) Substitutions: See Section 01 6000 - Product Requirements.

2.04 VAPOR RETARDER MATERIALS (AIR BARRIER AND WATER-RESISTIVE)

A. Vapor Retarder Sheet Type: Butyl, black color.
   1. Thickness: 45 mil.
   2. Water Vapor Permeance: 0.1 perm, maximum, when tested in accordance with ASTM E96.
   3. Seam Lap and Perimeter Adhesive: Elastomeric, same composition as sheet or other compatible material.
   4. Products:
      a. Substitutions: See Section 01 6000 - Product Requirements.

B. Vapor Retarder Sheet Type 2: ASTM D1970.
   1. Type: Rubberized asphalt bonded to thermoplastic sheet, self-adhesive.
   2. Thickness: 40 mil, nominal.
   3. Sheet Width: 18 inches, and 36 inches.
   4. Water Vapor Permeance: 0.05 perm, maximum, when tested in accordance with ASTM E96.
   5. Seam and Perimeter Tape: As recommended by sheet manufacturer.
   6. Products:
e. Substitutions: See Section 01 6000 - Product Requirements.

C. Vapor Retarder Sheet Type 3: Multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, complying with ASTM E1745, Class A; stated by manufacturer as suitable for application indicated. Single ply polyethylene is prohibited.
1. Water Vapor Permeance: 0.3 perm, maximum, when tested in accordance with ASTM E96.
2. Seam and Perimeter Tape: Polyethylene self-adhering type, mesh reinforced, 2 inches wide, compatible with sheet material.

D. Vapor Retarder Coating: Liquid applied, resilient, UV-resistant coating and associated joint treatment.
1. Dry Film Thickness: 40 mils, minimum.
2. Water Vapor Permeance: 1.0 perm, maximum, when tested in accordance with ASTM E96.
3. VOC Content: Less than 50 g per L when tested in accordance with 40 CFR 59, Subpart D (EPA Method 24).
4. Resistance to Fungal Growth: No growth when tested according to ASTM D5590.
5. Code Acceptance: Comply with applicable requirements of ICC-ES AC212.
7. Joint Preparation Treatment: Coating manufacturer's recommended method, either tape or reinforcing mesh saturated with coating material.
8. Products:
   c. Substitutions: See Section 01 6000 - Product Requirements.
9. Joint Filler: As recommended by coating manufacturer and suitable to the substrate.

2.05 ACCESSORIES

A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.

1. Composition: Precured silicone rubber.
2. Thickness: 70 mil, nominal.
3. Products:
   b. Substitutions: See Section 01 6000 - Product Requirements.

C. Pre-formed Transition Membrane: Semi-rigid silicone composition, tapered edges, tear resistant.
1. Products:
   c. Dow Corning Corporation; Silicone Transition Strip: www.dowcorning.com/construction/sle.
   d. Substitutions: See Section 01 6000 - Product Requirements.

D. Vapor Retarder Tape: Coated polyester film with acrylic adhesive backing; pressure sensitive.
1. **Products:**
   b. Substitutions: See Section 01 6000 - Product Requirements.

E. Thinners and Cleaners: As recommended by material manufacturer.

F. Attachment Battens: Galvanized steel bars, with anchors of same material.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that surfaces and conditions are ready to accept the work of this section.

**3.02 PREPARATION**

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive adhesives in accordance with manufacturer's instructions.

**3.03 INSTALLATION**

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

B. Water-Resistive Barriers: Install continuous barrier over surfaces indicated, with sheets lapped to shed water but with seams not sealed.

C. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

D. Vapor Retarders: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

E. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.

F. Mechanically Fastened Sheets - On Exterior:
   1. Install sheets shingle-fashion to shed water, with seams generally horizontal.
   2. Overlap seams as recommended by manufacturer but at least 6 inches.
   3. Overlap at outside and inside corners as recommended by manufacturer but at least 12 inches.
   4. Attach to framed construction with fasteners extending through sheathing into framing. Space fasteners at 12 to 18 inches on center along each framing member supporting sheathing.
   5. Attach to masonry construction using mechanical fasteners spaced at 12 to 18 inches on center vertically and maximum 24 inches on center horizontally.
   6. For applications specified to be air tight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners recommended by the manufacturer.
   7. Where stud framing rests on concrete or masonry, extend lower edge of sheet at least 4 inches below bottom of framing and seal to foundation with sealant.
   8. Install water-resistive barrier over jamb flashings.
   9. Install air barrier and vapor retarder UNDER jamb flashings.
   10. Install head flashings under weather barrier.
   11. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.

G. Mechanically Fastened Sheets - Vapor Retarder On Interior:
   1. When insulation is to be installed in assembly, install vapor retarder over insulation.
   2. Anchor to metal framing using seam tape, adhering at least one-half of tape width to substrate.
4. Locate laps at a framing member; at laps fasten one sheet to framing member then tape overlapping sheet to first sheet.
5. Seal entire perimeter to structure, window and door frames, and other penetrations.
6. Where conduit, pipes, wires, ducts, outlet boxes, and other items are installed in insulation cavity, pass vapor retarder sheet behind item but over insulation and maintain air tight seal.

H. Self-Adhesive Sheets:
1. Prepare substrate in manner recommended by sheet manufacturer; fill and tape joints in substrate and between dissimilar materials.
2. Lap sheets shingle-fashion to shed water and seal laps air tight.
3. Once sheets are in place, press firmly into substrate with resilient hand roller; ensure that all laps are firmly adhered with no gaps or fishmouths.
4. Use same material, or other material approved by sheet manufacturer for the purpose, to seal to adjacent construction and as flashing.
5. At wide joints, provide extra flexible membrane allowing joint movement.

I. Coatings:
1. Prepare substrate in manner recommended by coating manufacturer; treat joints in substrate and between dissimilar materials as recommended by manufacturer.
2. Where exterior masonry veneer is to be installed, install masonry anchors before installing weather barrier over masonry; seal around anchors air tight.
3. Mastic Coating: Install by trowel or roller to minimum thickness of 1/4 inch; use sheet seal to join to adjacent construction, seal air tight with sealant.
4. Use flashing to seal to adjacent construction and to bridge joints.

J. Openings and Penetrations in Exterior Weather Barriers:
1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with at least 4 inches wide; do not seal sill flange.
3. At openings to be filled with non-flanged frames, seal weather barrier to all sides of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.
4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

3.04 FIELD QUALITY CONTROL
A. See Section 01 4000 - Quality Requirements, for additional requirements.
B. Coordination of ABAA Tests and Inspections:
1. Provide testing and inspection required by ABAA QAP.
2. Notify in ABAA writing of schedule for air barrier work. Allow adequate time for testing and inspection.
3. Cooperate with ABAA testing agency.
4. Allow access to air barrier work areas and staging.
5. Do not cover air barrier work until tested, inspected, and accepted.
C. Do not cover installed weather barriers until required inspections have been completed.
D. Obtain approval of installation procedures by the weather barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.
E. Take digital photographs of each portion of the installation prior to covering up.
3.05 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

B. Do not leave paper- or felt-based barriers exposed to weather for longer than one week.

END OF SECTION
SECTION 07 2713
FIRE RESISTANT, SELF-ADHERING MEMBRANE AIR & VAPOR BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. A self-adhered membrane and accessory products of fire-resistant composition for use as an air and vapor barrier in exterior walls.

B. Materials and installation to bridge and seal the following air leakage pathways and gaps:
   1. Connections of the walls to the roof air barrier
   2. Connections of the walls to the foundations
   3. Seismic and expansion joints
   4. Openings and penetrations of window frames, door frames, store front, curtain wall
   5. Barrier pre-cast concrete and other envelope systems
   6. Door frames Piping, conduit, duct and similar penetrations
   7. Masonry ties, screws, bolts and similar penetrations
   8. All other air leakage pathways through the walls

1.02 RELATED SECTIONS

A. Section 03 3000 - Cast-In-Place Concrete
B. Section 04 2000 - Unit Masonry
C. Section 07 2100 - Thermal Insulation
D. Section 07 2300 - Envelope Thermal and Moisture Protection
E. Section 07 5323 – Elastomeric Membrane Roofing
F. Section 07 62 00 - Sheet Metal Flashing and Trim: Metal through-wall flashings
G. Section 07 9005 – Joint Protection: Joint sealant materials and installation.
H. Section 08 1113 - Metal Door Frames
I. Section 08 8000 – Glazing

1.03 REFERENCES

A. American Association of Textile Chemists and Colorists (AATCC) Test Method 127. "Water Resistance – Hydrostatic Pressure Test"


F. ASTM D 1876 Standard Test Method for Peel Resistance of Adhesive


H. ASTM D 4073 Standard Test Method for Tensile-Tear Strength of Bituminous Roofing Membranes


L. ASTM E 154 Standard Test Methods for Water Vapor Retarders used in Contact with Earth under Concrete Slabs, on Walls or as Ground Cover

M. ASTM E 783 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors


P. ASTM E 2178 Standard Test Method for Air Permeance of Building Materials

Q. ASTM E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies


1.04 PERFORMANCE REQUIREMENTS

A. Installed product and accessories constitute a continuous air barrier, as described in ASHRAE Standard 90.1-2010 Section 5.4.3.1

B. Installed product and accessories shall perform as a liquid water drainage plane flashed to discharge to the exterior any incidental condensation or water penetration.
C. Installed product and accessories shall exhibit an air leakage rate, infiltration and exfiltration modes, measured after pressure cycling, not to exceed 0.2 L/s*m² at 75 Pa (0.040 CFM/ft² at 1.57 PSF) according to ASTM E 2357.

D. Installed product and accessories shall perform as a vapor barrier, installed on the predominantly warm side of the insulation.

E. For Type I, II, III and IV construction: Installed product and accessories shall be evaluated to NFPA 285 in wall assemblies of Project.

F. Product shall consist of nominal 0.040 inch thickness composite membrane consisting of an aluminum-faced cross-laminated high density polyethylene sheet laminated with a styrene-butadiene-styrene modified asphalt adhesive.
G. Product shall meet the following requirements:

<table>
<thead>
<tr>
<th>REQUIREMENT</th>
<th>RESULT</th>
<th>TEST METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Permeance</td>
<td>Not more than 0.02 L/s*m² at 75 Pa (0.004 CFM/ft² at 1.57 PSF)</td>
<td>ASTM E-2178</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>Not less than 40 lbf per inch</td>
<td>ASTM D-882</td>
</tr>
<tr>
<td>Puncture Resistance</td>
<td>Not less than 50 lbf</td>
<td>ASTM E 154</td>
</tr>
<tr>
<td>Tear Initiation and Propagation</td>
<td>Not less than 30 lbf, machine direction and cross direction</td>
<td>ASTM D 4073</td>
</tr>
<tr>
<td>Low Temperature Flexibility</td>
<td>No cracking at minus 20 degrees F, 1 inch mandrel</td>
<td>ASTM D 1970</td>
</tr>
<tr>
<td>Fastener Sealability</td>
<td>No water leaking through fastener penetration after 24 h.</td>
<td>ASTM D 1970</td>
</tr>
<tr>
<td>Water Resistance</td>
<td>Membrane specimen including a lap shall resist a 55 cm (22 inch) column of water for 5 hours, no leaking or wet through.</td>
<td>AATCC-127, modified static head generated with 5&quot;diameter PVC pipe sealed to specimen</td>
</tr>
<tr>
<td>Pull Adhesion</td>
<td>Not less than 16 lbf per square inch (or report value at substrate failure) on glass-faced gypsum sheathing and concrete masonry unit, substrate prepared with contact adhesive</td>
<td>ASTM D 4541, modified 4 inch puck</td>
</tr>
<tr>
<td>Lap Adhesion</td>
<td>Not less than 5 lbf per inch of width</td>
<td>ASTM D 1876</td>
</tr>
<tr>
<td>Water Vapor Permeance</td>
<td>Not more than 0.1 Perm</td>
<td>ASTM E-96, Method B</td>
</tr>
<tr>
<td>Surface Burning Characteristics.</td>
<td>Flame Spread Index: Not more than 25</td>
<td>ASTM E 84, sample tested at full coverage, cement board substrate, including surface preparation</td>
</tr>
<tr>
<td>Measurement of Heat Release Rate by Cone Calorimeter</td>
<td>Effective Heat of Combustion of 0 MJ/kg or less Peak heat release rate of 6.67 kW/m² or less Total heat release rate of 1.1 MJ/m² or less</td>
<td>ASTM E 1354, membrane applied to glass-faced gypsum sheathing, including surface preparation. 50 kW/m² heat flux.</td>
</tr>
</tbody>
</table>
1.05 SUBMITTALS

A. Provide submittals in accordance with Section 01 3000.

B. At bid submission, provide evidence to the Architect of installer qualification by the air & vapor barrier manufacturer.

C. Shop drawings showing locations and extent of air & vapor barrier and details of all typical conditions.

D. Manufacturer’s list and description of wall assemblies, incorporating product, tested per NFPA 285

E. Manufacturer's technical data sheets and material safety data sheets for product and accessories.

F. Manufacturer's installation instructions.

G. Certification of compatibility by manufacturer, listing all materials on the project with which the product and accessories may come into contact.

H. Sample of product and transition membrane, minimum 2 inch by 3 inch size.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Shall be experienced in applying the same or similar materials and shall be specifically approved in writing by Manufacturer.

B. Single-Source Responsibility: Obtain product and accessories from single manufacturer.

C. Product and Accessories shall comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

D. Pre-Installation Meeting: Convene two weeks prior to commencing Work of this Section.

E. Field-Constructed Mock-Ups: Prior to installation on Project, apply Product and Accessories on mock-up to verify details under shop drawing submittals, to demonstrate tie-ins with adjoining construction and other termination conditions and to become familiar with properties of materials in application:

1. Apply in field-constructed mockups of assemblies as specified in Mockups.

2. Construct typical exterior wall panel, 8 feet long by 8 feet wide, incorporating back-up wall, cladding, window and doorframe and sill, insulation, flashing, junction with roof system, and typical penetrations and gaps, illustrating interface of materials and seals

F. Test mock-up in accordance with Quality Assurance and test in accordance with ASTM E 783 and ASTM E1105 for air and water infiltration

G. Cooperate and coordinate with the Owner's inspection and testing agency. Do not cover any installed Product unless it has been inspected, tested and approved.
1.07 DELIVERY, STORAGE AND HANDLING
   A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, lot number and directions for storage.
   B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by Manufacturer.
   C. Avoid spillage. Immediately notify Owner and Architect if spillage occurs and start clean up procedures. Clean spills and leave area as it was prior to spill.

1.08 WASTE MANAGEMENT AND DISPOSAL
   A. Separate and recycle waste materials in accordance with Section 01 5000.
   B. Place materials defined as hazardous or toxic waste in designated containers.
   C. Ensure emptied containers are stored safely for disposal away from children.

1.09 PROJECT CONDITIONS
   A. Do not apply product or accessories during rain or accumulating snowfall.
   B. Apply product and accessories within approved ambient and substrate temperature range stated in manufacturer’s literature.
   C. Do not apply product or accessories over incompatible materials.
   D. Observe safety and environmental measures indicated in manufacturer’s MSDS, and mandated by federal, state and local regulations.

1.10 WARRANTIES: Provide the manufacturer’s minimum five year material warranty under provisions of Warranties.

PART 2 PRODUCTS

2.01 PRODUCTS AND MANUFACTURERS:
   B. Other equivalent products and manufacturers as approved by Design Professional

2.02 ACCESSORIES: Provide from same manufacturer as air barrier membrane.
   A. Detail Flashing: Similar composition to air barrier membrane. Factory slit to convenient sizes.
      1. CCW: Fire Resist 705 FR-A
      2. Others: As specified by air barrier membrane manufacturer
   B. Contact Adhesive: Liquid or spray-applied for preparing surfaces accepting air barrier membrane
1. CCW: CCW-702 Solvent-Based, CCW-702 LV VOC Compliant, Solvent-Based, CCW-702 WB Water-Based or CAV-GRIP™ Aerosol Spray
2. Others: As specified by air barrier membrane manufacturer

C. Detail Mastic: 1-part material for sealing details. Installation over air barrier membrane.
   1. CCW: Universal Single Ply Sealant
   2. Others: As specified by air barrier membrane manufacturer

D. Transition Membrane: Tough, elastomeric sheet capable of bridging a 1” gap. Minimum 60 mils thickness
   1. CCW: SURE-SEAL Pressure-Sensitive Elastoform
   2. Others: As specified by air barrier membrane manufacturer

E. Fill Compound: 2-part chemical cure sealant, compatible with adhesive side of air barrier membrane.
   1. CCW: CCW-703 V Modified polyurethane, 2-part or CCW-201 Polyurethane, 2-part
   2. Others: As specified by air barrier membrane manufacturer

2.03 RELATED MATERIALS BY OTHERS

A. Polyurethane Sealant: used for sealing membrane surface defects, penetrations and terminations:
   1. Approved by CCW: Sonneborn NP-1, Dymonic FC, S-M 7100 Permathane Pro-Installer by Schnee-Morehead Div, ITW or Xtra-Bond 7500 TX by Premiere Industrial Supply
   2. Others: As specified by air barrier membrane manufacturer

B. Silicone Sealant: used for sealing fenestration to air barrier membrane, surface defects and penetrations
   1. Approved by CCW: Dow-Corning 758, 790, 791 or 795 or Pecora AVB Silicone, 890, 891 or 895 or GE Silpruf or Silpruf LM
   2. Others: As specified by air barrier membrane manufacturer

C. Polyurethane Foam Sealant: used for sealing gaps around fenestration and other penetrations
   1. Approved by CCW: Great Stuff by Dow Chemical Company, FireBlock Gun Foam by TVM Building Products or Fireblock Foam Sealant by FOMO
   2. Others: As specified by air barrier membrane manufacturer

D. Insulation Adhesive: used for bonding foam board insulation to air barrier membrane
   1. Approved by CCW for polyisocyanurate insulation: LM 800 XL or CAV-GRIP Spray Contact Adhesive by Carlisle Coatings & Waterproofing Incorporated
   2. Approved by CCW for extruded polystyrene insulation: CAV-GRIP Spray Contact Adhesive by CCW, QB-300 Multi-Purpose Construction Adhesive by OSI or PL-300 VOC Foamboard Adhesive by Loctite
   3. Others: As specified by air barrier membrane manufacturer

PART 3 EXECUTION

3.01 EXAMINATION
A. Examine substrates, areas, and conditions affecting installation of the air & vapor barrier and accessory products for compliance with requirements. Verify that surfaces and conditions are suitable prior to commencing Work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Verify that wall assemblies are dried in, such that water intrusion will not occur from above, behind or around the air barrier installation.

C. Concrete shall be cured for a minimum of seven days. It shall be smooth, with sharp protrusions such as form joints ground flush. Honeycomb and holes/cracks exceeding ¼ inch across shall be filled with grout or mortar.

D. Surfaces shall be sound, dry and free of oil, grease, dirt, excess mortar or other contaminants.

E. Surfaces shall be supported and flush at joints without large voids or sharp protrusions.

F. Mortar joints shall be struck flush and shall be free of voids exceeding ¼ inch across. Mortar droppings shall be removed from brick ties and all other surfaces accepting air barrier.

G. Sheathing boards shall be flush at joints, with gaps between boards according to building code and sheathing manufacturer’s requirements. Sheathing boards shall also be securely fastened to the structure with proper fastener type, technique and spacing according to building code and sheathing manufacturer’s requirements. Sheathing boards shall be repaired or replaced if inspection reveals moisture damage, mechanical damage or if sheathing boards have exceeded the exposure duration or exposure conditions as required by the sheathing manufacturer.

H. Plywood, OSB, lumber or pressure-treated wood moisture content, measured with a wood moisture meter in the core of the substrate, shall be below 20%.

I. Inform Architect, Construction Manager and Owner in writing of:
   1. Cracks in concrete and masonry.
   2. Gaps or obstructions such as steel beams, angles, plates and projections which cannot be spanned or covered by Product or Accessories.
   3. Anticipated problems applying Product and Accessories over substrate.

3.02 SURFACE PREPARATION

A. Concrete masonry unit (CMU) wall shall be prepared as follows to accept the air & vapor barrier:
   1. Surfaces shall be free of contaminants such as grease, oil and wax on surfaces to receive membrane
   2. The CMU surfaces shall be free from projections.
   3. Strike all mortar joints flush to the face of the concrete block.
   4. Fill all voids and holes greater than ¼ inch across at any point with mortar, sealant or other approved fill material.
   5. Surface irregularities exceeding ¼ inch in height or sharp to touch shall be ground flush or made smooth.
   6. Fill around all penetrations with mortar, sealant or other approved fill material and strike flush.
7. If the surfaces cannot be made smooth to the satisfaction of the Architect, it will be the responsibility of the trade to alternatively apply a parging coat (typically one part cement to three parts sand) over the entire surface to receive Air & Vapor Barrier Membrane.
8. Remove mortar droppings on brick ties, shelf angles, brick shelves or other horizontal obstructions.

B. Fill cracks, gaps and joints exceeding ¼ inch width with fill compound or polyurethane sealant.

C. Fill rough gaps around pipe, conduit and similar penetrations with mortar, non-shrink grout, fill compound or polyurethane foam sealant shaved flush.

D. Apply a ¾ inch cant of fill compound at the intersection of the base of the wall and the footing.

3.03 INSTALLATION

A. Apply product over opaque wall surfaces as indicated in Project drawings.

B. Allow sealants used during surface preparation to cure fully before applying product.

C. Apply contact adhesive to all surfaces accepting product, according to manufacturer’s instructions.

D. Apply product to prepared surfaces according to manufacturer’s instructions and drawings.

E. Sequence installation to provide shingled laps. Lap neighboring sheets 2 inches minimum.

F. Install detail flashing or transition membrane according to manufacturer’s drawings and instructions at expansion joints, seismic joints, mechanical/electrical penetrations and similar conditions.

G. Install detail mastic, polyurethane sealant or silicone sealant covering non-water shedding laps, penetrations and similar surface defects.

3.04 SCHEDULE

A. Wall substrates and roof or temporary roof shall be in place, effectively enclosing interior space before proceeding with air barrier installation.

B. Seal penetrations made through installed product according to manufacturer’s instructions and drawings.

C. Seal fenestration to product with detail membrane, transition membrane, polyurethane sealant, silicone sealant or polyurethane foam sealant according to Project drawings.

D. Through-wall flashing may be installed before or after product. Seal termination of metal through-wall flashing to product with 6 inch width detail flashing.

E. Cladding shall be installed after product.
F. Rigid or semi-rigid insulation installed over product shall be attached with insulation adhesive and mechanical fastening according to insulation manufacturer and air barrier manufacturer’s instructions.

G. Sequence Work to enable air barrier continuity at wall-to.foundation, shelf angle, wall-to-roof, fenestration, different wall assemblies and other conditions providing challenges to air barrier continuity.

3.05 REPAIR AND PROTECTION

A. Protect from damage during application and remainder of construction period.

B. Inspect before covering. Repair or replace damaged material according to Manufacturer’s instructions and drawings.

C. Product and accessories are not designed for permanent exposure. Cover with insulation or exterior cladding as soon as schedule allows.

D. Outdoor exposure of installed product and accessories shall not exceed 180 days.

END OF SECTION
SECTION 07 4213
STANDING SEAM METAL FAÇADE PANELS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. All of the Contract Documents, including General and Supplementary Conditions and Division 1 Specification Sections, apply to the work of this Section.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

C. Coordinate work with that of all other trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK

A. The Work of this Section shall include, but not be limited to, the following:

1. Custom fabricated, mechanically attached, [bright rolled, prePATINA] zinc alloy [standing seam] [horizontal or vertical] wall panels as indicated on the Drawings, with all required accessories for a weatherproof installation.

2. Zinc coping and wall trim as indicated on the Drawings.

3. Penetrations (doors, windows, louvers, etc. in the wall assembly as indicated on Drawings.

B. Related Sections:

1. Section 05 4000 – Cold Formed Metal Framing
2. Section 06 1000 – Rough Carpentry
3. Section 07 2300 – Envelope Thermal and Moisture Protection
4. Section 07 5323 – Membrane Roofing
5. Section 07 6200 – Sheet Metal Flashing and Trim
6. Section 07 9005 – Joint Sealants

1.03 REFERENCES


1. RHEINZINK Division 7 Binder; 5TH Edition

2. SMACNA – Architectural Sheet Metal Manual; 7th Edition; Chapter 7 as a minimum standard or these specification and details where they exceed.

3. Names of the applicable building codes or other authorities having jurisdiction:

4. As all documents are intended to be complementary, in the event of contradiction in the references, the RHEINZINK Division 7 Binder; 5TH Edition will govern.

1.04 SUBMITTALS

A. Provide product data for [zinc wall panels] including manufacturer’s product specifications, standard details, and installation instructions.

B. Material Samples: submit bright rolled, prePATINA blue-grey, prePATINA graphite-grey samples of each material that is to be exposed in the finished work.

C. Shop Drawings: show layouts of panel joints on all wall elevations, details of panel terminations, edge conditions, joints, corners, panel profiles, supports, anchorages, trim, flashings, closures, and special details. Provide actual dimensions to the greatest extent possible for all plan, and detail conditions.

1. Details for shop fabricated sheet metal components, including seams and dimensions.

2. Details for joining and securing sheet metal components, including layout, number of required fasteners, clips and other attachments. Include pattern of seams and spacing of clips.
3. Details of termination points and assemblies, including fixed points.
4. Details of expansion joints, including showing direction of expansion and contraction.
5. Details of wall penetrations such as doors, windows, and louvers.
6. Details of special conditions, integrating mechanical, electrical and plumbing conditions.
7. Details of connections to adjoining work.

D. Engineering Calculations: Installer to provide positive and negative wind load pressure calculations and design performance certification of the wall panel system. Submit written certification showing calculations prepared and stamped by a Professional Structural Engineer licensed and registered in the project state. Show how design load requirements and other performance criteria have been satisfied.

1.05 QUALITY ASSURANCE

A. Fabricator/Installer Qualifications: the zinc material manufacturer and system fabricator shall train the fabricator and installer of the wall panel system. Installer shall submit list of successful installations of projects (3 minimum) that have similar complexity and scope.

B. Source: Provide panels, which are the product of one manufacturer. Provide secondary materials, which are acceptable to the zinc manufacturer. Award installation of zinc wall panels, including underlayment and membrane to a single firm for undivided responsibility.

C. Industry Standard: Except as otherwise shown or specified, comply with applicable recommendations and details of the RHEINZINK Division 7 Binder; 5TH Edition and SMACNA Architectural Sheet Metal Manual, 7th Edition. Conform to dimensions and profiles shown.

D. Field Measurements: Prior to fabrication of panel systems, verify drawing dimensions by taking field measurements of structure or substrates to receive panel systems.

E. Pre-Installation Conference: Prior to commencement of work, convene an installation conference to include the Architect, General Contractor and Zinc Panel Installer in order to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.
   1. Review methods and procedures for installation including, but not limited to: substrates, sub framing, penetrations and other preparatory work
   2. Review drawings, specifications, submittals and other contract documents
   3. Review construction schedule verifying availability of all materials, personnel and equipment needed to proceed and avoid delays
   4. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including cold temperatures

F. Mock-Up: As determined by the architect, provide wall panels cladding for exterior wall. Incorporate materials and methods of fabrication and installation identical with project requirements. Install mock-up at façade area location directed by Architect. Retain accepted mock-up as quality standard for acceptance of completed metal facade. If accepted, mock-up may be incorporated as part of metal wall work.
   1. Provide mock-up of sufficient size and scope to show typical pattern of [standing] seams, panel width, edge construction, and finish color.
   2. Extent of mock-ups to be indicated on the Drawings
   3. Obtain Architect's written approval of mock-ups prior to proceeding with installation of mock-up.

G. Soldering: In accordance with manufacturer’s instructions.

H. Corrosion Control: Avoid direct contact of incompatible materials including but not limited to copper, red rosin paper and masonry cleaning solutions.

1.06 PERFORMANCE REQUIREMENTS

B. Install sheet metal wall panels and underlayment system capable of withstanding exposure to weather without failure or infiltration of water into the building interior.

C. Wind Load: Design and engineer sheet metal wall assemblies, including size and spacing of attachment devices, meeting requirements engineering calculations and local building codes.

D. Thermal Movement: Provide systems and detail connections, which allow for thermal movement resulting from ambient temperature range of -4 degrees F to 176 degrees F.

E. Structural Performance: Provide metal panels, anchors and attachments, which resist loads, required by code and loads as indicated on the Drawings without permanent deflection or deformation. Information on Drawings referring to specific design of attachment, panel stiffening, and structural systems is intended for information only. System performance, based on project conditions and compliance with all applicable codes and loading requirements, shall be the responsibility of the panel fabricator and installer.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in unopened factory labeled packages. Protect from all possible damage. All zinc to be transported according to manufacturer’s recommendations.

B. Store and handle in strict compliance with manufacturer’s instructions and recommendations.
   1. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weatherproof ventilated covering. Slope cover to shed moisture. Allow for free airflow around covered material to exchange outside air.
   2. Require all personnel to wear clean white cotton gloves when handling and installing zinc panels and accessories when no strippable film is present.
   3. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.
   4. Store metal wall panels so that they will not accumulate water or excess moisture.

C. Exercise care in unloading, storing, and erecting panels to prevent bending, warping, or surface damage.

D. Sequence deliveries to avoid delays, but minimize on-site storage.

1.08 WARRANTY

A. Material Only Warranty: provide X-year limited warranty for Titanium-Zinc alloy from original rolling mill manufacturer. Warranty to cover the material quality of the sheet/ coil material used to fabricate sheet metal flashing & trim profiles appropriate for zinc installation.

B. Fabrication Warranty: provide X-year fabrication warranty against sharp bends that fracture the metal, tears, and equipment induced damage to the Architectural Zinc sheet or coil. Installation Warranty: provide X-year guarantee covering the proper material or product application preventing failure due to hot-water corrosion, damage due to inappropriate slip sheet, absorptive separation material, or other installer induced failure.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering metal wall panel materials that may be incorporated in the work include:

   1. RHEINZINK America, Inc.
      Woburn, MA 01801 ph: (781) 729.0812
      Regional Sales Manager: Chuck Bell-phone:302.660.6407.
B. Zinc Alloy Sheet/Coils:
   1. Titanium Zinc Alloy whose base is electrolytic high grade with a 99.995% Zn degree of purity and alloying additives of 0.08% - 1.0% copper and 0.07% - .12% titanium, .001% - .015% aluminum in accordance with ASTM B69-13 – Architectural Rolled Zinc - Type 1 and Type 2.
      a. prePATINA Bright Rolled
      b. prePATINA: pickling process
         i. Blue-grey (BG)
         ii. Graphite Grey (GG)
      c. prePATINA: BG or GG with ProRoofing backside coating
   2. Minimum Panel Thickness: [0.7mm (24 ga.), 0.8 mm (22 ga.), 1.0 mm (20 ga.)]
   3. Minimum Flashing Thickness: 0.7 mm (24 ga.)

C. Panel Fabricator or System Manufacturer:
   1. Local/ Regional Sheet Metal Fabrication Shop
      a. Select wall panel fabricator that has the equipment and personnel capable of providing quality zinc wall panel profiles as indicated on the drawings.
      b. Installer’s option to purchase prefabricated wall panels as provided by an approved and experience RHEINZINK system partner or fabricator.

2.02 FRAMING

A. Provide additional sub framing components, hats, zees or similar light-gauge metal profile to provide air space as indicated on drawings. All framing members and components shall be fabricated from ASTM A525 G90 galvanized sheet steel. Provide all secondary framing members as required for panel installation whether indicated or not on the architectural drawings.

B. Coordinate wall panel sub framing support with cold-formed metal framing, plywood sheathing, exterior gypsum sheathing and furring, for complete structural support for performances indicated. Refer to Section for related requirements.

2.03 ACCESSORIES

A. Provide all components necessary for a complete, functional, weatherproof assembly including, but not limited to, trims, copings, fascias, sills, flashings, counter flashings, door frame trim, corner units, clips, wall caps, copings, sealants, closures and fillers. Metal materials shall match panels and be zinc compatible.

B. Clips & Fasteners: Provide stainless steel concealed clips and stainless steel fasteners; supplied in accordance with manufacturer’s recommendations and to meet the load requirements as specified by architect and confirmed by engineering calculations. Attachment clips shall permit expansion and contraction of the panel system throughout the specified temperature range. When permeable air barrier sheets are used and as required by the architect to resist liquid water penetration at the fastener penetration, provide fasteners with watertight washer gaskets (such as self-adhered membrane).

C. Solder: Lead-tin solder containing 50% tin and 50% lead in accordance with ASTM B32 – 08 or lead-free solder. Flux: Felder ZD-Pro or equal.

D. Self-adhered Waterproof Underlayment: non-permeable self-adhering, high-temperature composite, butyl rubber-based, polyethylene-backed membrane such as Vycor Ultra as or other high-temperature rubberized-asphalt sheet.

E. Permeable Underlayment: Permeable breather type underlayment membrane: Wallshield as manufactured by Vaproshield or A.Proctor Group (note fastener gasket requirement).
F. Air Barrier Underlayment: Vapor permeable sheet underlayment: Tyvek Commercial Wrap or equal (note fastener gasket requirement).

G. Sealants and Accessories:
   1. Seam Sealing Tape: pressure-sensitive 100 per cent solids polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, non-sag, non-toxic non-staining tape.
   2. Joint Sealant: DOW 795, or other documented pH neutral sealant
   3. Backer rod shall be extruded polyethylene foam as DOW ETHAFOAM SB or equal.

2.04 PANEL FABRICATION

A. General: Custom fabricate sheet metal wall panels to comply with details shown and Binder; 5TH Edition that apply to the design, dimensions (pan width and seam height), geometry, metal thickness, and other characteristics of installation indicated. Shops fabricate sheet metal wall panels and accessories to greatest extent possible.
   1. Standing-Seam wall Panels: Form standing-seam pans from continuous metal sheets, with male & female single lock standing seam panel edges on two sides with a finished seam height of 1 inch unless otherwise noted.
   2. Apply bituminous coating or other permanent separation materials on concealed panel surfaces where panels would otherwise be indirect contact with substrate materials that are non-compatible or could result in corrosion or deterioration of either material or finishes.

B. Fabricate sheet metal wall panels to allow for expansion in running work sufficient to prevent leakage, damage, and deterioration of the Work. Form exposed sheet metal work to fit substrates without excessive oil canning, buckling, and tool marks, true to line and levels indicated, and with exposed edges folded back to form hems.
   1. Lay out sheet metal wall panels so cross seams, when required, are made in direction of flow with higher pans overlapping lower pans. Stagger cross seams.
   2. Form and fabricate sheets, seams, strips, cleats, edge treatments, integral flashing, and other components of metal wall to profiles, patterns, and drainage arrangements shown and as required to resist water infiltration without excessive use of sealants (dry joints) while also allowing any water infiltration behind the wall panels to weep out.

C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with non-acidic sealant (concealed within joints).

D. Sealant Joints: Where movable, non-expansion-type joints are indicated or required to produce weather tight seams, form metal to provide for proper installation of elastomeric sealant in compliance with SMACNA standards. In general, panel joints are intended to be dry, sealant-free, to facilitate air movement and drying behind the wall panels.

PART 3 – EXECUTION

3.01 INSPECTION

A. Contractor shall inspect all surfaces, areas and other contingent construction in or to which his work is to be installed and insure himself that they are in proper condition to receive the work to be performed under this Section.

B. Verify that sheathing surfaces are sound, dry, properly secured and that provision has been made for flashings, anchorage, and all other interface items attaching to or penetrating through the Work of this Section.
C. The Contractor shall notify the Architect in writing, before any work is installed, of any condition requiring correction. Failure to make such a report shall be construed as acceptance of the existing conditions and the responsibility to provide an acceptable installation.

3.02 PREPARATION

A. Verify field dimensions before fabrication. Notify Architect of any discrepancies between field measurements and dimensions indicated in Construction Documents.

B. Place [air barrier, permeable underlayment, waterproof] membrane on substrate surfaces to receive metal panels; comply with manufacturer’s instructions.
   1. Coordinate installation of underlayment with metal cladding, flashing, trim and coping to provide a weatherproof, secure and non-corrosive installation.
   2. For underlayment end and side laps, see underlayment manufacturer’s instructions for proper attachment, seaming, and termination recommendations.

C. For breather-type permeable /air barrier membranes, consult the architect for strategies preventing infiltration through fastener holes by applying sealant to backside of clips.

3.03 INSTALLATION

A. Manufacturer’s Recommendations: Except as otherwise shown or specified, comply with recommendations and instructions of manufacturer of sheet metal being fabricated and installed.
   1. Do not install in inclement weather
   2. Do not install over a damp substrate
   3. If covering of zinc panels is required, provide free airflow around the zinc material to manufacturer’s requirement to prevent white rust.

B. Install work to be truly straight and square or conform to curvilinear geometry indicated on drawings.
   1. Fabricate and install work with lines and corners of exposed units true and accurate.
   2. Form exposed faces free of buckles, excessive waves, and avoidable tool marks considering temper and reflectivity of metal.
   3. Shim and align panel units within installed tolerance of ¼ inch in 20’ –0”
   4. All seams shall be of uniform appearance and dimensions, straight and level with minimum exposure of solder and sealant.
   5. Except as otherwise shown, fold back sheet metal to form a hem on concealed side of exposed edges.
   6. Form all seams to be weatherproof, leaving room for expansion and contraction with specified and required tolerances.

C. Conceal fasteners and expansion provision where possible in exposed work, and locate so as to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

D. Provide work as indicated on approved shop drawings
   1. Form and fabricate sheets, seams, strips, cleats, edge treatments, integral flashings, and other components of metal wall cladding to profiles, patterns, and drainage arrangements shown and as required for water shedding construction. Ensure that all shop & field fabricated bends have an acceptable “rounded” or radius bend. NO SHARP BREAKS.

E. Separate non-compatible materials with a rubberized asphalt underlayment.
F. Install work to meet specified performance requirements.

3.04 CLEANING AND PROTECTION

A. Remove protective film (if any) from zinc panel surfaces promptly upon installation (or prior if film covers any concealed seam areas) with care to avoid damage to finish.

B. Clean exposed metal surfaces of substances that would interfere with uniform oxidation and weathering and as recommended by panel manufacturer and maintain in a clean condition during construction. Please reference RHEINZINK Cleaning Recommendations and Maintenance Instructions.

C. Ensure that cleaning by other trades working in proximity to zinc installation is in accordance with the recommendations of the zinc manufacturer.

D. Damaged units: Replace panels and other components of the work that have been damaged or have deteriorated beyond successful repair by means of finish touch-up or similar minor repair.

3.05 RECYCLING

A. Collect all zinc drop-offs (scrap) and return to local scrap metal recycling facility for current market monetary return.

3.06 CLEAN-UP

A. During the progress of the work, keep premises clear of debris resulting from these operations and remove surplus and waste materials from the site as soon as possible.

B. Upon completion of the work, Contractor shall remove from the site all equipment and materials used on the work as well as any debris resulting from the operations.

END OF SECTION
SECTION 07 4265
RIGID FOAM BOARD INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Polyisocyanurate foam rigid board insulation.

1.02 RELATED SECTIONS

A. Section 07 2100 - Thermal Insulation.
B. Section 07 2129 – Sprayed Insulation.
C. Section 07 2300 - Envelope Thermal and Moisture Protection.
D. Section 07 4213 - Metal Wall Panels.
E. Section 07 9005 - Joint Sealants.
F. Section 09 2116 - Gypsum Board.

1.03 REFERENCES

A. ANSI/UL 1256-[02], Standard for Fire Test of Roof Deck Constructions.
D. [ASTM C920-[08], Standard Specification for Elastomeric Joint Sealants.]
K. FM 4880-[2005], Approval Standard - Wall-Ceiling Construction Metal-faced Class 1 Rated to Max 30 ft High.
L. Federal Specification HH-I-1972/1, Class 2 Insulation Board, Thermal, Polyurethane or Polyisocyanurate, Faced with Aluminum Foil on Both Sides of the Foam.

1.04 PERFORMANCE REQUIREMENTS

A. Materials for This Section: Provide continuous thermal insulation vapor retarder and air barrier at building enclosure assemblies and spaces in conjunction with:
   1. Thermal insulating materials specified.
   2. Vapor retarder materials specified.
   3. Air barrier materials specified.
   4. FROTH-PAK™ Foam Insulation kits (Class A) for ceiling/roof to wall juncture.

1.05 SUBMITTALS

A. Submit Product data and manufacturer’s installation instructions as specified. Section 01 0000.

B. Product Data
   1. Provide manufacturer’s technical data for each type of insulation.
   2. Include product characteristics and performance criteria: aged thermal resistance values, fire performance characteristics, moisture vapor permeance, water absorption ratings, compressive strengths, (evaluation reports showing conformance to applicable codes for insulation).

C. Manufacturer’s Installation Instructions: Indicate procedures for preparation and installation specific to the work of this Section.

1.06 SHOP DRAWINGS

A. Submit Shop Drawings for prefabricated work and details.

B. Shop Drawings: Include plans, sections, details in accordance with performance requirements, and for attachment to other portions of the Work. Indicate degree of slope and layout of sloping insulation on roof surfaces. Ensure positive drainage to roof drains.

1.07 CERTIFICATES

A. Submit a manufacturer’s certificate.

B. Manufacturer’s Certificate: stating that Products meet or exceed specified requirements.

1.08 REGULATORY REQUIREMENTS

A. Conform to applicable code for combustibility flame spread and smoke developed performance requirements of foam insulations.

1.09 MOCKUPS

A. Provide mockup as specified.

B. Mockup insulation for wall cladding assembly, roof assembly, part of the engineered building to establish construction techniques.
C. Locate where directed.
D. Mockup may remain as part of the Work.

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver Product as specified.
B. Store and handle Product as specified.
C. Protect Product from moisture.

1.11 ENVIRONMENTAL REQUIREMENTS

A. Do not apply adhesives or sealants when substrate and ambient air temperatures are below 40 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers of rigid foam insulation systems having Products considered acceptable for use:
   1. The Dow Chemical Company - THERMAX™ Brand Sheathing.

B. Substitution Procedures: refer to Section 01 6000.

2.02 MATERIALS

A. Rigid Foam Board Insulation: closed cell polyisocyanurate foam board with glass fiber reinforced core, to ASTM C1289, Type I, Class 2 and Federal Specification HH-I-1972/1, Class 2; meeting the following criteria:
   1. Thermal Resistance (ASTM C1363 @ 75 deg. F) (ASTM C518 @ 75 deg. F): R-6.5 per 1 inch of thickness.
   5. Board Thickness as indicated on Drawings.
   7. Faces: 1.0 mil thick aluminum foil facer, both sides.
   9. Water Vapor Transmission (ASTM E96): less than 0.03 perms.
   10. Water Absorption by Volume (ASTM C209): maximum 0.3 percent.
   11. Product and Manufacturer Name: THERMAX™ Insulation Sheathing by The Dow Chemical Company.

B. Blanket Insulation: mineral fiber blankets, as specified.

2.03 ACCESSORIES

A. Mechanical Fasteners - Screw Type: ITW Buildex Multi-Diameter Insulation Teks with Dow Quik-Caps or similar fastener with a 1-1/4 inch plastic washer or similar
1. Manufacturer: Rodenhouse fastener with thermal grip washer and screw.
   a. Approved equal: Wind-lock, Hohmann & Barnard or Dayton Superior.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Inspect existing conditions to ensure they are suitable for work to begin. Do not proceed until unacceptable conditions are corrected.

B. Ensure substrates are solid, clean, dry and free of any contaminants.

C. Ensure Products are dry prior to installation. Replace damaged Products.

**3.02 INSTALLATION**

A. Install rigid foam board insulation system in accordance with manufacturer’s installation guidelines.

B. Install boards with long axis perpendicular to supports. Ensure end joints are fully supported.

**3.03 FIELD QUALITY CONTROL**

A. Jointly with Architect and manufacturer’s representative, visually inspect the rigid foam insulation system application and confirm that the installation is in strict accordance with the manufacturer's recommendations.

B. Ensure exposed or visible applications meet the manufacturer’s standards for uniform appearance.

C. Correct identified defects and irregularities.

**3.09 CLEANING**

A. Clean adjacent surfaces, levels and ground level areas of debris and excess Products.

**3.10 PROTECTION**

A. Adequately protect Products and work from damage by weather, traffic and other causes.

B. At the end of each Working Day, seal exposed edges to be weather tight.

C. Protect adjacent Work from damage. Repair damage.

**END OF SECTION**
SECTION 07 5323
EPDM THERMOSET SINGLE-PLY ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES
A. EPDM thermoset single-ply roofing.
B. Membrane flashings.
C. Metal flashings.
D. Roof insulation.

1.2. RELATED SECTIONS
A. Section 05 3100 - Steel Roof Decking.
B. Section 06 1000 - Rough Carpentry.
C. Section 07 6200 - Sheet Metal Flashing and Trim.
D. Section 07 7200 - Roof and Wall Specialties and Accessories.
E. Section 22 3000 - Plumbing Equipment.

1.3. REFERENCES
A. American Society of Civil Engineers (ASCE) - ASCE 7 - Minimum Design Loads for Buildings and Other Structures, Current Revision.
C. ANSI/SPRI WD-1 "Wind Design Standard for Roofing Assemblies".
D. ASTM International (ASTM):
E. International Code Council (ICC):
H. Underwriters Laboratories (UL):
   1. TGFU R1306 - "Roofing Systems and Materials Guide".


1.4. DESIGN CRITERIA

A. Wind Uplift Performance:
   1. Roof system is designed to withstand wind uplift forces as calculated using the current revision of ASCE-7.
   2. Roof System is designed to achieve 105-psf of uplift testing.
   3. Carlisle offers a standard 55 MPH wind speed warranty. Please contact Carlisle if a higher wind speed warranty is desired.

B. Fire Resistance Performance -
   1. Roof system will achieve a UL Class A rating when tested in accordance with UL-790.

C. Thermal Performance: Roof system will achieve a minimum R value not less than R-30.

D. Drainage: Provide a roof system with positive drainage where all standing water dissipates within 48 hours after precipitation ends.

E. Building Codes:
   1. Roof system will meet the requirements of all federal, state and local code bodies having jurisdiction.

1.5. SUBMITTALS

A. Submit under provisions of Section 01 3000.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Detail Drawings:
   1. Submit approved plan, section, elevation or isometric drawings which detail the appropriate methods for all flashing conditions found on the project.
   2. Coordinate approved drawings with locations found on the Contract Drawings.

D. Selection Samples: For each finish product specified, two complete sets of chips representing manufacturer's full range of available colors, membranes, and thicknesses.

E. Verification Samples: For each finish product specified, two samples, minimum size 4 inches square representing actual product, color, and patterns.

1.6. QUALITY ASSURANCE

A. Manufacturer Qualifications: All products specified in this section will be supplied by a single manufacturer with a minimum of twenty (20) years experience.

B. Installer Qualifications:
   1. All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified.
   2. Installer must be capable of extending the Manufacturer's Labor and Materials guarantee.
   3. Installer must be capable of extending the Manufacturer's No Dollar Limit guarantee.
1.7. **DELIVERY, STORAGE, AND HANDLING**

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

B. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.8. **PROJECT CONDITIONS**

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Refer to Carlisle's Roofing System specification, Part II - Application, for General Job Site Considerations.

C. Material Safety Data Sheets (MSDS) must be on location at all times during the transportation, storage and application of materials.

D. When positioning membrane sheets, exercise care to locate all field splices away from low spots and out of drain sumps. All field splices should be shingled to prevent bucking of water.

E. When loading materials onto the roof, the Carlisle Authorized Roofing Applicator must comply with the requirements of the building owner to prevent overloading and possible disturbance to the building structure.

F. Proceed with roofing work only when weather conditions are in compliance with the manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with the manufacturer's requirements and recommendations.

G. Proceed with work so new roofing materials are not subject to construction traffic. When necessary, new roof sections shall be protected and inspected upon completion for possible damage.

H. Provide protection, such as 3/4 inch thick plywood, for all roof areas exposed to traffic during construction. Plywood must be smooth and free of fasteners and splinters.

I. The surface on which the insulation or roofing membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges, foreign materials, oil and grease.

J. New roofing shall be complete and weathertight at the end of the work day.

K. Contaminants such as grease, fats and oils shall not be allowed to come in direct contact with the roofing membrane.

1.9. **WARRANTY**

A. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's Total-System warranty, outlining its terms, conditions, and exclusions from coverage.

1. **40 years on SureSeal 145 mil EPDM Fleeceback Membrane Non-Prorated**
2. **90 Mph Wind Speed Warranty**
3. Coverage to be extended to include accidental punctures in accordance with terms stated in the Warranty document.
4. Coverage to be extended to include damage caused by a maximum 2 inch diameter hail in accordance with terms stated in the Warranty document.

2. PRODUCTS

2.1. MANUFACTURERS

A. Acceptable Manufacturer: Carlisle SynTec Systems, which is located at: P. O. Box 7000; Carlisle, PA 17013; Toll Free Tel: 800-4-SYNTEC; Tel: 717-245-7000; Fax: 717-245-7053; Email: request info (Paige.Morey@carlisleccm.com); Web: www.carlisle-syntec.com

2.2. SCOPE / APPLICATION

A. Roof System: Provide a waterproof roof system, capable of withstanding uplift forces as specified in Design Criteria.
   1. Membrane Attachment: Fully Adhered.

B. Base Flashing: Provide a waterproof, fully adhered base flashing system at all penetrations, plane transitions and terminations.

C. Insulation: Provide a roof insulation system beneath the finish membrane.

2.3. MEMBRANE BASE SHEET

A. VapAir Seal 725TR Air/Vapor Barrier: A 40-mil composite consisting of 35-mils of self-adhering rubberized asphalt laminated to a 5-mil woven polypropylene film.

2.4. INSULATION

A. SecurShield Polyiso: Rigid board with coated glass fiber mat facers on both sides, meeting or exceeding the requirements of ASTM C 1289.
   1. Compressive Strength: 20 psi.
   2. Density: 2 lb per cubic foot minimum.

B. Composite Board: Composite insulation panel comprised of 1/2 inch high-density Polyiso cover board laminated during the manufacturing process to SecurShield rigid Polyiso roof insulation meeting ASTM C1289 Type II, Class 2. Carlisle SecurShield HD Composite.
   1. Compressive Strength: Grade 3 (25 psi).

C. Substrate Board: Moisture-, mold- and impact-resistant, nonstructural fiber-reinforced gypsum panel made from 95 percent recycled materials. Securock, distributed by Carlisle.
   1. Board Thickness: 1/2 inch.

2.5. INSULATION ADHESIVE

A. Sure-Seal FAST 100 or 100 LV Adhesive: A spray or extruded applied, two-component polyurethane, low-rise expanding foam adhesive used for attaching approved insulations to compatible substrates (concrete, cellular lightweight insulating concrete, gypsum, cementitious wood fiber, wood or steel) or existing smooth or gravel surfaced BUR, modified bitumen or cap sheets.

B. Sure-Seal FAST Catalyst: Added to FAST Adhesive (Part B Side) to quicken adhesive reaction time.

C. Sure-Seal FAST Dual Cartridge Adhesive: A two-component, polyurethane construction grade, low-rise expanding adhesive designed for bonding insulation to various substrates using a portable applicator.
D. FAST Box Set: A two-component, polyurethane construction grade, low-rise expanding adhesive designed for bonding insulation to various substrates using a portable applicator.

E. FAST Bag in a Box: A two-component, polyurethane construction grade, low-rise expanding adhesive designed for bonding insulation to various substrates, packaged for use with the PaceCart 2.

F. OlyBond 500 BA - A two-component, polyurethane, low-rise expanding adhesive used to bond insulation to various substrates using a mechanical dispenser system.

G. OlyBond Spot Shot - A two-component, polyurethane construction grade, low-rise expanding adhesive designed for bonding insulation to various substrates using a portable applicator.

H. One-Step: A two-component, polyurethane construction grade, low-rise expanding adhesive designed for bonding insulation to various substrates using a portable applicator.

2.6. ETHYLENE, PROPYLENE, DIENE TERPOLYMER (EPDM) MEMBRANE

A. Sure-Seal FleeceBACK Membrane: Cured, non-reinforced EPDM membrane with a 55 mil fleece bonded to the underside. Meets the requirements of ASTM D 4637 Type I.
   3. Sheet Dimensions:
      a. Width: 10 feet maximum.
      b. Length: 100 feet maximum.
   4. Performance:
      a. Breaking Strength: 200 lbf minimum.
      b. Tear Strength: 45 lbf minimum.
      c. Elongation: 480 percent.

2.7. FLASHING ACCESSORIES

A. Sure-Seal (black) Pressure-Sensitive Pipe Seals with Factory-Applied TAPE on the deck flange are available for use with Sure-Seal Roofing systems.

B. Sure-Seal Pressure-Sensitive (PS) Inside/Outside Corner: A 7 inch by 9 inch precut 60-mil thick Elastoform Flashing with a 35-mil Factory-Applied TAPE.

C. Sure-Seal Pressure-Sensitive (PS) Curb Flashing - A 60-mil thick, 20 inch wide cured EPDM membrane with 5 inch wide Factory-Applied TAPE along one edge to be used to flash curbs/skylights, etc.

D. Sure-Seal Pressure-Sensitive Cured Cover Strip: Sure-Seal cured EPDM membrane laminated to a nominal 35-mil cured Factory-Applied TAPE.

E. Sure-Seal Pressure-Sensitive "T" Joint Covers: A factory cut uncured 60-mil thick EPDM flashing laminated to a nominal 35-mil Factory-Applied TAPE, used to overlay field splice intersections and to cover field splices at angle changes. Available in 6 inch by 6 inch and 12 inch by 12 inch for Sure-Seal applications.

F. Sure-Seal Uncured EPDM Elastoform Flashing: Formable 60-mil thick Sure-Seal uncured EPDM membrane.

G. Sure-Seal Pressure-Sensitive Elastoform Flashing: 60-mil thick uncured EPDM Flashing laminated to a 35-mil Factory-Applied TAPE used in conjunction with Sure-Seal Primer as an option to Sure-Seal Elastoform Flashing.

H. Sure-Seal Fully Pressure Sensitive Curb Flashing: 60 mil Sure-Seal cured EPDM Membrane.
laminated to a 35 mil 6 inch and 12 inch SecurTape.

2.8. CLEANERS, PRIMERS, ADHESIVES AND SEALANTS

A. Carlisle Weathered Membrane Cleaner: Clear, solvent-based cleaner used to loosen and remove contaminants from the surface of exposed EPDM membrane prior to applying EPDM Primer.

B. Sure-Seal SecurTAPE: 6 inch wide by 100 foot long splice tape used for splicing adjoining sections of EPDM membrane.

C. Sure-Seal Lap Sealant: A heavy-bodied material (trowel or gun-consistency) used to seal the exposed edges of a membrane splice. A pre-formed Lap Sealant tool is included in each carton of Lap Sealant.

D. FAST 100 or 100-LV Adhesive: A spray or extruded applied, two-component, polyurethane, low-rise expanding foam adhesive used to securely bond FleeceBACK membranes to a variety of substrates.

E. FAST Dual Cartridge Adhesive: A two-component, polyurethane construction grade, low-rise expanding adhesive used to securely bond FleeceBACK membranes to a variety of substrates. The adhesive is extrusion applied 4 inch, 6 inch or 12 inch on center (depending on project conditions) using a portable applicator.

F. FAST Adhesive Box Sets: A spray applied, two-component, polyurethane construction grade, low-rise expanding adhesive used to securely bond FleeceBACK membranes to a variety of substrates.

G. FAST Bag in a Box: A two-component, polyurethane construction grade, low-rise expanding adhesive designed for bonding insulation to various substrates, packaged for use with the PaceCart 2.

H. Water Cut-Off Mastic: A one-component, low viscosity, self wetting, Butyl blend mastic used as a compression sealing agent between EPDM membranes and applicable substrates.

I. Universal Single-Ply Sealant: A 100 percent solids, solvent free, one-part, polyether sealant that provides a weather tight sealant to a variety of building substrates; used as a termination bar sealant. Available in white only.

J. Low VOC Bonding Adhesive: High strength, solvent-based, Low VOC contact adhesive that allows bonding of EPDM membranes to various porous and non-porous substrates.

K. EPDM x-23 Low-VOC Bonding Adhesive: Low-VOC bonding adhesive.

L. Low VOC EPDM Primer: Solvent Based, Low VOC primer for one-step cleaning and priming of EPDM surfaces prior to application of SecurTape and other pressure sensitive flashing and seaming products.

M. Cav-Grip: a multi-purpose contact adhesive recommended for enhancing bond of CCW self-adhering sheet products and for bonding MiraDRAIN and board insulation to various substrates.

2.9. FASTENING COMPONENTS

A. HP Fastener: Threaded, black epoxy electro-deposition coated (E-Coat) fastener for use with steel, wood plank or oriented strand board (OSB).
B. Seam Fastening Plate: 2 inch diameter metal plate for insulation, membrane and RUSS attachment.

C. Insulation Fastening Plate: Nominal 3 inch diameter FM approved metal plate used for insulation attachment.

2.10. EDGINGS AND TERMINATIONS

A. SecurEdge 4000: A metal anchor bar fascia system consisting of a 20 gauge steel retainer bar, corrosion resistant fasteners and aluminum or 24 gauge steel snap-on fascia cover.

B. SecurEdge 400 Coping: An anchor cleat with pre-slotted holes, a concealed joint cover, and 10 or 12 foot sections of coping cap. Kynar 500 finish selected by the Architect from available finishes.

C. Sure-Seal Termination Bar: 1 inch wide, .098 inch thick extruded aluminum bar pre-punched 6 inches on center with sealant ledge to support Lap Sealant.

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 Architect 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.

C. Do not commence work until all other work trades have completed jobs that require them to traverse the deck on foot or with equipment.

D. A vapor retarder / temporary roof (Carlisle 725 TR Air & Vapor Barrier/Temporary Roof) may be applied to protect the inside of the structure prior to the roof system installation.

3.3. INSULATION - SYSTEM DESIGN

A. Substrate Board: Securock: Moisture-, mold- and impact-resistant, nonstructural fiber-reinforced gypsum panel made from 95 percent recycled materials. Securock, distributed by Carlisle.
   1. Board Thickness: 1/2 inch.
   2. Attachment: Fully Adhered to Metal Deck (4” Beads)
   3. Cav Grip Primer and 725 TR Vapor Barrier over Substrate Board

B. Base Layer:
   1. Type: SecurShield Poly ISO Insulation.
   2. Thickness: 2.6 inches.
   3. Attachment Method: Fully Adhered with Flex Fast 100. (4 inch Beads)

C. Top Layer:
   1. Type: SecurShield HD Composite.
   2. Thickness: 2.6 inches.
   3. Attachment Method: Fully Adhered with Flex Fast 100. (4 inch Beads)
3.4. INSULATION PLACEMENT

A. Install insulation or membrane underlayment in multiple layers over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch. Stagger joints both horizontally and vertically.

B. Secure insulation to the substrate with the required mechanical fasteners or insulation adhesive in accordance with the manufacturer's current application guidelines.

C. Do not install wet, damaged or warped insulation boards.

D. Stagger joints in one direction unless joints are to be taped. Install insulation boards snug. Gaps between board joints shall not exceed 1/4 inch. Fill all gaps in excess of 1/4 inch (6 mm) with same insulation material.

E. Wood nailers must be at least 3 1/2 inches wide or 1 inch wider than adjacent metal flange. Thickness must equal that of insulation but not less than 1 inch thickness.

F. Miter and fill the edges of the insulation boards at ridges, valleys and other changes in plane to prevent open joints or irregular surfaces. Avoid breaking or crushing of the insulation at the corners.

G. Do not install any more insulation than will be completely waterproofed each day.

3.5. INSULATION ATTACHMENT

A. Securely attach insulation to the roof deck for Adhered or Mechanically Fastened Roofing Systems. Attachment must have been successfully tested to meet or exceed the calculated uplift pressure required by the International Building Code (ASCE-7) or ANSI/SPRI WD-1.

B. Enhance the perimeter and corner areas in accordance with the International Building Code (ASCE-7) or ANSI/SPRI WD-1.

C. Install insulation layers, maximum 4 feet by 4 feet, applied with adhesive, coverage rate as necessary to achieve the specified attachment and uplift rating. Press each board firmly into place after adhesive develops strings when touched, typically 1-1/2 to 2 minutes after adhesive was applied, and roll with a weighted roller. Add temporary weight and use relief cuts to ensure boards are well adhered. Stagger the joints of additional layers by a minimum of 6 inches.

3.6. MEMBRANE PLACEMENT AND ATTACHMENT (Fully Adhered)

A. Unroll and position membrane without stretching. Allow the membrane to relax for approximately 1/2 hour before bonding. Fold the sheet back onto itself so half the underside of the membrane is exposed.

B. Apply the Bonding Adhesive in accordance with the manufacturer's published instructions, to both the underside of the membrane and the substrate. Allow the adhesive to dry until it is tacky but will not string or stick to a dry finger touch.
C. Roll the coated membrane into the coated substrate while avoiding wrinkles. Brush down the bonded half of the membrane sheet with a soft bristle push broom to achieve maximum contact.

D. Fold back the unbonded half of the membrane sheet and repeat the bonding procedure.

E. Install adjoining membrane sheets in the same manner, overlapping edges appropriately to provide for the minimum splice width. It is recommended that all splices be shingled to avoid bucking of water.

3.7. MEMBRANE PLACEMENT AND ATTACHMENT (FleeceBACK Fully Adhered)

A. Position and unroll successive sheets and align to provide for a minimum 3 inch wide splice.

B. Fold adjacent sheets in half lengthwise to expose an approximate 10 foot wide substrate area.

C. Membrane which will have the adjacent sheet spliced over it should be adhered to the substrate first. In this fashion, selvage edge splice area will not be contaminated by setting splice edge into the FAST Adhesive.

D. Spray or extrude FAST Adhesive onto the substrate and allow to foam up approximately 1/8 inch. Wait for the adhesive to achieve "string" when a small object is lifted out if the adhesive.

E. Place the membrane into adhesive after adhesive develops strings when touched, typically 1-1/2 to 2 minutes after adhesive was applied, and roll with a weighted roller.

F. Apply FAST Adhesive to the substrate and continue process described above until all sheets are fully bonded, allowing for necessary splice overlaps at selvage edges. At end laps (along the width of the sheet) membrane shall be butted together which will be overlaid with 6 inch wide Pressure-Sensitive Cured Cover Strip or Pressure-Sensitive Overlayment Strip.

3.8. MEMBRANE SPLICING (Tape Splice)

A. Overlap adjacent sheets and mark a line 1/2 inch out from the top sheet.

B. Fold the top sheet back and clean the dry splice area (minimum 2 1/2 inches of both membrane sheets with Sure-Seal Primer as required by the membrane manufacturer.

C. Where Splice Tape is not Factory-Applied, apply Splice Tape to bottom sheet with the edge of the release film along the marked line. Press tape onto the sheet using hand pressure. Overlap tape roll ends a minimum of 1 inch.

D. Remove the release film and press the top sheet onto the tape using hand pressure.

E. Roll the seam toward the splice edge with a 2 inch wide steel roller.

F. Install Pressure-Sensitive "T" Joint Cover, a 6 inch wide section of Pressure-Sensitive Flashing or Elastoform Flashing over all field splice intersections.

G. When using non-Pressure-Sensitive Elastoform Flashing, seal edges of flashing with Lap Sealant.

H. The use of Lap Sealant with tape splices is optional except at tape overlaps and cut edges of reinforced membrane where Lap Sealant is required.
3.9. FLASHING
   A. Wall and curb flashing shall be cured EPDM membrane. Continue the deck membrane as wall flashing where practicable.
   B. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.

3.10. WALKWAYS
   A. Install walkways at all traffic concentration points (such as roof hatches, access doors, rooftop ladders, etc.) and all locations as identified on the Contract Drawings.
   B. Adhere walkways pads to the EPDM membrane in accordance with the manufacturer's current application guidelines.

3.11. DAILY SEALS
   A. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the work day, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.
   B. Use Sure-Seal Pourable Sealer or other acceptable membrane seal in accordance with the manufacturer's requirements.

3.12. CLEAN UP
   A. Perform daily clean-up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.
   B. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.

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

END OF SECTION
PART 1 GENERAL

1.01 DESCRIPTION

A. The project consists of installing Carlisle's Sure-Weld gray FleeceBACK 135 mil membrane adhered with Flexible FAST or FAST Adhesive as outlined below: Apply the Sure-Weld FleeceBACK Adhered Roofing System in conjunction with 1/2" Securshield HD Plus Poly ISO Cover Board over the new 1 1/2" Metal roof deck.

1.02 EXTENT OF WORK

A. Provide all labor, materials, tools, equipment, and supervision necessary to complete the installation of the Sure-Weld FleeceBACK Adhered Roofing System including flashings and insulation as specified herein and as indicated on the drawings in accordance with the manufacturer's most current specifications and details.

B. The roofing contractor shall be fully knowledgeable of all requirements of the contract documents and shall make themselves aware of all job site conditions that will affect their work.

C. The roofing contractor shall confirm all given information and advise the building owner, prior to bid, of any conflicts that will affect their work.

D. Any contractor who intends to submit a bid using a roofing system other than the approved manufacturer must submit for pre-qualification in writing fourteen (14) days prior to the bid date. Any contractor who fails to submit all information as requested will be subject to rejection. Bids stating "as per plans and specs" will be unacceptable.

1.03 SUBMITTALS

A. Prior to starting work, the roofing contractor must submit the following:
   1. Shop drawings showing layout, details of construction and identification of materials.
   2. A sample of the manufacturer's Membrane System Warranty.
   3. Submit a letter of certification from the manufacturer which certifies the roofing contractor is authorized to install the manufacturer's roofing system and lists foremen who have received training from the manufacturer along with the dates training was received.
   4. Certification from the membrane manufacturer indicating the membrane thickness over the reinforcing scrim (top ply membrane thickness) is nominal .015-mil or thicker.
   5. Certification of the manufacturer's warranty reserve.

B. Upon completion of the installed work, submit copies of the manufacturer's final inspection to the specifier prior to the issuance of the manufacturer's warranty.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the job site in the manufacturer's original, unopened containers or wrappings with the manufacturer's name, brand name and installation instructions intact and legible. Deliver in sufficient quantity to permit work to continue without interruption.

B. Comply with the manufacturer's written instructions for proper material storage.
   1. Store Sure-Weld membrane in a dry, cool, shaded area in the original undisturbed plastic.
Sure-Weld membrane that has been exposed to the elements for approximately 7 days must be prepared with Weathered Membrane Cleaner prior to hot air welding.

2. Store curable materials (adhesives and sealants) between 60°F and 80°F in dry areas protected from water and direct sunlight. If exposed to lower temperature, restore to 60°F minimum temperature before using.

3. Store materials containing solvents in dry, well ventilated spaces with proper fire and safety precautions. Keep lids on tight. Use before expiration of their shelf life.

C. Insulation must be on pallets, off the ground and tightly covered with waterproof materials.

D. Any materials which are found to be damaged shall be removed and replaced at the applicator's expense.

1.05 WORK SEQUENCE

A. Schedule and execute work to prevent leaks and excessive traffic on completed roof sections. Care should be exercised to provide protection for the interior of the building and to ensure water does not flow beneath or wick into any completed sections of the membrane system.

B. Do not disrupt activities in occupied spaces.

1.06 USE OF THE PREMISES

A. Before beginning work, the roofing contractor must secure approval from the building owner's representative for the following:
   1. Areas permitted for personnel parking.
   2. Access to the site.
   3. Areas permitted for storage of materials and debris.
   4. Areas permitted for the location of cranes, hoists and chutes for loading and unloading materials to and from the roof.

B. Interior stairs or elevators may not be used for removing debris or delivering materials, except as authorized by the building superintendent.

1.07 EXISTING CONDITIONS

If discrepancies are discovered between the existing conditions and those noted on the drawings, immediately notify the owner's representative by phone and solicit the manufacturer's approval prior to commencing with the work. Necessary steps shall be taken to make the building watertight until the discrepancies are resolved.

1.08 PRECONSTRUCTION CONFERENCE

A. A pre-bid meeting will be held at the job site. Contact the owner's representative, Jay Appleton, Greyhawk, 856-722-1800, if there are any questions.

B. Prior to bid submittal, the roofing contractor should schedule a job site inspection to observe actual conditions and verify all dimensions on the roof. The job site inspection may occur on the day of the pre-bid meeting or prior to such a meeting. Should access to the roof be necessary before or after the pre-bid meeting, the contractor must contact the owner's representative to coordinate an appropriate time.

C. Bids must be forwarded to the following address:
   Two River Theater, 21 Bridge Avenue, Red Bank, NJ 07701, Attn: Jay Appleton.
D. Any conditions which are not shown on the shop drawings should be indicated on a copy of the shop drawing and included with bid submittal if necessary to clarify any conditions not shown.

1.09 TEMPORARY FACILITIES AND CONTROLS

A. Temporary Utilities:
   1. Water, power for construction purposes and lighting are available at the site and will be made available to the roofing contractor.
   2. Provide all hoses, valves and connections for water from a source designated by the owner when made available.
   3. When available, electrical power should be extended as required from the source. Provide all trailers, connections and fused disconnects.

B. Temporary, Sanitary Facilities

Sanitary facilities will not be available at the job site. The roofing contractor shall be responsible for the provision and maintenance of portable toilets or their equal.

C. Building Site:
   1. The roofing contractor shall use reasonable care and responsibility to protect the building and site against damages. The contractor shall be responsible for the correction of any damage incurred as a result of the performance of the contract.
   2. The roofing contractor shall remove all debris from the job site in a timely and legally acceptable manner so as to not detract from the aesthetics or the functions of the building.

D. Security:

Obey the owner's requirements for personnel identification, inspection and other security measures.

1.10 JOB SITE PROTECTION

A. The roofing contractor shall adequately protect building, paved areas, service drives, lawn, shrubs, trees, etc. from damage while performing the required work. Provide canvas, boards and sheet metal (properly secured) as necessary for protection and remove protection material at completion. The contractor shall repair or be responsible for costs to repair all property damaged during the roofing application.

B. During the roofing contractor's performance of the work, the building owner will continue to occupy the existing building. The contractor shall take precautions to prevent the spread of dust and debris, particularly where such material may sift into the building. The roofing contractor shall provide labor and materials to construct, maintain and remove necessary, temporary enclosures to prevent dust or debris in the construction area(s) from entering the remainder of the building.

C. Do not overload any portion of the building, by either use of or placement of equipment, storage of debris, or storage of materials.

D. Protect against fire and flame spread. Maintain proper and adequate fire extinguishers.

E. Take precautions to prevent drains from clogging during the roofing application. Remove debris at the completion of each day's work and clean drains, if required. At completion, test drains to ensure the system is free running and drains are watertight. Remove strainers and plug drains in areas where work is in progress. Install flags or other telltales on plugs. Remove plugs each night and screen drain.

F. Store moisture susceptible materials above ground and protect with waterproof coverings.
G. Remove all traces of piled bulk material and return the job site to its original condition upon completion of the work.

1.11 SAFETY

The roofing contractor shall be responsible for all means and methods as they relate to safety and shall comply with all applicable local, state and federal requirements that are safety related. Safety shall be the responsibility of the roofing contractor. All related personnel shall be instructed daily to be mindful of the full-time requirement to maintain a safe environment for the facility's occupants including staff, visitors, customers and the occurrence of the general public on or near the site.

1.12 WORKMANSHIP

A. Applicators installing new roof, flashing and related work shall be factory trained and approved by the manufacturer they are representing.

B. All work shall be of highest quality and in strict accordance with the manufacturer's published specifications and to the building owner's satisfaction.

C. There shall be a supervisor on the job site at all times while work is in progress.

1.13 QUALITY ASSURANCE

A. The Sure-Weld Membrane Roofing System must achieve a UL Class A. The specified roofing assembly must have been successfully tested by a qualified testing agency to resist the design uplift pressures calculated according to and after multiplying the results with a safety factor.

B. The membrane must be manufactured by the material supplier. Manufacturer’s supplying membrane made by others are not acceptable.

C. Unless otherwise noted in this specification, the roofing contractor must strictly comply with the manufacturer's current specifications and details.

D. The roofing system must be installed by an applicator authorized and trained by the manufacturer in compliance with shop drawings as approved by the manufacturer. The roofing applicator shall be thoroughly experienced and upon request be able to provide evidence of having at least five (5) years successful experience installing single-ply roofing systems and having installed at least one (1) roofing application or several similar systems of equal or greater size within one year.

E. Provide adequate number of experienced workmen regularly engaged in this type of work who are skilled in the application techniques of the materials specified. Provide at least one thoroughly trained and an experienced superintendent on the job at all times roofing work is in progress.

F. There shall be no deviations made from this specification or the approved shop drawings without the prior written approval of the specifier. Any deviation from the manufacturer's installation procedures must be supported by written certification on manufacturer's letterhead and presented for the specifier's consideration.

G. Upon completion of the installation, the applicator shall arrange for an inspection to be made by a non-sales technical representative of the membrane manufacturer in order to determine whether or not corrective work will be required before the warranty will be issued. Notify the building owner seventy-two (72) hours prior to the manufacturer's final inspection.
1.14 **JOB CONDITIONS, CAUTIONS AND WARNINGS**

Refer to Carlisle’s FleeceBACK Adhered Roofing System specification for General Job Site Considerations.

A. Material Safety Data Sheets (MSDS) must be on location at all times during the transportation, storage and application of materials.

B. **Do not apply FAST Adhesive** when surface and/or ambient temperatures are below 25°F.

C. Drums of FAST Adhesive must be a minimum of 70°F at the time of use. Use drum band heaters when necessary.

D. The addition of **FAST Adhesive Catalyst (to Part B side) is recommended** to speed up reaction time when temperatures are below 50°F.

E. The contractor must exercise caution during adhesive spraying to avoid overspray.

Use a non-atomizing spray tip such as the Graco Spatter Tip and reduce spray pressure to 500 – 800 psi to increase adhesive droplet size and reduce airborne mist. Maintain hand held wind screens on-site for use as necessary.

Extruding FAST Adhesive method may be used to eliminate overspray concerns.

F. When positioning membrane sheets, exercise care to locate all field splices away from low spots and out of drain sumps. All field splices should be shingled to prevent bucking of water.

G. When loading materials onto the roof, the Carlisle Authorized Roofing Applicator must comply with the requirements of the building owner to prevent overloading and possible disturbance to the building structure.

H. Proceed with roofing work only when weather conditions are in compliance with the manufacturer’s recommended limitations, and when conditions will permit the work to proceed in accordance with the manufacturer’s requirements and recommendations.

I. Proceed with work so new roofing materials are not subject to construction traffic. When necessary, new roof sections shall be protected and inspected upon completion for possible damage. Provide protection, such as 3/4 inch thick plywood, for all roof areas exposed to traffic during construction. Plywood must be smooth and free of fasteners and splinters.

J. The surface on which the insulation or roofing membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges, foreign materials, oil and grease.

K. New roofing shall be complete and weather tight at the end of the work day. Care must be taken to avoid wicking water though the fleece by properly sealing exposed edges of the membrane.

L. Contaminants such as grease, fats and oils shall not be allowed to come in direct contact with the roofing membrane.

1.15 **WARRANTY**

A. Provide manufacturer’s 30 year Total System Warranty covering both labor and material with no dollar limitation. The maximum wind speed coverage shall be peak gusts of 90 measured at 10 meters above ground level. Certification is required with bid submittal indicating the manufacturer has reviewed and agreed to such wind coverage.
Note: For projects specified with warranties greater than 20 year and/or wind coverage specified greater than 80 mph, additional design enhancements are required. Refer to Carlisle published FleeceBACK Specifications:

<table>
<thead>
<tr>
<th>Warranty Length</th>
<th>Minimum Membrane Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 year</td>
<td>135-mil Sure-Weld FleeceBACK</td>
</tr>
</tbody>
</table>

B. Warranty shall also cover leaks caused by accidental punctures:
   1. 32 man-hours per year for 135-mil FleeceBACK.
   2. When Flexible FAST is specified and installed an additional 4 man-hours per year can be included.

C. Warranty shall also cover leaks caused by hail:
   1. 3” diameter hail when 135-mil FleeceBACK installed.
   2. When Flexible FAST is specified and installed an additional 1” diameter hail can be included.

D. Pro-rated System Warranties shall not be accepted.

E. Evidence of the manufacturer's warranty reserve shall be included as part of the project submittals for the specifier's approval.

PART 2 PRODUCTS

2.01 GENERAL
   A. All components of the specified roofing system shall be products of Carlisle SynTec or accepted by Carlisle SynTec as compatible.
   B. Unless otherwise approved by the specifier and accepted by the membrane manufacturer, all products (including adhesives, insulation, fasteners, fastening plates and edgings) must be manufactured and supplied by the roofing system manufacturer and covered by the warranty.

2.02 MEMBRANE
   A. Furnish Sure-Weld gray FleeceBACK 135-mil reinforced TPO (Thermoplastic Polyolefin) membrane. Membrane thickness over the reinforcing scrim (top-ply thickness) shall be nominal .015-mil or thicker.
   B. Membrane Weathering Performance: The TPO membrane shall be formulated with OCTAGUARD XT Weathering Package to withstand 60 days of exposure at a 275° F temperature and a minimum of 17,000 kJ/m xenon arc resistance at 80°F without cracking or showing signs of material failure, exceeding ASTM 6878.
   C. Gray Membrane Sheets are 12’ wide by 100’ long.

2.03 INSULATION/UNDERLAYMENT
Two River Theater 07 5324-6 EPDM CONTOUR RIB
Addition and Alterations
A. When applicable, insulation shall be installed in multiple layers and mechanically fastened or secured with Carlisle FAST Adhesive to the substrate in accordance with manufacturer's published specifications.

B. Insulation shall be SecurShield HD Plus as supplied by Carlisle SynTec.
   1. **Carlisle HP-H Polyiso** – A foam core insulation board covered on both sides with a medium weight fiber-reinforced felt facer meeting ASTM C 1289-06, Type II, Class 1, Grade 2 (20 psi) or Grade 3 (25 psi). The product is available in 4’ x 8’ standard size with a thickness from 1 to 4 inches. 4’ x 4’ tapered panels are also available.
   2. **SecurShield HD PLUS** – a rigid insulation panel composed of a high-density, closed-cell polyisocyanurate foam core laminated to coated-glass fiber-mat facer for use as a cover board or recover board. Available 1/2” thick 4’ x 8’ panel weight 11 lbs with an R-value of 2.5.

### 2.04 FASTENING COMPONENTS

To be used for mechanical attachment of insulation and to provide additional membrane securement:

A. **Fasteners, Plates and Bars**
   1. **Pre-Assembled ASAP Fasteners**: A pre-assembled 3” diameter Plastic Plate and # 12 threaded fastener with a #3 drive used for insulation attachment into steel or wood decks. Installed using OMG Fastening Tools.
   2. **HP Term Bar Nail-Ins**: A 1-1/4” long expansion anchor with a zinc plated steel drive pin used for fastening the Carlisle Termination Bar or Seam Fastening Plates to concrete, brick, or block walls.
   3. **Piranha Plates**: A 2-3/8” diameter metal barbed fastening plate used with Carlisle HP-X or HP-14-10 Fasteners for membrane securement. This plate can be used for insulation securement.
   4. **Piranha Xtra Plates**: A 2-3/8” diameter metal barbed fastening plate with an oversized hole for use with Carlisle HP-Xtra Fasteners for membrane securement.
   5. **Insulation Fastening Plates**: a nominal 3 inch diameter plastic or metal plate used for insulation attachment.

B. **Cricket / Insulation Adhesive**:
   1. **Flexible FAST Adhesive**: An elongating impact resistant two component insulating urethane adhesive used to attach insulation and FleeceBACK membrane. Packaging formats include 50 and 15 gallon drums.
      a. Adhesive to provide 150% elongation in conjunction with fleece backed membrane – ASTM D412
      b. MDI content of Part A material less than 25%
   2. **FAST Adhesive**: A two component insulating urethane adhesive used to attach insulation and FleeceBACK membrane. Packaging formats include 50 and 15 gallon drums as well as Dual Tanks, Dual Cartridges and 5 gallon Bag in a Box formats.

### 2.05 ADHESIVES, CLEANERS AND SEALANTS

All products shall be furnished by Carlisle and specifically formulated for the intended purpose.

A. **Flexible FAST Adhesive**: An elongating impact resistant two component insulating urethane adhesive used to attach insulation and FleeceBACK membrane. Packaging formats include 50 and 15 gallon drums.
   1. Adhesive to provide 150% elongation in conjunction with fleece backed membrane – ASTM D412
   2. MDI content of Part A material less than 25%
B. **FAST Adhesive:** A two component insulating urethane adhesive used to attach insulation and FleeceBACK membrane. Packaging formats include 50 and 15 gallon drums as well as Dual Cartridges and 5 gallon Bag in a Box formats.

C. **Low VOC Bonding Adhesive for TPO:** This product meets the <250 gpl VOC (volatile organic compound) content requirements of the OTC Model Rule for Single-Ply Roofing Adhesives. A high strength, solvent-based contact adhesive that allows bonding of TPO membrane to various porous and non-porous substrates. Apply at a rate of 60 ft² per gallon finished surface. Available in 5 gallon pails. This product does not comply with southern California counties with additional restrictions on solvents. See Carlisle’s Product Data Sheet for a listing of the counties involved.

D. **Cut-Edge Sealant:** A white or clear colored sealant used to seal cut edges of reinforced Sure-Weld membrane. A coverage rate of approximately 225 - 275 linear feet per squeeze bottle can be achieved when a 1/8” diameter bead is applied.

E. **Water Cut-Off Mastic:** Used as a mastic to prevent moisture migration at drains, compression terminations and beneath conventional metal edging (at a coverage rate of approximately 10’ per tube or 100’ per gallon).

F. **Universal Single-Ply Sealant:** A 100% solids, solvent free, VOC free, one part polyether sealant that provides a weather tight seal to a variety of building materials. It is white in color and is used for general caulking such as above termination bars and metal counter flashings and at scuppers.

G. **Thermoplastic One-Part Pourable Sealer:** A one-part, moisture curing, elastomeric polyether sealant used to fill TPO Molded Pourable Sealant Pockets. Packaged in 4, 2-liter foil pouches inside a reusable plastic bucket. 1 pouch will fill 2 TPO Molded Pourable Sealant Pockets.

H. **Weathered Membrane Cleaner:** Used to prepare membrane for heat welding that has been exposed to the elements or to remove general construction dirt at an approximate coverage rate of 400 square feet per gallon (one surface).

I. **TPO Primer:** A solvent-based primer used to prepare the surface of Sure-Weld Membrane prior to application of Pressure-Sensitive Coverstrip and TPO Pressure-Sensitive RUSS.

J. **TPO Low VOC Primer:** A solvent-based, low solids primer used to prepare the surface of Sure-Weld Membrane prior to application of Pressure-Sensitive Coverstrip and TPO Pressure-Sensitive RUSS. This low VOC product is ideal for use in states where environmental issues are a concern.

K. **CCW 702 or CCW 702-LV:** A single component, solvent based, high tack primer used to provide adhesion between Carlisle 725TR and an approved substrate.

L. **Cav-Grip Primer:** A low VOC contact adhesive used to prime surfaces for the application of 725TR.

2.06 **METAL EDGING AND MEMBRANE TERMINATIONS**

A. **General:** All metal edgings shall be tested and meet ANSI/SPRI ES-1 standards and comply with International Building Code.

B. **SecurWeld Drip Edge:** 4’x 10’ coated metal sheets made from 24 gauge galvanized steel with a minimum .035” thick non-reinforced gray Sure-Weld.

C. **Weld laminate.** Sure-Weld membrane can be welded directly to the Sure-Weld Coated Metal in accordance with the manufacturer’s detail.

D. **Termination Bar:** A 1” wide and .098” thick extruded aluminum bar pre-punched 6” on center; incorporates a sealant ledge to support Lap Sealant and provide increased stability for membrane terminations.
2.07 WALKWAYS

Protective surfacing for roof traffic shall be Sure-Weld TPO Walkway Rolls installed per manufacturer's requirements or concrete pavers loose laid over an approved slip sheet (pavers not recommended for slopes greater than 2” in 12”).

2.08 OTHER MATERIALS

A. Carlisle 725TR Air & Vapor Barrier / Temporary Roof: 725TR is a 40-mil composite consisting of 35-mils of self-adhering rubberized asphalt factory laminated to a 5-mil polyethylene film with an adhesion textured surface. 725TR roll dimensions are 39” x 75’ and the product is applied after priming an acceptable substrate with CCW 702, 702-LV or Cav-Grip primer.

B. (Metal Flashing, if required, and miscellaneous items needed to fulfill the project requirements)

C. Sure-Weld TPO Contour Rib Profile: Contour Rib Profile provides the look of a standing seam metal roof with the performance of a single-ply membrane. The Contour Rib Profile measures 1¼” tall and 2 1/8” wide, including the welding flanges, while the vertical profile is a substantial 38” thick. The profile has an 1/8” alignment hole as well as an 1/8” fiberglass reinforcing cord.

PART 3 EXECUTION

3.01 GENERAL

A. Comply with the manufacturer's published instructions for the installation of the membrane roofing system including proper substrate preparation, job site considerations and weather restrictions.

B. Position sheets to accommodate contours of the roof deck and shingle splices to avoid bucking water.

3.02 INSULATION PLACEMENT

A. Install insulation or membrane underlayment over the substrate with boards butted together. Fill joints or gaps greater than 1/4 inch with FAST Adhesive. Stagger joints both horizontally and vertically if multiple layers are provided.

B. Secure insulation to the substrate with FAST Adhesive or mechanical fasteners in accordance with the manufacturer's specifications.

3.03 MEMBRANE PLACEMENT AND BONDING

A. Position and unroll successive sheets and align to provide a minimum 2 inch overlap (use pre-marked overlap line) along the selvage edge. At end laps (along the width of the sheet), membrane shall be butted together which will be overlaid with 6 inch wide Sure-Weld Reinforced Membrane and hot air welded on all edges.

B. FleeceBACK Membrane shall be fully adhered to an acceptable substrate with Carlisle FAST Adhesive. The adhesive is spray applied or extruded to the substrate only and the membrane is rolled into the wet adhesive once it has foamed up and reached string/gel time (approximately 2 minutes). Roll the membrane with a weighted (100 - 150 pounds) steel roller to set the membrane into the adhesive.

Note: Exercise care to prevent overspray onto the membrane. If FAST Adhesive should contaminate the splice area, immediately (while the adhesive is still in liquid form) clean with Weathered Membrane Cleaner or allow FAST Adhesive to cure and remove with a paint-type scraper.

C. Position adjoining sheets to allow a minimum overlap of 2 inches to provide a minimum 1-1/2” hot
D. Continue to install adjoining membrane sheets in the same manner, overlapping edges a minimum of 2 inches and complete the bonding procedures as stated previously.

3.04 MEMBRANE HOT AIR WELDING PROCEDURES

A. General
The FleeceBACK membrane has a selvage edge (the fleece-backing is discontinued) along the length of the sheet for membrane splicing. Selvage edges are not provided along the width of the membrane; adjoining membrane sheets must be butted together and overlaid with 6 inch wide Sure-Weld Reinforced membrane heat welded on all sides.

B. Hot Air Welding Procedures
1. Hot air weld the Sure-Weld FleeceBACK membrane using an Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's specifications. At all splice intersections, roll the seam with a silicone roller to ensure a continuous hot air welded seam.
   Note: When using 115-mil thick or thicker membrane, all splice intersections shall be overlaid with Sure-Weld T-Joint covers or non-reinforced flashing
2. Probe all seams once the hot air welds have thoroughly cooled (approximately 30 minutes).
3. Repair all seam deficiencies the same day they are discovered.
4. Apply Cut Edge Sealant on all cut edges of reinforced membrane (where the scrim reinforcement is exposed) after seam probing is complete. Cut Edge Sealant is not required on vertical splices.

3.05 FLASHING

A. Flashing of parapets, curbs, expansion joints and other parts of the roof must be performed using Sure-Weld FleeceBACK membrane or Sure-Weld reinforced membrane. Sure-Weld non-reinforced membrane can be used for flashing pipe penetrations, Sealant Pockets, and scuppers, as well as inside and outside corners, when the use of pre-molded accessories is not feasible.

B. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.

3.06 CONTOUR RIB

A. The Contour Rib Profile is designed for use with FleeceBACK® TPO adhered roofing systems. Ensure that all welding surfaces are clean and dry. Inspect all seam areas for proper weld prior to installing TPO Contour Ribs

B. Contour Rib spacing can be individually determined to achieve the desired appearance

C. Consult the Sure-Weld TPO Contour Rib Installation Guide for instructions on proper installation techniques.

3.07 DAILY SEAL

A. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the work day, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.

B. Use FAST Adhesive or other similar material in accordance with the manufacturer's requirements.
3.08  CLEAN UP

A. Perform daily clean up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.

B. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.

END OF SECTION
SECTION 07 6200
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings and counterflashings.
B. Sealants for joints within sheet metal fabrications.
C. Reglets and accessories.
D. Precast concrete splash pads.

1.02 DESCRIPTION OF WORK

A. The work of this Section shall include, but not be limited to, the following:

1. Custom Profiles: Shop fabricated Architectural Zinc flashing & trim profiles utilized for (steep-slope and low-slope, roof edge metal, custom roof drainage, custom metal roofing accents, exposed wall flashings, exterior ornaments & other miscellaneous architectural metal details as indicated on the Drawings including, but not limited to, coping, cornice, fascia, soffit, etc. Custom metal fabrications shall include all accessories for a weatherproof installation. Although custom profiles described here are not typically tested (wind or fire resistance), they may provide acceptable performance based on sound design & installation practices.

2. Prefabricated Profiles: Architectural Zinc products (profiles) & systems fabricated from sheet/coil material produced by the zinc manufacturer. Available in standard shapes & sizes, offering zinc profiles that shall satisfy the architectural design intent and performance criteria unless otherwise approved by the Architect. Single-source fabricator to provide prefabricated profiles & component parts for undivided responsibility. Available Prefabricated profiles include, but not limited to, (coping, fascia, soffit, cornice, ornaments, gutter, downspout, ridge cap, etc.) as indicated on the Drawings.

3. Concealed Sheet Metal Flashing integral with masonry & other wall cladding construction as indicated on the drawings or required for a weathertight installation. Concealed flashing profiles to be fabricated from stainless steel.

1.03 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry
B. Section 05 5000 – Metal Fabrications
C. Section 06 1000 – Rough Carpentry
D. Section 07 2100 – Thermal Insulation
E. Section 07 2300 – Envelope Thermal and Moisture Protection Section
F. Section 07 2500 – Weather Barriers
G. Section 07 4213 – Metal Wall Panels
H. Section 07 7100 – Roof Specialties
I. Section 07 9005 – Joint Sealers

1.04 REFERENCE STANDARDS

B. Stainless Steel alloy Material Standards: ASTM A167-99 & A240. Type (304, 316, 316L)

D. SMACNA – Architectural Sheet Metal Manual; 7th Edition; Chapters 2, 3 and 4 as a minimum standard or these specification and details where they exceed (subordinate to Architectural Zinc Guidelines).

E. Manufacturing Quality Control: ISO 9001 (Quality management) & ISO 14001 (Environmental management).


G. As all documents are intended to be complimentary, in the event of contradiction in the references, the RHEINZINK Division 7 Binder (latest Edition) will govern.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.06 SUBMITTALS

A. Provide product data sheet for Architectural Zinc (Titanium-Zinc) material including Zinc Rolling Mill name, Quality control (ASTM & ISO standards), Physical properties, intended uses, and storage & handling requirements.


C. Material Samples: Submit 12 x 12 inch (prePATINA Bright Rolled, prePATINA Blue Grey, prePATINA Graphite Grey to match existing Rheinzink color) samples of each zinc-alloy (&prePATINA surface color) included in the finished work.

D. Shop Drawings: indicate location of all fabricated sheet metal flashing & trim shapes on (roof, soffit/reflected) plans and exterior wall elevations included in the work. Include detail of profile attachment (thru-fastened or indirect/clipped), terminations, joints, corners, supports, anchorage points/ slot locations, cleats, hooks/ hems/ edge conditions, closures, and special details. Provide anticipated profile dimensions and bend angles for all critical sheet metal profiles when required by the Architect. Indicate profiles that are "custom fabricated" and those that are "prefabricated" profiles.

1. Provide sheet metal flashing & trim details required by drawings & associated [roof, façade] installation. Show all shop fabricated sheet metal fabrications including seam pattern/ alignment, seam configuration and dimensions.

2. Indicate metal type, thickness, surface finish prePATINA, & zinc alloy for all sheet metal profiles.

3. Show all accessory products to be provided including but not limited to: waterproof underlayment, ventilation mat, slip sheet, mechanical fasteners, VHB tape, clips, sealant, & sealant tape.

4. Details for joining and securing sheet metal components, including layout, number of fasteners, clip spacing, & soldered connections.

5. Detail of expansion provisions including sliding joints, use of clips/ prepunched slotted holes, anticipated direction(s) of movement, maximum allowable movement, and fixed-point location.

6. Details of roof and wall penetration flashing such as vents, skylights, chimneys, dormers, doors, windows, louvers, and special conditions.

7. Details of coordinated trades: provide flashing details for integrating mechanical, electrical and plumbing conditions.

8. Show all concealed cleats (keepers) and clip material, size, & gauge. Design attachment for roof edge flashing to meet ANSI/SPRI ES-1 standard.
9. Termination Details of connections to adjoining work.

E. Profile Samples: when further shop drawing clarification is required by Architect, provide 12” min. fabricated profile (full width).

F. Mock-up: As designated by Architect, provide Architectural Zinc flashing & trim profiles required by other roof and wall panel assemblies specified. Maximum total mockup size to be 10’ x 10’. Provide mock-up where designated; mock-up may be included in the final work if approved by Architect.

G. Engineering Calculations: As required by local building code or by the Architect, provide prefabricated sheet metal flashing & trim profiles by system fabricators capable of supplying completed test data prior to the bid date. Where testing data is not available, provide sheet metal flashing & trim attachment schedule that meets the uplift requirements provided herein or as indicated on the drawings. Provide Engineering Calculations signed & stamped by a Structural Engineer certifying wind-uplift resistance of exposed architectural sheet metal work.

1.07 QUALITY ASSURANCE

A. Fabricator Qualifications: Zinc flashing & trim fabricator to have minimum of 5 years experience fabricating architectural zinc or similar metals and must be trained by the zinc-alloy manufacturer. Architectural Zinc fabrication & application training program to be directed by the zinc rolling-mill (or third-party reseller).

B. Installer Qualifications: Installer shall have completed training provided by the zinc rolling mill [or third-party reseller]. Installers new to Architectural Rolled Zinc applications shall have prior work experience using aluminum, copper, & other natural weathering non-ferrous metals.

C. Product Source: Provide sheet metal flashing & trim which are produced by one manufacturer. Provide accessory materials (fasteners, clips, etc.) which are compatible to the zinc manufacturer. Award installation of zinc flashing & trim including weather barrier, waterproof underlayment and ventilation mat to a single firm for undivided responsibility.

D. Industry Standard: Except as otherwise shown or specified, comply with applicable recommendations and details of the RHEINZINK Division 7 Binder (latest Edition) and SMACNA Architectural Sheet Metal Manual, 6th Edition. Conform to dimensions and profiles shown or as approved on shop drawing submittal.

E. Field Measurements: Prior to fabrication of sheet metal flashing & trim, compare architectural drawings, approved shop drawings, and actual field measurements of substrates to receive sheet metal flashing & trim. Make necessary minor adjustments to satisfy design intent and functional performance. Notify Contractor of any major discrepancies to structure and substrate that deviate from the original intent of the Architect.

F. Pre-Installation Conference: As needed for field coordination and required by the Architect, convene an installation conference to include the Architect, General Contractor, masonry contractor, wall cladding contractors, roofing contractor, and Architectural Sheet Metal installer in order to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Notify local sales manager employed by Rolled Zinc manufacturer one week prior to meeting date.

1. Review methods and procedures for installation including, but not limited to: substrates, sub framing, penetrations and other preparatory work.
2. Review drawings, specifications, submittals and other contract documents.
3. Review construction schedule verifying availability of all materials, personnel and equipment needed to proceed and avoid delays. Verify that all masonry cleaning will be completed in the immediate area that would adversely impact the installed Architectural Zinc sheet metal.

4. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including cold temperatures.

G. Soldering: In accordance with instructions provided by manufacturer of Architectural Rolled Zinc.

H. Corrosion Control: Avoid direct contact of incompatible materials including but not limited to copper, red rosin paper, wet concrete & mortar, masonry cleaning solutions, & de-icing materials.

1.08 PERFORMANCE REQUIREMENTS


B. Install sheet metal flashing & trim and underlayment materials shingle fashion to avoid trapping of water. Flashing to divert all moisture infiltration to the building exterior.

C. Wind Load: As required by local code and the contract documents, design and engineer sheet metal flashing & trim, including size, spacing, & quality of mechanical fasteners & clips, and meeting requirements established by engineering calculations and local building codes.

D. Thermal Movement: Provide zinc profiles and detail connections which allow for thermal movement of the metal resulting from ambient temperature range of 120 °F. Individual zinc flashing & trim profiles shall have a fixing point zone (typically 36 inches) as needed to allow thermal movement of the zinc profiles.

E. Structural Performance: Provide zinc flashing, trim, anchors and attachments, which resist loads as required by code [and as documented in Engineering requirements] without permanent deflection or deformation.

1.09 DELIVERY, STORAGE AND HANDLING

A. Deliver all sheet, coil, and prefabricated zinc profiles unopened factory labeled packages. Protect materials from damage at all times. Rolled Zinc to be transported according to manufacturer’s recommendations.

B. Store and handle in strict compliance with manufacturer’s instructions and recommendations.

1. Protect zinc flashing & trim to the greatest extent possible. Store in covered shelter when possible minimizing exterior exposure until installation time. Stack materials on platforms or pallets, covered with tarpaulins or other suitable ventilated weatherproof covering. Slope cover & pallets to shed moisture. Allow for free airflow around covered material to exchange outside air.

2. All personnel to wear clean white cotton gloves when handling zinc flashing & trim profiles when no strippable film is present.

3. Do not store zinc profiles in contact with or below materials that might cause staining, denting, or other surface damage.

4. Store zinc profiles so that they will not accumulate water or excess moisture.
C. Exercise care in unloading, storing, and erecting zinc flashing & trim to prevent bending, warping, or surface damage.

D. Sequence deliveries to avoid delays, but minimize on-site storage.

1.10 WARRANTY

A. Material Only Warranty: provide 10-year limited warranty for Titanium-Zinc alloy from original rolling mill manufacturer. Warranty to cover the material quality of the sheet/ coil material used to fabricate sheet metal flashing & trim profiles appropriate for zinc installation.

B. Fabrication Warranty: provide 2-year fabrication warranty against sharp bends that fracture the metal, tears, and equipment induced damage to the Architectural Zinc sheet or coil.

C. Installation Warranty: provide 3-year guaranty covering the proper material or product application preventing failure due to hot-water corrosion, damage due to inappropriate slip sheet, absorptive separation material, or other installer induced failure.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Architectural Rolled Zinc Manufacturers: Subject to compliance with requirements, manufacturers of rolled-zinc sheet & coil used to fabricate custom flashing & trim profiles & prefabricated flashing & trim profiles used for exposed exterior building applications include:

1. RHEINZINK America, Inc. (Basis-of-Design)
   Woburn, MA 01801   ph: (781) 729.0812    www.rheinzink.us

B. Rolled Zinc Alloy Sheet/Coil:
   1. Titanium-Zinc Alloy containing approximately 99% electrolytic SHG Zinc (with 99.995% degree of purity) with additives of copper (0.08% - 1.0%), titanium (0.07% - 0.12%), and aluminum (0.001% - 0.015%) in accordance with ASTM B69-13, Type 1 and Type 2 (containing higher copper content).

   Manufactured Surface Aesthetic:

   a. PrePatina Rolled Zinc produced by submerging rolled Zinc Alloy in acid solution (etching/ pickling process) without the use of phosphates or pigmented color coatings.

      1. RHEINZINK prePATINA Blue-Grey (PPBG), ASTM B69 -13, type 1
      2. RHEINZINK prePATINA Graphite Grey (PPGG), ASTM B69 -13, type 2 (Dark RHEINZINK)
      3. RHEINZINK product to match material on existing building.

   b. PrePatina Rolled Zinc with backside colored paint coating designed to provide a protective barrier against occasional water exposure for applications with limited air changes behind the profile. Note: Backside coating is not intended to replace a capillary break, ventilation mat, or “zinc considerate” design.

      1. RHEINZINK PPBG ProRoofing, ASTM B69 -13, type 1
      2. RHEINZINK PPGG ProRoofing, ASTM B69 -13, type 2

   c. [prePATINA Bright Rolled Zinc, shiny surface without preweathered treatment:
      1. RHEINZINK prePATINA Bright Rolled (PPBR), ASTM B69 – 13, type
2. Minimum Zinc sheet thickness based on profile’s primary face dimension:
   a. 0.7mm (24 ga.) [for face width < 8”]
   b. 0.8 mm (22 ga.) [for face width < 12”]
   c. 1.0 mm (20 ga.) [for face width < 18”]

3. Minimum Flashing Thickness: 24 ga., (22 ga. or as required to minimize oil-canning & provide acceptable wind resistance.

C. Zinc Flashing & Trim Fabricator or System Manufacturer:
   1. Local/ Regional Sheet Metal Fabrication Shop
      a. Select zinc flashing & trim fabricator that has appropriate zinc-friendly equipment and personnel trained by the zinc rolling mill capable of producing quality zinc flashing & trim profiles.
      b. Contractor may elect to purchase prefabricated zinc flashing & trim profiles as fabricated by an approved RHEINZINK fabricator or system partner.

2.02 ACCESSORIES

A. Provide all components necessary for a complete, functional, weatherproof assembly including, but not limited to, trims, copings, fascias, sills, flashings, counter flashings, door frame trim, corner units, clips, wall caps, copings, sealants, closures and fillers. Metal materials shall match panels and be zinc compatible.

B. Clips & Fasteners: Provide stainless steel concealed clips and stainless steel fasteners; supplied in accordance with manufacturer’s recommendations and to meet the load requirements as specified by architect and confirmed by engineering calculations. Attachment clips shall permit expansion and contraction of the panel system throughout the specified temperature range. When permeable air barrier sheets are used and as required by the architect to resist liquid water penetration at the fastener penetration, provide fasteners with watertight washer gaskets (such as self-adhered membrane).

C. Solder: Lead-tin solder containing 50% tin and 50% lead in accordance with ASTM B32 – 08 or lead-free solder. Flux: Felder ZD-Pro or equal.


E. Permeable Underlayment: Permeable breather type underlayment membrane: Roofshield or Wallshield as manufactured by Vaproshield or A.Proctor Group (note fastener gasket requirement) or equal accepted by zinc manufacturer.

F. Air Barrier Underlayment: Vapor permeable sheet underlayment: Tyvek Commercial Wrap with taped seams or equal (note fastener gasket requirement) or equal accepted by zinc manufacturer.

G. Synthetic Underlayment: High tear strength non-bituminous felt (no asphalt felt) produced from polypropylene/ polyethylene fibers such as Grace Tri-Flex 30 or equal accepted by zinc manufacturer (note fastener gasket requirement).
H. Ventilation Mat/ Capillary Break/ Slip Sheet: Entangled nylon filaments creating a drainage space/ ventilation cavity to allow air movement and the possibility for liquid water or water vapor to escape. Provide Enkamat 7010 by Bonar or Air-Z by RHEINZINK. Note: Use of Red Rosin paper or other moisture-holding material as a slip sheet is NOT acceptable.

I. Joint Sealants: Where sheet metal flashing & trim terminates into or adjacent to dissimilar materials (masonry, glass, other metals, etc.) and a waterproof connection is required, provide joint backer rod, bond-breaker, and pH neutral sealant. Responsibility of this scope of work as determined by the Contractor. Provide Dow 795 structural silicone sealant or other documented pH neutral sealant. Use butyl-based sealant when required for moving joints.

Note: use of sealants should not interfere with the zinc's ability to dry out. Do not block weep holes or interfere with concealed drainage path when using sealant. Minimize exposed sealant joints that drain onto other zinc surfaces to avoid visible staining.

2.03 FABRICATION

A. General: Fabricate zinc flashing & trim in a heated shop and when metal temperature is 50 degrees F. Comply with minimum "soft" bend requirements based on metal thickness (min. bending radius to be 1.5 times metal thickness). Provide details as shown provided they do not interfere with functional performance of the zinc. Comply with recommendations found in RHEINZINK "Applications in Architecture", 2nd Updated Edition, SMACNA "Architectural Sheet Metal Manual", 6th Edition, and RHEINZINK Division 7 Binder (most recent update). Apply all zinc-specific recommendations to the design, dimensions (pan width and seam height), geometry, metal thickness, and other characteristics of installation indicated. Fabricate zinc flashing & trim to greatest extent possible in interior shop environment.

B. Fabricate zinc flashing & trim to allow for expansion in running work sufficient to prevent leakage, damage, and deterioration of the Work. Form exposed sheet metal work to fit substrates without excessive oil canning, buckling, and tool marks, true to line and levels indicated, and with exposed edges folded back to form hems.

1. Lay out sheet metal flashing & trim work so cross seams, when required, are made in direction of flow with higher profile overlapping lower profile. Stagger cross seams when aesthetics are critical.

2. Form and fabricate sheets, seams, strips, cleats, edge treatments, integral flashing, and other components of zinc flashing & trim to profiles, patterns, and drainage arrangements shown and as required to resist water infiltration without excessive use of sealants (dry joints) while also allowing any water infiltration behind the wall panels to weep out.

C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with non-acidic sealant (concealed within joints).

D. Sealant Joints: Where movable, non-expansion-type joints are indicated or required to produce weather tight seams, form metal to provide for proper installation of elastomeric sealant in compliance with SMACNA standards. In general, panel joints are intended to be dry, sealant-free, to facilitate air movement and drying behind the profiles whenever possible.
E. Separating dissimilar products: Provide permanent separation materials on concealed profile surfaces where zinc profile would otherwise be in direct contact with substrate materials that are non-compatible or could result in corrosion or deterioration.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Contractor shall inspect all surfaces, areas and other contingent construction in or to which his work is to be installed and insure himself that they are in proper condition to receive the work to be performed under this Section.

1. Verify that sheathing surfaces are sound, dry, properly secured and that provision has been made for flashings, anchorage, and all other interface items attaching to or penetrating through the Work of this Section has been completed.

2. The Contractor shall notify the Architect in writing, before any work is installed, of any condition requiring correction. Failure to make such a report shall be construed as acceptance of the existing conditions and the responsibility to provide an acceptable installation.

3.02 PREPARATION

A. Verify field dimensions before fabrication. Notify Architect of any discrepancies between field measurements and dimensions indicated in Construction Documents.


1. Coordinate installation of underlayment with roof and wall material or product manufacturer so that sheet metal flashing, & trim will provide a weatherproof, secure and durable installation.

2. Provide underlayment end and side laps as recommended by underlayment manufacturer’s instructions for proper attachment, seaming, and termination recommendations.

3. Use cap nails or screws with rubber gaskets (do not use staples)

C. For breather-type permeable /air barrier membranes, consult the architect for strategies preventing infiltration through fastener holes by applying sealant to backside of clips.

3.03 INSTALLATION

A. Rolled Zinc Manufacturer’s Recommendations: Except as otherwise shown or specified, comply with recommendations and instructions of manufacturer of sheet metal being fabricated and installed.
1. Do not install in inclement weather or over a damp substrate.
2. Use screws rather than nails to greatest extent possible.
3. Provide ventilation mat under zinc flashing & trim whenever possible without interfering with the primary roof and wall cladding material. When slope of zinc flashing & trim is greater than 30%, backside coating alone is acceptable. For slopes over 50%, no backside coating is required. If covering of zinc flashing is required, take extra precautions to ensure long-term waterproof seal over the zinc.

B. Install work to be truly straight and square or conform to curvilinear geometry indicated on drawings.

1. Fabricate and install work with lines and corners of exposed units true and accurate.
2. Form exposed faces free of buckles, excessive waves, and avoidable tool marks considering temper and reflectivity of metal.
3. Shim and align zinc flashing & trim within installed tolerance of ¼ inch in 20’-0’.
4. All seams shall be of uniform appearance and dimensions, straight and level with minimum exposure of solder.
5. Except as otherwise shown, fold back sheet metal to form an open hem (water check) on concealed side of exposed edges.
6. Form all seams to be weatherproof, leaving room for expansion and contraction with specified and required tolerances.

C. Conceal fasteners and expansion provision where possible in exposed work, and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

D. Provide work as indicated on approved shop drawings.

1. Form and fabricate sheets, seams, strips, cleats, edge treatments, integral flashings, and other components of metal wall cladding to profiles, patterns, and drainage arrangements shown and as required for water shedding construction. Ensure that all shop & field fabricated bends have an acceptable “rounded” or radius bend. NO SHARP BREAKS.

E. Separate non-compatible materials with a rubberized asphalt underlayment.

F. Install work to meet specified performance requirements.

3.04 CLEANING AND PROTECTION

A. Remove protective film (if any) from zinc panel surfaces promptly upon installation (or prior if film covers any concealed seam areas) with care to avoid damage to finish.

B. Clean exposed metal surfaces of substances that would interfere with uniform oxidation and weathering and as recommended by panel manufacturer and maintain in a clean condition during construction. Use WD-40 applied to a clean cloth and apply light pressure to remove contaminated surface. Never apply cleaner directly to zinc surface.
C. Ensure that cleaning by other trades working in proximity to zinc installation is in accordance with the recommendations of the zinc manufacturer.

D. Damaged units: Replace panels and other components of the work that have been damaged or have deteriorated beyond successful repair by means of finish touch-up or similar minor repair.

### 3.05 RECYCLING

A. Collect all zinc drop-offs (scrap) and return to local scrap metal recycling facility for current market monetary return.

### 3.06 CLEAN-UP

A. During the progress of the work, keep premises clear of debris resulting from these operations and remove surplus and waste materials from the site as soon as possible.

B. Upon completion of the work, Contractor shall remove from the site all equipment and materials used on the work as well as any debris resulting from the operations.

END OF SECTION
SECTION 07 7100
ROOF SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Manufactured roof specialties, including copings, fascias, gravel stops, and vents.
B. Roof control, expansion, and joint covers.
C. Roof membrane vents.

1.02 RELATED REQUIREMENTS
A. Section 07 7200 - Roof Accessories: Manufactured curbs, roof hatches, and snow guards.

1.03 REFERENCE STANDARDS
B. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2015.

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.
C. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.
D. Samples: Submit two appropriately sized samples of coping and gravel stop.
E. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members, and perimeter conditions requiring special attention.

1.05 QUALITY ASSURANCE
A. Perform work in accordance with SMACNA (ASMM) details.
   1. Maintain one copy on project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Roof Edge Flashings and Copings:
5. Substitutions: See Section 01 6000 - Product Requirements.

B. Control and Expansion Joint Covers:
1. GAF; www.gaf.com/sle.
4. Substitutions: See Section 01 6000 - Product Requirements.

C. Louvered Vents:

D. Pipe and Penetration Flashings:
2. Substitutions: See Section 01 6000 - Product Requirements.

E. Manufactured Counter Flashings:
2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 COMPONENTS

A. Roof Edge Flashings: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.
1. Configuration: Fascia, cant, and edge securement for roof membrane as indicated on drawings;
2. Pull-Off Resistance: Tested in accordance with SPRI ES-1 RE-1 and RE-2 to positive and negative design wind pressure as defined by applicable code.
3. Material: Extruded aluminum, 0.08 inch thick, minimum.
4. Finish: 70 percent polyvinylidene fluoride.
5. Color: To be selected by Architect from manufacturer's standard range.
6. Manufacturers:
   b. Substitutions: See Section 01 6000 - Product Requirements.

B. Copings: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.
1. Configuration: Concealed continuous hold down cleat at both legs; internal splice piece at joints of same material, thickness and finish as cap; concealed stainless steel fasteners.
2. Pull-Off Resistance: Tested in accordance with SPRI ES-1 RE-3 to positive and negative design wind pressure as defined by applicable code.
3. Material: Formed aluminum sheet, 0.050 inch thick, minimum.
4. Finish: 70 percent polyvinylidene fluoride.
5. Manufacturers:
   b. Substitutions: See Section 01 6000 - Product Requirements.

C. Control and Expansion Joint Covers: Composite construction of flexible EPDM flashing of whitecolor with closed cell urethane foam backing, each edge seamed to aluminum sheet metal flanges, designed for nominal joint width of 1 inch. Include special formed corners, tees, intersections, and wall flashings, each sealed watertight.

D. Roofing Vents: Formed aluminum 3/4 inch thick, of watertight construction to permit construction below roof membrane to breathe; with attachment flanges 1 inch wide. Provide
1. Finish: Mill finish.
2. Color: To be selected by Architect from manufacturer's standard range.

E. Attic Vents: Dome type; aluminum, 1 inch thick, color coated, formed to permit installation with shingle roofing and shed water. Fabricate with fifty-percent minimum free area of ventilation.
1. Finish: Mill finish.
2.03 FINISHES
   A. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as scheduled.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

3.02 INSTALLATION
   A. Install components in accordance with manufacturer's instructions.
   B. Seal joints within components when required by component manufacturer.
   C. Anchor components securely.
   D. Coordinate installation of components of this section with installation of roofing membrane and base flashings.
   E. Coordinate installation of sealants and roofing cement with work of this section to ensure watertightness.
   F. Coordinate installation of flashing flanges into reglets.

END OF SECTION
SECTION 07 7123
MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Pre-finished aluminum gutters and downspouts.
   B. Precast concrete splash pads.

1.02 RELATED REQUIREMENTS
   A. Section 05 5000 - Metal Fabrications: Downspout boots.
   B. Section 07 6200 - Sheet Metal Flashing and Trim.
   C. Section 09 9000 – Painting and Coatings: Field painting of metal surfaces.

1.03 REFERENCE STANDARDS
   A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2015.
   B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2013.
   C. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS
   A. Conform to SMACNA (ASMM) for sizing components for rainfall intensity determined by a storm occurrence of 1 in 5 years.
   B. Conform to applicable code for size and method of rain water discharge.
   C. Maintain one copy of each document on site.

1.05 SUBMITTALS
   A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide data on prefabricated components.
   C. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.
   D. Samples: Submit two samples, 12 inch long illustrating component design, finish, color, and configuration.

1.06 DELIVERY, STORAGE, AND HANDLING
   A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.
   B. Prevent contact with materials that could cause discoloration, staining, or damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   A. Gutters and Downspouts:
      5. Substitutions: See Section 01 6000 - Product Requirements.
2.02 MATERIALS
   A. Pre-Finished Galvanized Steel Sheet: ASTM A653, with G90/Z275 zinc coating; minimum 0.02 inch thick base metal.
      1. Finish: Shop pre-coated with modified silicone coating.
      2. Color: As selected from manufacturer's standard colors.

2.03 COMPONENTS
   A. Gutters: CDA rectangular style profile.
   B. Downspouts: CDA Rectangular profile.
   C. Anchors and Supports: Profiled to suit gutters and downspouts.
      1. Anchoring Devices: In accordance with CDA requirements.
      2. Gutter Supports: Brackets.
      3. Downspout Supports: Brackets.
   D. Fasteners: Galvanized steel, with soft neoprene washers.

2.04 ACCESSORIES
   A. Splash Pads: Precast concrete type, size and profiles indicated; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.
   B. Downspout Boots: Cast iron; ASTM A48.
      1. Manufacturers:
         b. Substitutions: See Section 01 6000 - Product Requirements.

2.05 FINISHES
   A. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system; color as indicated.
   B. Primer Coat: Finish concealed side of metal sheets with primer compatible with finish system, as recommended by finish system manufacturer.

PART 3 EXECUTION
3.01 EXAMINATION
   A. Verify existing conditions before starting work.
   B. Verify that surfaces are ready to receive work.

3.02 PREPARATION
   A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION
   A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.
   B. Sheet Metal: Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.
   C. Slope gutters 1/8 inch per foot.
   D. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.
   E. Connect downspouts to downspout boots at 12 inches above grade. Grout connection watertight. Provide cleanout where downspout meets boot.
   F. Connect downspouts to storm sewer system. Grout connection watertight.
   G. Set splash pans under downspouts.

END OF SECTION
SECTION 07 7200
ROOF ACCESSORIES

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. Roof curbs.
   2. Equipment supports.
   4. Pipe supports.
   5. Preformed flashing sleeves.

B. Related Sections:
   1. Division 23 Section "HVAC Power Ventilators" for power roof-mounted ventilators.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction. Roof curbs and equipment supports should be designed for 95 mph wind loads, exp. B per ASCE7-05.

1.4 SUBMITTALS

A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

C. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:
   1. Size and location of roof accessories specified in this Section.
   2. Method of attaching roof accessories to roof or building structure.
   3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
   4. Required clearances.
D. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

E. Warranty: Sample of special warranty.

F. Submit calculations, signed & sealed by Professional Engineer Licensed in New Jersey, indicating that roof curbs and equipment supports can withstand imposed loads. Calculations shall include connection of equipment.

1.5 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.6 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

A. Zinc-Coated Galvanized Steel Sheet: ASTM A 653, G90 coating designation and mill phosphatized for field painting where indicated.

   1. Mill-Phosphatized Finish: Manufacturer's standard for field painting.
   2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.
   3. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

      a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
4. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil for topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.

B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792, AZ50 coated.

1. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.

2. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

   a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

3. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil for topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.

C. Aluminum Sheet: ASTM B 209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

1. Mill Finish: As manufactured.

2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.


5. Exposed Coil-Coated Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

   a. Two-Coat Fluoropolymer Finish: AAMA 620. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

6. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

7. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.
2.2 ROOF CURBS

A. Roof Curbs: Internally reinforced roof-curb units with integral spring-type vibration isolators capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, integral metal cant, and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Refer to Section 23 0548 – Vibration Isolation, Seismic, Wind & Flood Load Restraints for HVAC components for acceptable manufacturers.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Loads: See plan schedules and performance requirements.

D. Material: Zinc-coated (galvanized) or Aluminum-zinc alloy-coated steel sheet, 0.052 inch thick.

1. Finish: Two-coat fluoropolymer.
2. Color: As selected by Architect from manufacturer's full range.

E. Material: Aluminum sheet, 0.090 inch thick.

1. Finish: Mill.
2. Color: As indicated by manufacturer's designations.

2.3 EQUIPMENT SUPPORTS

A. Equipment Supports: Internally reinforced metal equipment supports capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, integral metal cant, and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Refer to Section 23 0548 – Vibration Isolation, Seismic, Wind & Flood Load Restraints for HVAC components for acceptable manufacturers.
B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Loads: See plan schedules.

D. Material: Zinc-coated (galvanized) or Aluminum-zinc alloy-coated steel sheet, 0.052 inch thick.
   1. Finish: Two-coat fluoropolymer.
   2. Color: As selected by Architect from manufacturer's full range.

E. Material: Aluminum sheet, 0.090 inch thick.
   1. Finish: Mill.
   2. Color: As indicated by manufacturer's designations.

F. Construction:
   1. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
   2. Fabricate equipment supports to minimum height of 12 inches unless otherwise indicated.
   3. Sloping Roofs: Where roof slope exceeds 1:48, fabricate each support with height to accommodate roof slope so that tops of supports are level with each other. Equip supports with water diverters or crickets on sides that obstruct water flow.

2.4 GRAVITY VENTILATORS

A. Low-Profile, Cylindrical-Style Gravity Ventilators: Manufacturer's standard, fabricated as indicated, with manufacturer's standard welded or sealed mechanical joints.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Greenheck Fan Corporation.
   b. Metallic Products Corp.
   c. Thaler Metal USA Inc.

2. Construction: Integral base flange, vent cylinder, cylinder bird screen, and rain cap or hood.

3. Dimensions: As indicated on Drawings.

4. Configuration: As indicated on Drawings.

5. Bird Screens: Manufacturer's standard mesh with rewireable frame.

6. Insect Screens: Manufacturer's standard mesh with rewireable frame.

7. Vent Cylinder, Base Flange, and Rain-Cap or Hood Material: Aluminum sheet, of manufacturer's standard thickness.

8. Finish: As indicated by manufacturer's designations.

2.5 PIPE SUPPORTS

A. Pipe Supports: Adjustable-height, extruded-aluminum tube, with aluminum baseplate, EPDM base seal, manufacturer's recommended hardware for mounting to structure or structural roof
deck as indicated, and extruded-aluminum carrier assemblies; suitable for quantity of pipe runs and sizes.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Thaler Metal USA Inc.
   b. Pate
   c. Roof Products & Systems
2. Roller Assembly: With stainless-steel roller, sized for supported pipes.

B. Light-Duty Pipe Supports: Extruded-aluminum base assembly and Type 304 stainless-steel roller assembly for pipe sizes indicated, including manufacturer's recommended load-distributing baseplate.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Thaler Metal USA Inc.
   b. Pate Co.
   c. Roof Products & Systems
2. Finish: Manufacturer's standard.

C. Duct Supports: Extruded-aluminum supports, with manufacturer's recommended hardware for mounting to structure or structural roof deck.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Thaler Metal USA Inc.
   b. Pate Co.
   c. Roof Products & Systems
2. Finish: Manufacturer's standard.

2.6 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum or stainless-steel roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene sheet.

C. Roof Curb Installation: Install each roof curb so top surface is level.

D. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.

E. Gravity Ventilator Installation: Verify that gravity ventilators operate properly and have unrestricted airflow. Clean, lubricate, and adjust operating mechanisms.

F. Pipe Support Installation: Install pipe supports so top surfaces are in contact with and provide equally distributed support along length of supported item.

G. Security Grilles: Weld bar intersections and, using tamper-resistant bolts, attach the ends of bars to structural frame or primary curb walls.
H. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Division 09 painting Sections.

C. Clean exposed surfaces according to manufacturer's written instructions.

D. Clean off excess sealants.

E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07 7200
SECTION 07 8100
APPLIED FIREPROOFING

PART 1     GENERAL

1.01     SCOPE

A. This specification covers labor, materials, equipment, and application necessary for, and incidental to, the complete and proper installation of intumescent fire protection for application to steel structures and supports in accordance with all applicable requirements of contract documents.

B. This specification shall be supplemented by the applicable requirements of building codes, insurance rating organizations and all authorities having jurisdiction.

1.02     SECTION INCLUDES

A. Intumescent fire protection material.

B. Topcoat protective decorative finish.

1.03     RELATED SECTIONS

A. Section 05 1200: Structural Steel.

B. Section 05 5000: Metal fabrications with reference to primer receiving fire protection materials.

C. Section 08 8400: Firestopping and Smoke Seals.

D. Section 09 9000: Painting and Coatings.

1.03     REFERENCE STANDARDS


B. Underwriters Laboratories of Canada (ULC) - List of Equipment and Materials.

C. Underwriters Laboratories Classified CDXA.

D. Underwriters Laboratories Classified CDYD

E. FIRETEX FX5120 has been certified by Underwriters Laboratories to UL263 and listed by the following designs:
   1. Design No. D981
   2. Design No. N636
   3. Design No. Y623
   4. Design No. Y624

F. Test Standards
   3. UL CDYD
   4. UL CDXA
5. ASTM E84 - Surface Burning Characteristics of Building Materials.  
   Flame Spread Maximum: 0 and Smoke Developed Maximum: 5. Class A
6. ASTM D2240 – Durometer Hardness: Minimum SHORE “D”- 70
8. ASTM D4060 – Abrasion Resistance - .2900g/ 1000 Cycles
9. ASTM D4541 – Bond Strength (Type IV). Average: 540 psi.

G. Steel Structures Painting Council (SSPC) Surface Preparation Standards.

H. Material manufacturer's current published Product Technical Data Sheet (PDS) and Material Safety Data Sheet (MSDS).


1.05 SYSTEM DESCRIPTION

A. The intumescent fire protection materials shall be applied at the required thickness to provide the UL fire resistive ratings.

B. Extrapolated thickness requirements will not be accepted.

1.06 SUBMITTALS

A. Manufacturer's Data: Submit manufacturer's Product Data Sheet, and certifications as may be required to verify material compliance with contract documents.

B. UL Listed and stamped schedule of fireproofing thickness requirements including the UL design listings upon which they are based.

1.07 QUALITY ASSURANCE

A. Manufacturer - Company specializing in manufacturing fire protection products.

B. The intumescent fire resistive material shall be manufactured under the Follow-Up Service program of UL or ULC and bear the UL and/or ULC label (mark).

C. Product - The product shall be approved by the architect and applicable authorities having jurisdiction. Products shall meet the ASTM E 119 fire standard, be tested at Underwriters Laboratories per UL 263 and meet the requirements of the local authority having jurisdiction.

D. Applicator - A firm with expertise in the installation of fire resistive or similar materials. Applicator must have applied intumescent fireproofing on projects of similar size and scope.

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the project in manufacturer's unopened packages, fully identified as to trade name, type and other identifying data. Packaged materials shall bear the appropriate labels, seals and UL label (mark) for fire resistive ratings and shall be stored at temperatures between 41° F and 77° F in a dry interior location away from direct sunlight. DO NOT FREEZE.
1.09 PROJECT/SITE CONDITIONS

A. When the temperature at the job site is less than 50°F, a minimum substrate and ambient temperature of 50°F, shall be maintained prior to, during, and a minimum of 72 hours after application. If necessary for job schedule, the General Contractor shall provide enclosures and heat to maintain proper temperatures and humidity levels in the application areas.

B. In enclosed areas, ventilation shall not be less than 4 complete air exchanges per hour until the material is dry.

C. Relative humidity shall not exceed 85% throughout the total period of application and drying for the intumescent fire resistive material, and must not exceed 85% throughout the application and drying for the protective decorative topcoat.

1.10 SEQUENCING AND SCHEDULING

A. Applicator shall cooperate in the coordination and scheduling of fire protection work void delays in job progress.

B. The installation of piping, ducts, conduit or other suspended equipment shall not commence until the application of the thin-film fire resistive material is complete in that area.

PART 2 - PRODUCTS

2.01 COMPATIBLE METAL PRIMER

A. Primer shall be approved by manufacturer and applied in full accordance with the primer manufacturer’s written instructions.

2.02 INTUMESCENT FIRE PROTECTION SYSTEM

A. The intumescent fire resistive material shall be Sherwin-Williams® FIRETEX FX 5120™ as supplied by The Sherwin-Williams Company.

B. Intumescent fire resistive material shall be applied in accordance with drawings and/or specifications, and shall have been tested in accordance with the procedures of UL 263 and ASTM E119 or CAN/ULC-S101, and reported by Underwriters Laboratories, Inc. or Underwriters Laboratories of Canada.

C. Thin-Film Fire-Resistive Intumescent Mastic Coating: Factory-mixed formulation.
   1. Water-Based Formulation: Approved by manufacturer and authorities having jurisdiction for indicated use.
   2. Verify with manufacturer that products selected are suitable for use indicated.
   3. UL Fire Tested Designs Only based on UL 263 (ASTM-E119) or UL Classified CDXA.
   4. A representative mock-up sprayed Architectural finish sample must be submitted, reviewed, and accepted by the architect in advance.

2.03 TOPCOATING

A. Topcoat materials shall be as required for color-coding, aesthetics or additional surface protection, approved by the thin-film fire resistive material manufacturer and applied in full accordance with the coating manufacturer’s written instructions.

PART 3 - EXECUTION
3.01 **PREPARATION**

A. All surfaces to receive thin-film fire resistive material shall be clean, dry and free of oil, grease, loose mill scale, dirt, dust or other materials which would impair bond of the thin-film fire resistive material to the surface.

B. Confirm compatibility of surfaces to receive thin-film fire resistive material. Steel surfaces shall be primed with a compatible primer approved by the thin-film fire resistive material manufacturer.

C. Provide masking, drop cloths or other suitable coverings to prevent overspray onto surfaces not intended to be coated with intumescent coating.

3.02 **APPLICATION**

A. The thin-film fire resistive material shall be applied at the required dry film thickness per the appropriate UL design number guidelines and manufacturers written application instructions.

3.03 **MOCK UP**

A. Before proceeding with the work, the applicator shall apply the thin-film fire resistive material to a section witnessed by the architect's or owner's representative. The application shall be subject to their approval and shall be used as a guide for texture and thickness of the finished work.

3.04 **CLEAN UP AND REPAIR**

A. Upon completion of installation, all excess material, overspray and debris shall be cleared and removed from the job site.

B. Patching and Touch-Up shall be performed by an applicator with expertise in the installation of Intumescent Fire Protection Coatings. Repair shall be in accordance with UL design number guidelines and manufacturers written application instructions.

3.05 **INSPECTION AND TESTING**


B. The results of the above tests shall be made available to all parties at the completion of each area and approved prior to the application of topcoat.
PART 4 - COATING SCHEDULE

4.01 PREPARATION

A. Minimum Surface Preparation: SSPC-SP1 Solvent Cleaning, SP2 Hand Tool Cleaning and/or SP3 Power Tool Cleaning as required. For optimum performance, Abasive Blast Clean steel surfaces per SSPC-SP6 Commercial Blast Cleaning.

B. Prime Coat: Kem Kromik Universal Metal Primer #B50Z Series @3.0-4.0 Dry Mils (or other compatible primer)

C. Intumescent: FIRETEX FX 5120 Waterbased Intumescent Fireproofing (Dry Film Thickness refer to UL263 Thickness Tables)

D. Topcoat: Pro Industrial Acrylic @ 2.5-4.0 Dry Mils (or other compatible topcoat)

END OF SECTION
SECTION 07 8400
FIRESTOPPING

PART 1  GENERAL

1.01  SECTION INCLUDES
A. Firestopping systems.

1.02  RELATED REQUIREMENTS
A. Section 01 7000 - Execution and Closeout Requirements: Cutting and patching.
B. Section 07 8100 - Applied Fireproofing.
C. Section 09 2116 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

1.03  REFERENCE STANDARDS
D. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestops; 2014b.
G. ITS (DIR) - Directory of Listed Products; current edition.

1.04  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 Installation Instructions: Indicate preparation and installation instructions.
F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
G. Certificate from authority having jurisdiction indicating approval of materials used.
H. Installer Qualification: Submit qualification statements for installing mechanics.

1.05  QUALITY ASSURANCE
A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
   1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.

3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and:
   1. Trained by the manufacturer.
   2. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:
   3. With minimum five years documented experience installing work of this type.

1.06 MOCK-UP
A. Install one firestopping assembly representative of each fire rating design required on project.
   1. Where one design may be used for different penetrating items or in different wall constructions, install one assembly for each different combination.
   2. Where firestopping is intended to fill a linear opening, install minimum of 1 linear ft.

B. Obtain approval of authorities having jurisdiction (AHJ) before proceeding.

C. If accepted, mock-up will represent minimum standard for the Work.

D. If accepted by Owner and Architect, mock-up may remain as part of the Work. Remove and replace mock-ups not accepted.

1.07 FIELD CONDITIONS
A. Comply with firestopping manufacturer’s recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS
2.01 FIRESTOPPING - GENERAL REQUIREMENTS
A. Manufacturers:
   2. 3M Fire Protection Products; www.3m.com/firestop.
   6. Substitutions: See Section 01 6000 - Product Requirements.

B. Firestopping: Any material meeting requirements.

C. Mold Resistance: Provide firestopping materials with mold and mildew resistance rating of 0 as determined by ASTM G21.

D. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.

E. Fire Ratings: Refer to drawings for required systems and ratings.

2.02 FIRESTOPPING ASSEMBLY REQUIREMENTS
A. Perimeter Fire Containment Firestopping: Use any system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of the floor assembly.
   1. Movement: In addition, provide systems that have been tested to show movement capability as indicated.
   2. Temperature Rise: In addition, provide systems that have been tested to show T Rating as indicated.
   3. Air Leakage: In addition, provide systems that have been tested to show L Rating as indicated.
4. Where floor assembly is not required to have a fire rating, provide systems that have been tested to show L Rating as indicated.

B. Head-of-Wall Firestopping at Joints Between Non-Rated Floor and Fire-Rated Wall: Use any 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.
   1. Movement: In addition, provide systems that have been tested to show movement capability as indicated.

C. Floor-to-Floor, Wall-to-Wall, and Wall-to-Floor Joints, Except Perimeter, Where Both Are Fire-Rated: Use any 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.
   1. Movement: In addition, provide systems that have been tested to show movement capability as indicated.
   2. Air Leakage: In addition, provide systems that have been tested to show L Rating as indicated.
   3. Watertightness: In addition, provide systems that have been tested to show W Rating as indicated.
   4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

D. Through Penetration Firestopping: Use any system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
   1. Temperature Rise: In addition, provide systems that have been tested to show T Rating as indicated.
   2. Air Leakage: In addition, provide systems that have been tested to show L Rating as indicated.
   3. Watertightness: In addition, provide systems that have been tested to show W Rating as indicated.
   4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

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:

B. Gypsum Board Walls:
   1. Wall to Wall Joints:
      a. 1 Hour Construction: UL System WW-D-0067; Hilti CP 606 Flexible Firestop Sealant.
      b. Top of Wall Joints at Underside of Steel Beam and Concrete Over Metal Deck Floor with Sprayed On Fireproofing:
         a. 1 Hour Construction: UL System HW-D-0259; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
      c. Top of Wall Joints at Underside of Flat Concrete:
         a. 1 Hour Construction: UL System HW-D-1068; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
      d. Top of Wall Joints at Concrete Over Metal Deck, Wall Parallel to Ribs:
         a. 1 Hour Construction: UL System HW-D-0049; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
      e. Top of Wall Joints at Concrete Over Metal Deck, Wall Perpendicular to Ribs, Cut to Fit Ribs:
         a. 1 Hour Construction: UL System HW-D-0045; Hilti CP 606 Flexible Firestop Sealant.
      f. Top of Wall Joints at Concrete Over Metal Deck, Wall Perpendicular to Ribs, Not Cut to Fit:
a. 1 Hour Construction: UL System HW-D-0042; Hilti CFS-SP WB Firestop Joint Spray and CP 672.

2.04 FIRESTOPPING PENETRATIONS THROUGH CONCRETE AND CONCRETE MASONRY CONSTRUCTION

A. Blank Openings:
   1. In Floors or Walls:
      a. 2 Hour Construction: UL System C-AJ-0090; Hilti FS-ONE MAX Intumescent Firestop Sealant.

B. Penetrations Through Floors or Walls By:
   1. Multiple Penetrations in Large Openings:
      a. 2 Hour Construction: UL System C-AJ-8143; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   2. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
      a. 2 Hour Construction: UL System System C-AJ-2167; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   3. Electrical Cables Not In Conduit:
      a. 2 Hour Construction: UL System W-J-3199; Hilti CFS-SL SK Firestop Sleeve Kit.
   4. Cable Trays with Electrical Cables:
      a. 2 Hour Construction: UL System C-AJ-4094; Hilti CFS-BL Firestop Block.
   5. Insulated Pipes:
      a. 3 Hour Construction: UL System C-AJ-5090; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   6. HVAC Ducts, Uninsulated:
      a. 2 Hour Construction: UL System C-AJ-7111; Hilti FS-ONE MAX Intumescent Firestop Sealant.

C. Penetrations Through Floors By:
   1. Multiple Penetrations in Large Openings:
   2. Uninsulated Metallic Pipe, Conduit, and Tubing:
      a. 2 Hour Construction: UL System F-A-1016; Hilti CP 680-P/M Cast-In Device.
   3. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
      a. 2 Hour Construction: UL System F-A-2065; Hilti CP 680-P Cast-In Device.
   4. Electrical Cables Not In Conduit:
      a. 2 Hour Construction: UL System F-A-3033; Hilti CP 680-P/M Cast-In Device.
   5. Electrical Busways:
   6. Insulated Pipes:
      a. 2 Hour Construction: UL System F-A-5015; Hilti CP 680-P/M Cast-In Device.

D. Penetrations Through Walls By:
   1. Uninsulated Metallic Pipe, Conduit, and Tubing:
      a. 1 Hour Construction: UL System W-J-1067; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   2. Electrical Cables Not In Conduit:
      a. 2 Hour Construction: UL System C-AJ-3095; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   3. Insulated Pipes:
      a. 1 Hour Construction: UL System C-AJ-5090; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   4. HVAC Ducts, Uninsulated:
      a. 2 Hour Construction: UL System W-J-7109; Hilti FS-ONE MAX Intumescent Firestop Sealant or CP 606 Flexible Firestop Sealant.
5. HVAC Ducts, Insulated:
   a. 2 Hour Construction: UL System W-J-7112; Hilti FS-ONE MAX Intumescent Firestop Sealant.

2.05 FIRESTOPPING PENETRATIONS THROUGH GYPSUM BOARD WALLS

A. Blank Openings:
   1. 1 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.

B. Penetrations By:
   1. Multiple Penetrations in Large Openings:
      a. 1 Hour Construction: UL System W-L-1408; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   2. Uninsulated Metallic Pipe, Conduit, and Tubing:
      a. 1 Hour Construction: UL System W-L-1054; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   3. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
      a. 1 Hour Construction: UL System W-L-2128; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   4. Electrical Cables Not In Conduit:
      a. 1 Hour Construction: UL System W-L-3065; Hilti FS-ONE MAX Intumescent Firestop Sealant, CP 606 Flexible Firestop Sealant, CD 601S Elastomeric Firestop Sealant, or CP 618 Firestop Putty Stick.
   5. Cable Trays with Electrical Cables:
      a. 1 Hour Construction: UL System W-L-4060; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   6. Insulated Pipes:
      a. 1 Hour Construction: UL System W-L-5028; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   7. HVAC Ducts, Insulated:
      a. 1 Hour Construction: UL System W-L-7156; Hilti FS-ONE MAX Intumescent Firestop Sealant.

2.06 FIRESTOPPING SYSTEMS

A. Firestopping: Any material meeting requirements.
   1. Fire Ratings: Use any system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814 or ASTM E119 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

B. Firestopping Between Edge of Floor Slab and Curtain Wall (without Penetrations): Fiber firestopping with smoke seal coating; T Rating 3/4 hour.

C. Firestopping Between Top of Partition Wall and Roof Slab: Fiber firestopping with smoke seal coating, equal to fire rating of the wall assembly.

END OF SECTION
SECTION 07 8413
THROUGH-PENETRATION FIRESTOP SYSTEMS

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 SUMMARY
A. This Section includes firestopping for the following:
   1. Penetrations through fire-resistance-rated floor and roof construction including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
   2. Penetrations through fire-resistance-rated walls and partitions including both empty openings and openings containing cable, pipes, ducts, conduits, and other penetrating items.
   3. Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 07 Section "Joint Sealants" for non-fire-resistive-rated joint sealants.
   2. Division 22 Sections specifying piping penetrations.
   3. Division 23 Sections specifying duct and piping penetrations.
   4. Division 26 Sections specifying cable and conduit penetrations.

1.3 SYSTEMS PERFORMANCE REQUIREMENTS
A. General: Provide firestopping systems that are produced and installed to resist spread of fire according to requirements indicated, and the passage of smoke and other gases.

B. Flame (F)-Rated Through-Penetrated Firestop Systems: Provide through-penetration firestop systems with F ratings, as determined per ASTM E 814, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated. F Ratings – 2 HR and 3HR.

C. Temperature (T)-Rated Through-Penetrated Firestop Systems: Provide through-penetration firestop systems with T ratings, in addition to F ratings, as determine per ASTM E 814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupiable floor areas. T-rated assemblies are required where the following conditions exist. T Ratings – 0HR and ¾ HR.

   1. Where firestop systems protect penetrations located outside of wall cavities.
   2. Where firestop systems protect penetrations located outside fire-resistive shaft enclosure.
   3. Where firestop systems protect penetrations located in construction containing doors required to have a temperature-rise rating.
   4. Where firestop systems protect penetrating items larger than a 4-inch-diameter nominal pipe or 16 sq. in. in overall cross-sectional area.
D. Fire-Resistive Joint Sealants: Provide joint sealants with fire-resistance ratings indicated, as determined per ASTM E 119, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.

E. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
   1. For piping penetrations for plumbing provide moisture-resistant through-penetration firestop systems.
   2. For floor penetrations with annular spaces exceeding 4 inches or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means.
   3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

1.4 SUBMITTALS

A. General Submit the following according to Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of products specified.
   1. Certification by firestopping manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs) and are nontoxic to building occupants.

C. Product test reports from, and based on tests performed by, a qualified testing and inspecting agency evidencing compliance of firestopping with requirements based on comprehensive testing of current products.

D. Products proposed for use at each condition.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide firestopping that complies with the following requirements and those specified under the "System Performance Requirements" article:
   1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for firestop systems that is acceptable to authorities having jurisdiction.

   2. Through-penetration firestop systems are identical to those tested per ASTM E 814 under conditions where positive furnace pressure differential of at least 0.01 inch of water is maintained at a distance of 0.78 inch below the fill materials surrounding the penetrating items in the test assembly. Provide rated systems complying with the following requirements.

B. Fire-resistive joint sealant systems are identical to those tested for fore-response characteristics per ASTM E 119 under conditions where the positive furnace pressure differential is at least 0.01 inch of water, as measured 0.78 inch from the face exposed to furnace fire. Provide systems complying with the following requirements:
1. Fire-Resistance Ratings of Joint Sealants: As indicated by reference to design designations listed by UL in their “Fire Resistance Directory” or by another qualified testing and inspecting agency.
2. Joint sealants including backing materials, bear classifications marking of qualified testing and inspection agency.

C. Firestopping materials and systems must be capable of closing or filling through openings created by 1) the burning or melting of combustible pipes, cable jacketing, or pipe insulation materials, or 2) deflection sheet metal due to thermal expansion (electrical & mechanical duct work).

D. Firestopping material shall be asbestos and lead free and shall not incorporate nor require the use of hazardous solvents.

E. Firestopping sealants must be flexible allowing for normal pipe movement.

F. Firestopping materials shall not shrink upon drying as evidence by cracking or pulling back from contact surfaces.

G. Firestopping materials shall be moisture resistant, and may not dissolve in water after curing.

H. Material used shall be in accordance with the manufacturer’s written installation instructions.

I. Installer Qualifications: Engage an experienced Installer who has completed firestopping that is similar in material, design, and extent to that indicated for Project and that has performed successfully.

J. Coordinating Work: Coordinate construction of openings and penetrating items to ensure that designated through-penetration firestop systems are installed per specified requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturers’ labels identifying product and manufacturer; date of manufacture; lot number; shelf life; if applicable: qualified testing and inspecting agency’s classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.

B. Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install firestopping systems when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilation: Ventilate firestopping per firestopping manufacturer’s instructions by natural means or, where this is inadequate, forced-air circulation.
PART 2 - PRODUCTS

2.1 FIRESTOPPING, GENERAL

A. Compatibility: Provide fire stopping composed of components that are compatible with each other, the substrates forming openings, and with the items, if any, penetrating firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.

B. Accessories: Provide components for each firestopping system that are needed to install fill materials and to comply with “System Performance Requirements” article in Part 1. Use only components specified by firestopping manufacturer and approved by qualified testing and inspecting agency for the designated fire-resistance-rated-systems. Accessories include, but are not limited to, the following items:

C. Permanent forming/damming/backing materials, including the following:
   1. Semirefractory fiber (mineral wool) insulation.
   2. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
   3. Fire-rated formboard
   4. Joint fillers for joint sealants
   5. Temporary forming materials.
   7. Collars.
   8. Steel sleeves.

D. Applications: Provide Firestopping systems composed of materials specified in this Section that Comply with system performance and other requirements.

E. Intumescent, Latex sealant: Single-component, intimescent, latex formulation.

F. Intumescent putty: Nonhardening, dielectric, water-resistant putty containing no solvents, inorganic fibers, or silicone compounds.

G. Intumescent Wrap Strips: Single-component, elastomeric sheet with aluminum foil on one side.

H. Job-Mixed Vinyl Compound: Prepackaged vinyl-based powder product for mixing with water at Project site to produce a paintable compound, passing ASTM E 136, with flame-spread and smoke-developed ratings of zero per ASTM E 84.

I. Mortar: Prepackaged dry mix composed of a blend of inorganic binders, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

J. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealant of grade indicated below:
   1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
   2. Grade for Horizontal Surfaces: Pourable (self-leveling) grade for openings in floors and other horizontal surfaces.
3. **Grade for Vertical Surfaces:** Nonsag grade for openings in vertical and other surfaces.

**K. Available Products:** Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

**L. Ceramic-Fiber and Mastic Coating:**
1. FireMaster Bulk and FireMaster Mastic, Thermal Ceramics.

**M. Ceramic-Fiber Sealant:**

**N. Endothermic, Latex Sealant:**
1. Fyre-Shield, Tremco, Inc.

**O. Endothermic, Latex Compounds:**
1. Flame-Safe FS500/600 Series, International Protective Coatings Corp.
2. Flame-Safe FS900/FST900 Series, International Protective Coatings Corp

**P. Intumescent Latex Sealants:**
1. Metacaulk 950, The RectorSeal Corp.

**Q. Intumescent Putty:**
1. Pensil 500 Intumescent Putty, General Electric Co.
2. Flame-Safe FSP1000 Putty, International Protective Coatings Corp.

**R. Intumescent Wrap Strips:**
1. Dow Corning Fire Stop Intumescent Wrap Strip 2002, Dow Corning Corp.
2. CP 648 Intumescent Wrap, Hilti Construction Chemicals, Inc.

**S. Job-Mixed Vinyl Compound:**
USG Firecode Compound, United States, Gypsum Co.

**T. Mortar:**
3. KBS-Mortar Seal, International Protective Coatings Corp.

**U. Silicone Sealants:**
1. Dow Corning Firestop Sealant 2000, Dow Corning Corp.
2. Dow Corning Firestop Sealant SL 2003, Dow Corning Corp.
4. FS-ONE Firestop Sealant, Hilti Constuction Chemicals, Inc.
7. Fyre-Sil-Tremco Inc.
8. Fyre-Sil S/L, Tremco Inc.
2.2 FIRE-RESISTIVE ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Provide manufacturer’s standard chemically curing, elastomeric sealants of base polymer indicated that complies with ASTM C 920 requirements, including those referenced for Type, Grade, Class, and Uses, and requirements specified in this Section applicable to fire-resistive joint sealants.

B. Sealants Colors: Provide color of exposed joint sealants to comply with the following:
   1. Provide selections made by Architect form manufacturer’s full range of standard colors for products of type indicated.

C. Single-Component, Neutral-Curing Silicone sealant: Type S; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, G, A, and (as applicable to joint substrates indicated) O.
   1. Additionally Movement Capability: Provide sealant with the capability to withstand the following percentage changes in joint width existing at time of installation, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, and remain in compliance with other requirements of ASTM C 920 for uses indicated:
      2. 50 percent movement in both extension and compression for a total of 100 percent movement.
      3. 100 percent movement in extension and 50 percent movement in compression for a total of 150 percent movement.

D. Multicomponent, Nonsag, Urethane Sealant: Type M; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, A, and (as applicable to joint substrates indicated) O.
   1. Additionally Movement Capability: Provide sealant with the capability to withstand the following percentage change in joint width existing at time of installation, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, and remain in compliance with other requirements of ASTM C 920 for uses indicated:
      2. 40 percent movement in extension and 25 percent in compression for a total of 65 percent movement.
      3. 50 percent movement in both extension and compression for a total of 100 percent movement.

E. Single-Component, Nonsag, Urethane Sealant: Type S; Grade NS; Class 25; and Uses NT, M, A, and (as applicable to joint substrates indicated) O.

F. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

G. Single-Component, Neutral-Curing, Silicone Sealant:
   1. Dow Corning 790, Dow Corning Corp.
   2. Dow Corning 795, Dow Corning Corp.
   5. 864, Pecora Corp.

H. Multicomponent, Nonsag, Urethane Sealant:
   1. Vulkem 922, Mameco International Inc.
   2. Dynflex, Pecora Corp.
3. Dynatred, Pecora Corp.
4. Dynatrol II, Pecora Corp.
5. Sikaflex 2cn NS, Sika Corp.
7. Dymeric, Tremco, Inc.

I. Single-Component, Nonsag, Urethane Sealant:
1. Isoflex 880 GB, Harry S. Peterson Co., Inc.
2. Isoflex 881, Harry S. Peterson Co., Inc.
3. Vulkem 921, Mameco International Inc.

2.3 MIXING

A. For those products requiring mixing prior to application, comply with firestopping manufacturer's directions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce firestopping products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings and joints immediately before installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:
1. Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items foreign materials that could interfere with adhesion of firestopping.
2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond firestopping. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as possible without disturbing firestopping seal with substrates.
3.3 INSTALLING THROUGH-PENETRATION FIRESTOPS

A. General: Comply with "System Performance Requirements" article in Part 1 and the through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.

B. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems.

After installing fill materials remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:
   1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
   2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
   3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 INSTALLING FIRE-RESISTIVE JOINT SEALANTS

A. General: Comply with the “System Performance Requirements” article in Part 1, with ASTM C 1193, and with the sealant manufacturer's installation instructions and drawings pertaining to products and applications indicated.

B. Install joint fillers to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability and develop fire-resistance rating required.

C. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and proving uniform, cross-sectional shapes and depths relative to joint width that optimum sealant movement capability. Install sealants at the same time joint fillers are installed.

D. Tool nonsag sealants immediately after sealant application and prior to the time skinning or curing begins. Form smooth, uniform beads of configuration indicated or required to produce fire-resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint. Remove excess sealant form surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.5 FIELD QUALITY CONTROL

A. Contractor shall coordinate with local agency at appropriate stages of the work to examine completed fire-stopping to determine, in general, if is is being installed in compliance with requirements.

B. Inspecting agency will report observations promptly and in writing to both Contractor and Architect.
C. Do not proceed to enclose firestopping with other construction until reports of examinations are issued.

D. Where deficiencies are found, repair or replace firestopping so that it complies with requirements.

3.6 CLEANING

A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials that are approved by manufacturers of firestopping products and of products in which opening and joints occur.

B. Provide firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at the time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with specified requirements.

END OF SECTION 07 8413
SECTION 07 9005  
JOINT SEALERS

PART 1  GENERAL

1.01  SECTION INCLUDES
   A.  Sealants and joint backing.
   B.  Precompressed foam sealers.
   C.  Hollow gaskets.

1.02  RELATED REQUIREMENTS
   A.  Section 07 2500 - Weather Barriers:  Sealants required in conjunction with air barriers and vapor retarders:
   B.  Section 07 8400 - Firestopping:  Firestopping sealants.
   C.  Section 08 6300 - Metal-Framed Skylights:  Structural and weatherseal sealants and accessories.
   D.  Section 08 8000 - Glazing:  Glazing sealants and accessories.
   E.  Section 09 2116 - Gypsum Board Assemblies:  Acoustic sealant.
   F.  Section 09 3000 - Tiling:  Sealant used as tile grout.

1.03  REFERENCE STANDARDS

1.04  ADMINISTRATIVE REQUIREMENTS
   A.  Coordinate the work with other sections referencing this section.

1.05  SUBMITTALS
   A.  See Section 01 3000 - Administrative Requirements, for submittal procedures.
   B.  Product Data:  Provide data indicating sealant chemical characteristics.
   C.  Samples:  Submit two samples, 1 x 6 inch in size illustrating sealant colors for selection.
   D.  Manufacturer's Installation Instructions:  Indicate special procedures, surface preparation, and perimeter conditions requiring special attention.

1.06  QUALITY ASSURANCE
   A.  Maintain one copy of each referenced document covering installation requirements on site.
   B.  Manufacturer Qualifications:  Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.
   C.  Applicator Qualifications:  Company specializing in performing the work of this section with minimum five years documented experience and approved by manufacturer.
1.07 **MOCK-UP**
   A. Provide mock-up of sealant joints in conjunction with window and wall under provisions of Section 01 4000.
   B. Construct mock-up with specified sealant types and with other components noted.
   C. Locate where directed by Architect.
   D. Mock-up may remain as part of the Work, if approved by the Architect.

1.08 **FIELD CONDITIONS**
   A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.09 **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 which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

**PART 2  PRODUCTS**

2.01 **MANUFACTURERS**
   A. Gunnable and Pourable Sealants:
     11. Substitutions: See Section 01 6000 - Product Requirements.
   B. Preformed Compressible Foam Sealers:
     5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 **SEALANTS**
   A. Sealants and Primers - General: Provide products having volatile organic compound (VOC) content.
   B. General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25 minimum; Uses M, G, and A; single component.
      1. Color: Match adjacent finished surfaces.
      2. Applications: Use for:
         a. Control, expansion, and soft joints in masonry.
         b. Joints between concrete and other materials.
         c. Joints between metal frames and other materials.
         d. Other exterior joints for which no other sealant is indicated.
      3. Polyurethane Products:
e. Sika Corporation; Sikaflex-1a; www.usa-sika.com.
f. Substitutions: See Section 01 6000 - Product Requirements.

4. Polysulfide Products:
   d. Substitutions: See Section 01 6000 - Product Requirements.

C. Type 1 - Exterior Expansion Joint Sealer: Precompressed foam sealer; urethane with water-repellent;
   1. Face color: As selected by the Architect from available colors.
   2. Size as required to provide weathertight seal when installed.
   3. Provide product recommended by manufacturer for traffic-bearing use.
   4. Applications: Use for:
      a. Exterior wall expansion joints.

5. Products:
   e. Substitutions: See Section 01 6000 - Product Requirements.

D. Type 2 - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
   1. Color: To be selected by Architect from manufacturer's standard range.
   2. Applications: Use for:
      a. Interior wall and ceiling control joints.
      b. Joints between door and window frames and wall surfaces.
      c. Other interior joints for which no other type of sealant is indicated.

3. Products:
   g. Tremco Global Sealants; www.tremcoisolants.com.
   h. Substitutions: See Section 01 6000 - Product Requirements.

E. Type 3 - Nonsag Tamper-Resistant Sealant: ASTM C920, Grade NS, Class 12-1/2, Uses M, G, and A; single or multi-component.
   1. Type: Polyurethane.
   2. Color: To be selected by Architect from manufacturer's standard range.
   3. Applications: Use for the following joints in secure areas.
      a. Interior wall and ceiling control joints.
      b. Joints between door and window frames and wall surfaces.
      c. Other interior joints for which no other type of sealant is indicated.
4. Products:
   c. Substitutions: See Section 01 6000 - Product Requirements.

F. Type 4 - Tile Sealant: White silicone; ASTM C920, Uses I, M and A; single component, mildew resistant.
   1. Applications: Use for:
      a. Joints between plumbing fixtures and floor and wall surfaces.
      b. Joints between kitchen and bath countertops and wall surfaces.
   2. Products:
      f. Substitutions: See Section 01 6000 - Product Requirements.

G. Type 5 - Acoustical Sealant for Concealed Locations:
   1. Composition: Acrylic latex emulsion sealant.
   2. Applications: Use for concealed locations only:
   3. Products:
      f. Substitutions: See Section 01 6000 - Product Requirements.

H. Type 6 - Concrete Floor Joint Filler: Self-leveling, pourable, semi-rigid sealant intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
   1. Composition: Single or multi-part, 100 percent solids by weight.
   2. Hardness: 85 after 7 days, when tested in accordance with ASTM D2240 Shore A.
   3. Color: To be selected by Architect from manufacturer's standard colors.
   5. Joint Depth: Provide product suitable for joints from 1/8 inch to 2 inches in depth including space for backer rod.
   6. Applications: Use for:
      a. Control joints in concrete slabs and floors not filled with filler placed in form.
      b. joints in concrete slabs and floors.
   7. Products:
      a. Nox-Crete; DynaFlex 502: www.nox-crete.com
      c. Substitutions: See Section 01 6000 - Product Requirements.

I. Type 7 - Polyurea Concrete Floor Joint Filler: Self-leveling, pourable, semi-rigid sealant intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
   1. Composition: Single or multi-part, 100 percent solids by weight.
   2. Hardness: 75, minimum, after 7 days, when tested in accordance with ASTM D2240 Shore A.
   3. Color: To be selected by Architect from manufacturer's standard colors.
6. Joint Depth: Provide product suitable for joints from 1/8 inch (3 mm) to 1-1/2 inches in depth excluding space for backer rod.
7. Applications: Use for:
   a. Control joints in concrete slabs and floors not filled with filler placed in form.
   b. Construction joints in concrete slabs and floors.
8. Products:
   b. ARDEX Americas; ARDISEAL RAPID PLUS: www.ardexamericas.com.
   c. Nox-Crete; DynaFlex JF-85: www.nox-crete.com
   d. Substitutions: See Section 01 6000 - Product Requirements.

J. Type 8 - Rigid Polyurethane Crack and Joint Filler: Two part, low viscosity, fast setting, rigid sealant intended for cracks and control joints not subject to significant movement; used on cracks and joints prior to application of moisture control systems, underlayments, and toppings.
1. Applications: Use for:
   a. Interior and exterior control joints in concrete slabs and floors.
   b. Saw cut joints.
   c. Cracks, spalls, and other repairs.
2. Products:
   b. Substitutions: See Section 01 6000 - Product Requirements.

1. Approved by manufacturer for wide joints up to 1-1/2 inches.
2. Applications: Use for:
   a. Expansion joints in floors.

L. Type 10 - Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C920, Class 25, Uses T, I, M and A; single component.
2. Applications: Use for:
   a. Joints in sidewalks and vehicular paving.

M. Type 11 - Concrete Paving Joint Sealant: Epoxy, multi-component.
1. Applications: Use for:
2. Products:
   b. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that substrate surfaces and joint openings are ready to receive work.
   B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION
   A. Remove loose materials and foreign matter that could impair adhesion of sealant.
   B. Clean and prime joints in accordance with manufacturer's instructions.
   C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
   D. Protect elements surrounding the work of this section from damage or disfigurement.
   E. Exposed Concrete Floor Joints: Test joint filler in inconspicuous area of floor slab. Verify specified product does not stain or discolor slab.
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. Perform acoustical sealant application work in accordance with ASTM C919.
   D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
   E. Install bond breaker where joint backing is not used.
   F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
   G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
   H. Tool joints concave.
   I. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.
   J. Compression Gaskets: Avoid joints except at ends, corners, and intersections; seal all joints with adhesive; install with face 1/8 to 1/4 inch below adjoining surface.
   K. Concrete Floor Joint Filler: Install concrete floor joint filler per manufacturer's written instructions. After floor joint filler is fully cured, shave joint filler flush with top of concrete slab.

3.04 CLEANING
   A. Clean adjacent soiled surfaces.

3.05 PROTECTION
   A. Protect sealants until cured.

END OF SECTION
SECTION 07 9513
EXPANSION JOINT COVER ASSEMBLIES

PART 1  GENERAL

1.01  SECTION INCLUDES
A. Expansion joint cover assemblies for floor, wall, ceiling and soffit surfaces.

1.02  RELATED REQUIREMENTS
A. Section 04 2000 - Unit Masonry: Placement of joint cover assembly frames in masonry.
B. Section 05 5000 - Metal Fabrications: Custom fabricated metal expansion and control joint devices.
C. Section 07 6200 - Sheet Metal Flashing and Trim: Roof expansion and control joint covers.
D. Section 07 7100 - Roof Specialties: Roof expansion and control joint covers.
E. Section 07 9005 - Joint Sealants: Sealing expansion and control joints using gunnable and pourable sealants.
F. Section 09 2116 - Gypsum Board Assemblies: Gypsum board control joint trim.
G. Section 09 2116 - Gypsum Board Assemblies: Placement of expansion joint assemblies in gypsum board walls and ceilings.
H. Sections 09 5100 to 09 5103 - Acoustical Ceilings: Expansion joint assemblies in suspended ceiling grids.

1.03  REFERENCE STANDARDS
C. ITS (DIR) - Directory of Listed Products; current edition.
D. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04  ADMINISTRATIVE REQUIREMENTS
A. Installation Templates: For frames and anchors to be embedded in concrete or masonry, furnish templates to relevant installers; include installation instructions and tolerances.

1.05  SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices and available colors and finish.
C. Shop Drawings: Indicate joint and splice locations, miters, layout of the work, affected adjacent construction and anchorage locations.
D. Samples: Submit two samples 12 inch long, illustrating profile, dimension, color, and finish selected.
E. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.
F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 for additional provisions.
   2. Extra Resilient Joint Filler: 100 ft length and any special tools required for installation.

PART 2  PRODUCTS

2.01  MANUFACTURERS
A. Expansion Joint Cover Assemblies:
6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 EXPANSION JOINT COVER ASSEMBLY APPLICATIONS
A. Interior Floor Joints Subject to Thermal Movement:
B. Interior Wall/Ceiling Joints Subject to Thermal Movement:
C. Exterior Wall Joints Subject to Thermal Movement:

2.03 EXPANSION JOINT COVER ASSEMBLIES
A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
   1. Joint Dimensions and Configurations: As indicated on drawings.
   2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
   3. Joint Cover Styles: As indicated on drawings.
   4. Joint Movement Capability: If not indicated, provide minimum plus/minus 25 percent joint movement capability.
   5. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
   6. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.
B. Floor Joint Covers: Coordinate with indicated floor coverings.
   1. If floor covering is not indicated, obtain instructions from Architect before proceeding.
   2. If style is not indicated, provide extruded aluminum frame both sides, resilient seals, and minimize exposed metal.
C. Resilient Seal Type Covers: Having flat exposed surface without crevices that could collect dirt; designed to withstand expected movement without extrusion of seal from joint assembly; for floors, provide style that is flush with top of floor covering; for exterior joints, weathertight.
D. Sliding Cover Plate Type Covers: Provide plate with beveled edges and neat fit that does not collect dirt.
E. Covers In Gypsum Board Assemblies: Provide style with anchoring wings that can be completely covered by joint compound.
F. Covers In Fire Rated Assemblies: Provide cover assembly having fire rating equivalent to that of assembly into which it is installed.
   1. Acceptable Evaluation Agencies: UL (DIR) and ITS (DIR).

2.04 MATERIALS
A. Extruded Aluminum: ASTM B221, 6063 alloy, T6 temper; or ASTM B308, 6061 alloy, T6 temper.
   1. Exposed Finish Outdoors: Natural anodized.
   2. Exposed Finish at Floors: Mill finish or natural anodized.
   3. Exposed Finish at Walls and Ceilings: Natural anodized.
B. Resilient Seals:
   1. For Ceilings: Any resilient material, flush, pleated, or hollow gasket.
   2. For Pedestrian Traffic Applications: EPDM rubber, Neoprene, or Santoprene; (no PVC); Shore A hardness of 40 to 50 Durometer.
   3. For Vehicular Traffic Applications: EPDM rubber, Neoprene, or Santoprene; (no PVC); Shore A hardness of 40 to 50 Durometer.
C. Anchors and Fasteners: As recommended by cover manufacturer.
D. Ferrous Metal Anchors: Galvanized where embedded in concrete or in contact with cementitious materials.
E. Threaded Fasteners: Aluminum.
F. Backing Paint for Aluminum Components in Contact with Cementitious Materials: Asphaltic type.

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.
B. Verify that frames and anchors installed by others are in correct locations and suitable for installation of remainder of assembly.

3.02 INSTALLATION
A. Install components and accessories in accordance with manufacturer's instructions.
B. Align work plumb and level, flush with adjacent surfaces.
C. Rigidly anchor to substrate to prevent misalignment.

3.03 PROTECTION
A. Do not permit traffic over unprotected floor joint surfaces.
B. Provide strippable coating to protect finish surface.

END OF SECTION
SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Steel doors.
B. Steel frames.
C. Steel sidelights and borrowed lights.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete; Placement of anchors in concrete construction.
B. Section 04 2000 - Unit Masonry; Placement of anchors in masonry construction.
C. Section 08 1416 - Wood Doors.
D. Section 08 7100 - Door Hardware.
E. Section 08 8000 - Glazing
F. Section 09 2116 - Gypsum Board: Stucco.
G. Section 09 9000 - Painting and Coating.

1.03 REFERENCE STANDARDS

B. ASTM A591 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hop-Dip Process
C. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Painted Steel Surfaces for Steel Doors and Frames.
D. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frame Anchors and Hardware Reinforcings.
E. ANSI/SDI A250.6 Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
G. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames (Formerly SDI-105).
H. SDI 111 - Recommended Standard Details for Steel Doors & Frames.
J. ANSI/UL 10B - Fire Tests of Door Assemblies.
K. ANSI/UL 10C - Positive Pressure Fire Tests of Door Assemblies.
L. ANSI/UL 1784 - Air Leakage Tests of Door Assemblies
M. UL - Building Materials Directory; Underwriters Laboratories Inc.
N. WH - Certification Listings; Warnock Hersey International Inc.
O. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.

1.04 SUBMITTALS

A. Submit under provisions of Section 01 3000.
B. Product Data: Submit manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
C. Certificates:
   1. Provide manufacturer's certification that products comply with referenced standards as applicable.
   2. Provide evidence of manufacturer's membership in the Steel Door Institute.
D. Shop Drawings:
   1. Show all openings in the door schedule and/or the Drawings.
   2. Provide details of door design, door construction details and methods of assembling sections, hardware locations, anchorage and fastening methods, door frame types and details, anchor types and spacing, and finish requirements.
   3. Provide door, frame, and hardware schedule in accordance with SDI 111.
E. Selection Samples: If required, for each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and finishes.
F. Verification Samples: If required, for each finish product specified, two samples, minimum size 6 inches square, representing actual product, color, and finishes.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide all products from a single manufacturer who is a member of the Steel Door Institute.
B. Doors and frames shall conform to the requirements of ANSI A250.8-(R2008) (SDI-100) and other specifications herein named.
C. Fire Rated Doors and Frames: Ratings as indicated on Door Schedule, when tested in accordance with NFPA 252 or UL 10C.
   1. Labeled by UL, WH, or other agency acceptable to the authority having jurisdiction.
   2. Stairwell Doors: 250 degrees F or 450 degrees F temperature rise rating as well as the required fire rating.
1.06 DELIVERY, STORAGE, AND HANDLING

A. Products shall be marked with Architect's opening number on all doors, frames, misc. parts and cartons.

B. Upon delivery, inspect all materials for damage; notify shipper and supplier if damage is found.

C. Protect products from moisture, construction traffic, and damage.
   1. Store vertically under cover.
   2. Place units on 4 inch high wood sills or in a manner that will prevent rust or damage.
   3. Do not use non-vented plastic or canvas shelters.
   4. Should wrappers become wet, remove immediately.
   5. Provide 1/4 inch space between doors to promote air circulation.

1.07 COORDINATION

A. Coordinate with door opening construction and door frame and door hardware installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   1. Ceco Door Products.
   2. Curries Company.
   3. Deansteel Manufacturing Co.
   4. Galaxy Metal Products
   5. Mesker Door, Inc.
   7. Pioneer Industries, Inc.
   8. Republic.
   10. Steelcraft.

2.02 MATERIALS

A. Doors, frames, frame anchors, and hardware reinforcing for each of the levels and models specified shall be provided to meet the requirements of the performance levels specified. The material used in manufacturing these products and components shall comply with ANSI/SDI A250.8. Hardware reinforcing on doors and frames shall comply with ANSI/SDI A250.6. The physical performance levels shall be in accordance with ANSI/SDI A250.4.

B. All steels used to manufacture doors, frames, anchors, and accessories shall meet at least one or more of the following requirements:
   1. Cold rolled steel shall conform to ASTM A1008 and A568.
   2. Hot rolled, pickled and oiled steel shall comply with ASTM A1011 and A568.
   3. Hot dipped zinc coated steel shall be of the alloyed type and comply with ASTM A924 and A653.
   4. Steel Sheet, Electrolytic Zinc-Coated shall conform to ASTM A591.
2.03 FRAMES

A. Provide Levels and Models in accordance with ANSI/SDI A250.8 as indicated in the door schedule.

B. Interior frames: Frame configuration and depth as indicated. Minimum thickness as follows:
   1. Level 1 Heavy duty: For use with:
      a. Door Model 2 (seamless design): 0.053 inch minimum steel frame thickness.

C. Exterior frames: Provide in accordance with ANSI/SDI A250.8 in the frame configuration and depth as indicated on the Drawings. Minimum thickness as follows:
   1. Level 2 Heavy duty: For use with:
      a. Door Model 2 (seamless design): 0.053 inch minimum steel frame thickness.

D. Provide units of galvanized steel where indicated on the door schedule.

E. Provide units of galvanized steel in the following locations:
   1. Exterior openings, as noted on door schedule.
   2. Kitchens, as noted on door schedule.
   3. Toilets, as noted on door schedule.
   4. Washrooms, as noted on door schedule.
   5. Locker rooms, as noted on door schedule.

F. Provide knockdown field assembled type frames where indicated.

G. Provide face welded type frames where indicated.

H. Prepare all frames for all mortise template hardware and reinforced only for surface mounted hardware. Drilling and/or tapping shall be completed by others.

I. Minimum hardware reinforcing gages shall comply with Table 4 of ANSI/SDI A250.8.

J. Provide glazing stops and beads where glazed lights are indicated.

2.04 DOORS

A. Interior doors: Provide interior doors in accordance with ANSI/SDI A250.8 and in the configuration and sizes as indicated on the door schedule:
   1. Level 1 - Standard duty 1-3/4 inches:
      a. Model 2 - Seamless

B. Exterior doors: Provide exterior doors in accordance with ANSI/SDI A250.8 and in the configuration and size as indicated on the door schedule:
   1. Level 1 - Standard duty 1-3/4 inches:
      a. Model 2 - Seamless

C. End closure: The top and bottom of the doors shall be closed with channels or closures. The channels or closures shall have a minimum material thickness of 0.042 inch
   1. Inverted closure channels: Set flange edges flush with door top/bottom.

D. Core: Provide in accordance with ANSI/SDI A250.8.
E. Door edge design: Provide in accordance with ANSI/SDI A250.8.

F. Minimum hardware reinforcing gages shall comply with Table 4 of ANSI/SDI A250.8.

G. Provide louvers and vision lights where indicated on the Drawings in accordance with ANSI/SDI A250.8.

H. Provide steel astragals where indicated on the Drawings or where required by the manufacturer's listing.

2.05 FABRICATION

A. Fabricate doors and frames in accordance with ANSI/SDI A250.8.

B. Prime finish: Doors and frames shall be thoroughly cleaned, and chemically treated to ensure maximum paint adhesion. All surfaces of the door and frame exposed to view shall receive a factory applied coat of rust inhibiting primer, either air-dried or baked-on. The finish shall meet the requirements for acceptance stated in ANSI/SDI A250.10 "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames."

C. Factory applied finish: Meet the performance requirements and acceptance criteria as stated in ANSI/SDI A250.3. Color shall be:
   1. As selected by the architect.

D. Design clearances: Fabricate doors and frames to maintain the following clearances:
   1. The clearance between the door and frame shall be 1/8 inch in the case of both single swing and pairs of doors.
   2. The clearance between the meeting edges of pairs of doors shall be 3/16 inch plus or minus 1/16 inch. For fire rated applications, the clearances between the meeting edges of pairs of doors shall be 1/8 inch plus or minus 1/16 inch.
   3. The clearance measured from the bottom of the door to the bottom of the frame (undercut) shall be a maximum of 3/4 inch unless otherwise specified. Fire door undercuts shall comply with ANSI/NFPA 80, "Fire Doors and Fire Windows."
   4. The clearance between the face of the door and the stop shall be 1/16 inch to 3/32 inch.
   5. All clearances shall be, unless otherwise specified in this document, subject to a tolerance of plus or minus 1/32 inch.
   6. The clearance at the bottom shall be 3/4 inch.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are suitable before beginning installation of frames. Do not begin installation until conditions have been properly prepared.
   1. Verify that completed openings to receive knock-down wrap-around frames are of correct size and thickness.
   2. Verify that completed concrete or masonry openings to receive butt type frames are of correct size.
   3. Verify that drywall construction walls are the correct thickness.
B. If opening preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

A. Install frames plumb, level, rigid, and in true alignment in accordance with ANSI A250.11.

B. Inspect and install fire rated doors and frames in accordance with NFPA 80.

C. All frames other than slip-on types shall be fastened to the adjacent structure so as to retain their position and stability.

D. Install frames as masonry is laid-up. Fill welded wrap-around frames in masonry construction solid with grout. Brace or fasten frame in such a way to prevent pressure of the grout from deforming frame. Coordinate with work specified in Section 04 2000.

E. Fill welded wrap-around frames solid with grout where indicated. Brace or fasten frame in such a way to prevent pressure of the grout from deforming frame.

F. Grout shall be mixed to provide a 4 inch maximum slump consistency, hand troweled into place. Grout mixed to a thin "pumpable" consistency shall not be used.

G. If additives are used in masonry or plaster work during cold weather, field coat the inside of steel frames with a bituminous compound to prevent corrosion.

H. Doors shall be installed and fastened to maintain alignment with frames to achieve maximum operational effectiveness and appearance. Doors shall be adjusted to maintain perimeter clearances specified. Shimming shall be performed by the installer as needed to assure the proper clearances are achieved.

3.03 ADJUST AND CLEAN

A. Adjust doors for proper operation, free from binding or other defects.

B. Clean and restore soiled surfaces. Remove scraps and debris and leave site in a clean condition.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.05 SCHEDULE

A. Refer to Door and Frame Schedule appended to this section.

END OF SECTION
PART 1 GENERAL

1.01 SCOPE
   A. Standards for manufacturing, machining, finishing, and installation of wood doors unless more specifically described under another section.

1.02 RELATED REQUIREMENTS
   A. Section 06 1000: Carpentry
   B. Section 08 1113: Hollow Metal Frames
   D. Section 08 7100: Door Hardware
   E. Section 08 8000: Glass & Glazing
   F. Section 09 9000: Painting and Coating

1.03 QUALITY ASSURANCES
   A. Provide doors meeting or exceeding the minimum standards as set forth by the following organizations unless standards are modified or exceeded by this specification.
      1. WDMA IS 1A-Window and Door Manufacturers Association.
   B. All doors shall be the product of the same manufacturer to insure uniformity of quality and appearance throughout the project.
   C. Fire doors shall bear labels approved by Underwriters Laboratories, Inc or Intertek Testing (WHI). Any discrepancies between the architectural drawings and the procedures and limitations as set forth by the testing agencies shall be brought to the architect's attention.
   D. Provide each fire rated door with a label permanently attached to either the hinge stile or to the top rail, showing testing agency approval for classification scheduled.
   E. The top of each door shall bear a label from the manufacturer indicating the door construction, face veneer species, cut and grade. If the doors are factory finished the label shall also have the finishing information.
   F. The Door Manufacturer shall provide a letter, signed by an authorized company representative, to the Architect stating that the doors have been manufactured in compliance with this specification.

1.04 SUBMITTALS
   A. Shop Drawings
      1. Submit schedules and elevations indicating door sizes, construction, swing, label, undercut, and applicable hardware locations.
      2. Dimensions and detail openings for glass lites, louvers, and grilles.
   B. Samples
1. If doors are to be factory finished, manufacturer shall submit veneer samples of specified veneer with their standard finish colors at architect's request, or a color sample from the architect will be sent to the manufacturer for duplication. Samples are to be submitted representing the color selected on veneer typical of grain patterns and coloration for the specified specie and cut.

C. Product Information
1. Submit manufacturer's product description showing compliance with specifications, along with finishing instructions, installation instructions, and any general recommendations manufacturer may have for the care and maintenance of each door type.

1.05 COORDINATION
A. Contractor shall be responsible for coordination and acquiring of all necessary information from hardware and metal frame manufacturers. Door manufacturer shall be responsible for coordinating all necessary information received by Contractor from hardware and metal frame manufacturers, in order that doors shall be properly prepared to receive hinges and hardware. Contractor shall provide his supplier with two copies of approved frame schedule, two copies of hardware schedule, and all necessary hardware templates. All the above information shall be in the possession of door supplier 120 days prior to desired delivery date of doors.

1.06 DELIVERY, STORAGE AND HANDLING
A. No doors shall be delivered to the building until weatherproof storage space is available. Store doors in a space having controlled temperature and humidity range between 30 and 60 percent. Stack doors flat and off the floor, supported to prevent warpage. Protect doors from damage and direct exposure to sunlight.

B. Factory finished doors shall be individually wrapped in polybags to protect the finish from damage by contact with other doors.

C. Do not walk or place other material on top of stacked doors. Do not drag doors across one another.

D. Contractor shall use all means necessary to protect doors from damage prior to, during, and after installation. All damaged doors shall be repaired or replaced by the contractor at no cost to the owner.

E. Doors shall be palletized at factory in stacks of no more than 30 doors per pallet. Door edges shall be protected with heavy corner guards.

1.07 WARRANTY
A. All work in this Section shall be warranted by a FULL DOOR WARRANTY (from the date of installation) against defect in materials and workmanship, including the following:
   1. Delamination in any degree.
   2. Warp or twist of ¼” or more in any 3’6” x 7’0” section of a door.
   3. Telegraphing of any part of core assembly through face to cause surface variation of 1/100” or more in a 3” span.
   4. Any defect which may, in any way, impair or affect performance of the door for the purpose which it is intended. Replacement under this warranty shall include hanging, installation of hardware, and finishing.

B. Periods of warranty after date or installation:
   1. Interior solid core and mineral core Life of original installation.

C. Doors must be stored, finished, hung and maintained per manufacturers recommendations set forth in their Full Door Warranty.
PART 2 PRODUCT

2.01 MANUFACTURERS

A. Listed manufacturers are believed to conform to the criteria stated for material quality standards, function and appearance. Manufacturers are still subject to meeting the requirements for 5-ply hot-pressed (cold-pressed will not be accepted) door construction procedures and warranties set forth in this specification. **Substitutions will not be accepted.**

1. Algoma Hardwoods, Inc.
2. Eggers Hardwood Products Corporation
3. Manhattan Door Co.
4. VT Industries

2.02 MATERIAL AND COMPONENTS - All stile and rail dimensions given are minimum sizes allowed after trimming to book size or factory prefitting.

A. Cores

Particleboard Core -

Shall conform to ANSI A208.1 LD-2 32lb. density core. Stiles shall be 1" minimum laminated hardwood or structural composite lumber (SCL) veneered over with veneer matching face veneer. Rails will be 1 1/8" minimum mill option hardwood or structural composite lumber (SCL). Stiles and rails shall be securely bonded to the core then abrasively planed as an assembly before veneering.

Mineral Core -

Shall be asbestos free, noncombustible mineral composite with a minimum of 28 pounds per cubic foot density when testing in accordance with ASTM C303-82, with 10% maximum absorption by weight with core in equilibrium at 90% relative humidity and 70 degrees Fahrenheit. Stiles and rails shall be manufacturers standard for specified label. Stile shall be reinforced to receive full mortise hinges. No salt treated components shall be used.

Structural Composite Lumber (SCL) Core

Stave Lumber Core replacement as described by AWI section 1300. SCL core as manufactured under the product name of Timberstrand™SL. Stiles shall be 1” minimum laminated hardwood or structural composite lumber (SCL) veneered over with veneer matching face veneer. Rails will be 1 1/8” minimum mill option hardwood or structural composite lumber (SCL). Stiles and rails shall be securely bonded to the core then abrasively planed as an assembly before veneering.

Minimum ½” hardwood stile (no finger joints allowed) to be same species lumber as face veneer with the exception of birch doors, which will have hard maple or beech stiles.

Acoustical Door -

Doors are to be 1 3/4” thick and tested as an operable unit in accordance with ASTME90 and ASTME 413. Stiles shall be same specie lumber as face veneer and rails mill option hardwood or SCL.

Sound Transmission Class:

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See Door Schedule for all STC ratings.
B. Faces and Crossbands

When veneer for transparent or opaque finish is specified, doors shall be 5 ply, made up of 2 face veneers and crossbands, all securely bonded to the core by the hot-press method in one operation, utilizing Type I water-proof adhesive. The cold pressing of 2 or 3ply door skins to the core will not be accepted. Face veneers shall have minimum thickness of 1/50 after factory sanding and the individual pieces of veneer forming the face must be edge glued together. Crossbands shall extend the full width of the core assembly. When pairs of doors are scheduled for transparent finish doors shall be pair matched with a continuous grain pattern. When doors are scheduled with transom panels and transparent finish door and transom shall be matched and produced from a continuous sheet of veneer. Bottom rail of transom panel shall extend full width and be same specie as face except for birch, which may have a maple or beech rail.

When plastic laminate is used as a face laminate shall be .050 standard grade to be selected from manufacturers available sources. Laminate shall be bonded to the core with type I waterproof glue.

1. Face veneers shall be of specie, cut and grade specified. Quality shall be governed by industry standards as set forth by ANSI/WDMA IS.1A Series.

   Door faces for: Transparent finish-
   a) Veneer Grade: To be determined by Architect
      "A" Grade
      Veneer Species:
      Red Oak          White Oak
      Natural Birch   Select White Birch
      Honduras Mahogany African Mahogany
      Cherry          Sapelle
      Walnut          Teak
      Maple           Other

   b) Veneer Cut:
      Rotary         (typically Birch and Oak only)
      Plain Sliced   (most common)
      Rift           (Red or White Oak only)
      Comb Grain     (Red or White Oak only)
      Quartered      (typically Oaks and Mahogany's)
      Quartered Ribbon Stripe  (African Mahogany only)

   c) Veneer Match:
      Book matched

   d) Assembly of Veneer on door face
      Running Match

Doors with Opaque Finish -

Doors shall have medium density overlay (MDO) faces meeting Government standards PSI74. Overlay shall be readily sandable, weatherproof, and carry a Class "B" Fire Rating. Paint grade Birch or hardboard shall not be considered as meeting this specification.

High Pressure Plastic Laminate - N/A

2. Cross banding shall be thoroughly dried 1/16 thick hardwood or engineered wood product extending full width and height of door with grain at right angles to face.

3. Face veneer and crossband shall be pressed to the core in a hot-press with Type I water-proof glue.
View windows non-labeled doors:

Furnish manufacturers standard flush wood glass stops to be same species as face veneer for transparent doors with the exception of Birch doors which will have hard maple or beech. Mill option hardwood for opaque doors. On plastic laminate doors, stops will be hardwood painted or stained to correspond with specified stile material.

2.03 LABELED FLUSH DOORS 45, 60 AND 90 MINUTE RATED

A. Doors shall be manufactured by the previously specified manufacturers and subject to the requirements of the specifications hereinafter.

B. Mineral core flush veneered doors, 5-ply shall be made up of face veneers, crossbanding and a core unit all securely bonded together utilizing Type I water-proof adhesive. Manufacture doors where temperature and humidity controls will insure a state of equilibrium between all component parts of doors at all times.

C. Face Veneer: Same as 2.2-B-1

D. Crossbanding: Same as 2.2-B-2 and no salt treating allowed.

E. Core Unit: Manufacturer’s noncombustible mineral, monolithic, or in sections tightly fitted and glued. The density shall be minimum 28 lbs. per cubic foot (nominal).

F. Rails: Top 15/16”, bottom 1-7/8” rail (one of two piece) of flame resistant material salt free. Securely glue all rails to core.

G. Stiles: Manufacturers standard for rating listed.

Stiles shall be bonded to the core and be salt free. Drill 5/32 pilot holes for all hinge screws at the factory prior to shipment for “B” and “C” label fire doors. Stiles must meet the following performance criteria:

1. Split Resistance: Average of ten test samples shall be not less than 800 load pounds when tested in accordance with “Test Method to Determine Split Resistance of Hinge Edges of Composite Type Fire Doors”.

2. Direct Screw Withdrawal: Average of ten test samples shall be not less than 650 load pounds when tested for direct screw withdrawal in accordance with ASTM D-1037; using a No. 12 x 1 ¼” steel thread-to-the-head wood screw of the cadmium plated or rust-resistant type.

3. Cycle/Slam: 200,000 cycles with no loose hinge screws or other visible signs of failure when tested in accordance with the requirements of ANSI A151.1, Section 2.5 (Note: Specific data regarding WHI listing features and mechanical test results shall be made available by the manufacturer upon request.)

H. Blocking: All 45, 60, and 90 min. fire doors shall be supplied with salt free non-combustible internal solid blocking. Blocking shall be arranged in the door so that surface mounted hardware such as but not limited to closers, exit device, etc. may be secured to the door without a need for through bolts. A lock block, minimum size 5 x 10 shall be supplied for each bored, mortised or unit lock scheduled. **No thru-bolting of hardware shall be permitted.**
I. Metal vision frames for door lites. Frames shall equal AWI standard, UL or Intertek approved.
   1. Primed for field painting
   2. Wrapped with veneer to match door face.

J. Door manufacturer shall furnish metal edges only on pairs of fire doors with two surface mounted vertical rod exit devices. All other pairs will be furnished with metal edges and overlapping astragal.
   1. Metal edges and astragals primed for field painting.
   2. Metal edges and astragals wrapped with veneer to match door face.

K. Labeled doors shall be manufactured to the required size so as to provide proper clearances without field trimming. This procedure shall be followed so as to assure the full thickness of the edge bands.

L. Doors shall be suitable for hanging on full mortised butt hinges using No. 12 x 1 ¼” steel threaded-to-the-head wood screws of the cadmium plated or rust resistant type. Coordinate with Hardware Section 08 7100 and 06 1000 for proper screws and installation. Half-surface hinges are not acceptable.

PART 3 EXECUTION

3.01 FABRICATION
A. Fabricate all wood doors in strict accordance with the referenced standards specified herein.

3.02 MACHINE AND FITTING
A. All wood doors shall be machined by the manufacturer for cutouts, hinges, locks and all hardware requiring routing and mortising. Any required rabbeting to properly hang doors will be performed by the manufacturer prior to finishing. Doors shall be sized to allow 1/8” clearance at top and each side, and ¾” at bottom (unless specified otherwise.) Factory drilling of pilot holes is not required except for “B” & “C” label fire doors at mortise hinge locations.

3.03 INSTALLATION OF HARDWARE
A. Contractor shall install hardware according to approved hardware schedule for proper locations.
B. Install with full-threaded wood screws furnished by hardware manufacturer.
C. Drill proper size pilot hole for all screws. (Full mortise hinges require 5/32” pilot holes.)
D. Securely anchor hardware in correct position and alignment.
E. Adjust hardware and door for proper function and smooth operation, proper latching, without force or excessive clearance.

3.04 INSTALLATION OF FIRE DOORS
A. Fire rated doors shall be installed in accordance with the requirements of the labeling agency and NFPA #80 and #101.

3.05 FACTORY FINISHING
   Transparent Finish -
   AWI system TR6 or equivalent catalyzed polyurethane finish for open grain finish per section l500. The sheen shall be satine of semi-gloss. Stain, if required, to be selected from manufacturers standard colors or custom matched to Architects sample. Doors to be individually enclosed in a polybag.

   (Solid Stain)
3.05 FIELD FINISHING

The appearance of field finishing shall be the responsibility of the painting contractor. Immediately before staining or finishing, the entire surface of the door must be sanded completely with the appropriate grit sandpaper while door is in a horizontal position. This should be followed by the steps necessary to achieve the desired AWI wood finish system.

END OF SECTION
SECTION 08 3100
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall and ceiling access door and frame units.

1.02 RELATED REQUIREMENTS

A. Section 08 7100 - Door Hardware: Mortise cylinder and core hardware.
B. Section 09 9000 - Painting and Coating: Field paint finish.
C. Section 23 3300 - Air Duct Accessories: Access doors in ductwork.

1.03 REFERENCE STANDARDS


1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
C. Shop Drawings: Indicate exact position of each access door and/or panel unit.
D. Manufacturer's Installation Instructions: Indicate installation requirements.
E. Project Record Documents: Record actual locations of each access unit.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

A. Wall-Mounted Units:
   1. Material: Steel.
   2. As indicated on drawings.
   3. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
   5. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.

B. Wall-Mounted Units in Wet Areas:
   1. Location: As indicated on drawings.
   3. As indicated on drawings.
   4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
5. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.

C. Fire-Rated Wall-Mounted Units:
1. Location: As indicated on drawings.
2. Wall Fire-Rating: As indicated on drawings.

D. Ceiling-Mounted Units:
1. Location: As indicated on drawings.
3. Size - Lay-In Grid Ceilings: To match module of ceiling grid.
4. Size - Other Ceilings: As indicated on drawings.

E. Fire-Rated Ceiling-Mounted Units:
3. Size: As indicated on drawings.
4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.

2.02 WALL & CEILING-MOUNTED UNITS

A. Manufacturers:
   a. Wall-Mounted Units: ACUDOR ADWT.
   b. Fire-Rated Wall-Mounted Units - 2 Hours or Less: ACUDOR FW-5015.
   c. Ceiling-Mounted Units: ACUDOR GFRG - R.
   d. Wall & Ceiling-Mounted Units: ACUDOR DW-5058.
   a. Wall-Mounted Units: Cendrex CTA, contoured cover concealing frame, hingeless with magnetic cover attachments, adjustable frame size.
   b. Fire-Rated Wall-Mounted Units - 2 Hours or Less: Cendrex PFI series, insulated.
   c. Fire-Rated Ceiling-Mounted Units: Cendrex PFI series, downward opening.
   d. Attic Draft Stop Units: Cendrex DRD.
8. Substitutions: See Section 01 6000 - Product Requirements.

B. Wall & Ceiling-Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
1. Style: As indicated on drawings.
2. Door Style: Single thickness with rolled or turned in edges.
3. Frames: 16 gage, 0.0598 inch, minimum thickness.
4. Insulation: Non-combustible mineral wool or glass fiber.
5. Units in Fire-Rated Assemblies: Fire rating as required by applicable code for fire-rated assembly that access doors are being installed.
   a. Provide products listed by ITS or UL as suitable for purpose indicated.
   b. Provide certificate of compliance from authorities having jurisdiction indicating approval of fire rated doors.
7. Primed and Factory Finish: Polyester powder coat; color as selected by Architect from standard range.
8. Door/Panel Size: As indicated on the drawings.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that rough openings are correctly sized and located.
   B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION
   A. Clean surfaces thoroughly prior to proceeding with this work.
   B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.03 INSTALLATION
   A. Install units in accordance with manufacturer's instructions.
   B. Install frames plumb and level in openings, and secure units rigidly in place.
   C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION
SECTION 08 3323
OVERHEAD COILING DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Overhead coiling doors and shutters, operating hardware, fire-rated, non-fire-rated, and exterior, manual and electric operation.
   B. Wiring from electric circuit disconnect to operator to control station.

1.02 RELATED REQUIREMENTS
   A. Section 08 7100 - Door Hardware: Cylinder cores and keys.
   B. Section 09 9000 – Painting and Coating: Field paint finish.
   C. Section 26 2717 - Equipment Wiring: Power to disconnect.
   D. Section 28 3100 - Fire Detection and Alarm: Fire alarm interconnection.

1.03 REFERENCE STANDARDS
   B. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
   D. ITS (DIR) - Directory of Listed Products; current edition.
   E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
   G. NEMA MG 1 - Motors and Generators; 2014.
   I. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
   J. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS
   A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide general construction, electrical equipment, component connections and details.
   C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
   D. Samples: Submit two slats, 12 x 12 inch in size, illustrating shape, color and finish texture.
   E. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.
   F. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.05 QUALITY ASSURANCE
   A. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.
PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Overhead Coiling Doors:
5. Entrematic; Amarr 4000 Rolling Slat Door: www.amarr.com/commercial/sle.
8. Substitutions: See Section 01 6000 - Product Requirements.

B. Overhead Coiling Fire Doors:
5. Entrematic; www.amarr.com/commercial/sle.
8. Substitutions: See Section 01 6000 - Product Requirements.

2.02 COILING DOORS

A. Exterior Coiling Doors: Steel slat curtain.
1. Capable of withstanding positive and negative wind loads of 20 psf (940 Pa), without undue deflection or damage to components.
2. Sandwich slat construction with insulated core of foamed-in-place polyurethane insulation; minimum R-value of 8.1.
3. Nominal Slat Size: 2 inches wide x required length.
4. Finish: Factory painted, color to be selected by Architect from standard range.
5. Guides: Angles; galvanized steel.
6. Hood Enclosure: Manufacturer's standard; primed steel.
7. Electric operation.

B. Non-Fire-Rated Interior Coiling Doors: Steel slat curtain.
1. Single thickness slats.
2. Nominal Slat Size: 2 inches wide x required length.
3. Finish: Factory painted, color as selected by Architect from standard range.
5. Hood Enclosure: Manufacturer's standard; primed steel.
8. Locking Devices: Lock and latch handle on outside.

C. Fire-Rated Coiling Doors: Steel slat curtain; conform to NFPA 80.
1. Rating as indicated on drawings.
2. Provide products listed and labeled by ITS or UL as suitable for the purpose specified and indicated.
3. Oversized Openings: Provide certificate of compliance from authorities having jurisdiction indicating approval of fire rated units and operating hardware assembly.
5. Nominal Slat Size: 2 inches wide by required length.
6. Finish: Factory painted, color as selected.
8. Hood Enclosure: Manufacturer's standard; primed steel.
11. Electric operation.
13. Locking Devices: Lock and latch handle on outside.

2.03 MATERIALS
A. Curtain Construction: Interlocking slats.
   1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
   2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
   3. Weatherstripping: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.
B. Steel Slats: Minimum thickness, 18 gage; ASTM A653 galvanized steel sheet.
C. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.
D. Steel Guides: Formed from galvanized steel sheet, complying with ASTM A653.
E. Hood Enclosure: Internally reinforced to maintain rigidity and shape.
F. Lock Hardware:
   1. Cylindrical Locking Mechanism: Latchset lock cylinder, specified in Section 08 7100.
   2. For motor operated units, additional lock or latching mechanisms are not required.
   3. Latching Mechanism: Inside mounted, adjustable keeper, spring activated latch bar feature to keep in locked or retracted position.
   4. Latch Handle: Manufacturer's standard.
G. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb (10 kg) nominal force to operate.

2.04 ELECTRIC OPERATION
A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
   1. Provide interlock switches on motor operated units.
   2. Provide tamperproof operation cycle counter.
B. Electric Operators:
   1. Mounting: Side mounted.
   2. Motor Enclosure:
      a. Exterior Doors: NEMA MG 1, Type 4; open drip proof.
      b. Interior Doors: NEMA MG 1, Type 1; open drip proof.
   3. Motor Rating: 1/3 hp (250 W); continuous duty.
   4. Motor Voltage: 120 volt, single phase, 60 Hz.
   7. Opening Speed: 12 inches per second.
C. Control Station: Standard three button (OPEN-STOP-CLOSE) momentary control for each operator.
1. 24 volt circuit.
2. Surface mounted.
D. Safety Edge: Located at bottom of curtain, full width, electro-mechanical sensitized type, wired to stop operator upon striking object, hollow neoprene covered.
1. Manufacturers:
   b. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION
3.01 EXAMINATION
   A. Verify that opening sizes, tolerances and conditions are acceptable.

3.02 INSTALLATION
   A. Install units in accordance with manufacturer's instructions.
   B. Install fire-rated doors in accordance with NFPA 80.
   C. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
   D. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
   E. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
   F. Coordinate installation of electrical service with Section 26 2717.
   G. Complete wiring from disconnect to unit components.
   H. Complete wiring from fire alarm system.
   I. Install perimeter trim and closures.

3.03 TOLERANCES
   A. Maintain dimensional tolerances and alignment with adjacent work.
   B. Maximum Variation From Plumb: 1/16 inch.
   C. Maximum Variation From Level: 1/16 inch.
   D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.04 ADJUSTING
   A. Adjust operating assemblies for smooth and noiseless operation.

3.05 CLEANING
   A. Clean installed components.
   B. Remove labels and visible markings.

END OF SECTION
SECTION 08 3513
ACCORDION FOLDING FIRE DOORS

PART 1 – GENERAL

1.01 SUMMARY OF WORK
A. Furnish and install all horizontal sliding, accordion folding fire doors shown on the drawings and specified herein.

1.02 RELATED SECTIONS
A. All headers, support structures, surrounding insulation, jambs, storage pockets, pocket doors, access doors, blocking and trim shall be furnished and installed by other sections.
B. All electrical wire, wiring, conduit and electrical boxes shall be furnished and installed by electrical section including connections to smoke detectors and building fire alarm panels.
C. Drilling/placement of anchorage points into pre or post tensioned decks, welding/punching/drilling steel members and all drywall work.
D. All track, soffit, chain guide and wall mounted striker posts shall be painted by Section 09900. Color shall be selected by the architect.

1.03 QUALITY ASSURANCE
A. Installation shall be performed by factory trained and certified installers with a minimum of three years’ experience installing electrically operated accordion folding fire doors.
B. Fire doors shall be listed by Underwriters Laboratories for ratings as indicated, when tested in accordance with the requirements of UL 10B and NFPA 252.
C. Automatic closing system shall be listed by Underwriters Laboratories in accordance with the requirements of UL 864 and be listed for use with assembly in compliance with NFPA 80, Chapter 9. Motor operator shall be rated for continuous use with unlimited cycle duty.
D. Fire Door shall be capable of resisting an air pressure differential up to 0.05 inches of water column.

1.04 SUBMITTALS
A. Refer to Section 01 3000 – Administrative requirements for shop drawings and submittals.
B. Product Data: Provide manufacturer's technical literature; include UL listing data.
C. Shop Drawings: Indicate construction and installation details and dimensions, including layout, electrical requirements, required stacking depth, height of header above finished floor, and requirements for anchorage and support of each door.
D. Operation and Maintenance Data: Operating manual, troubleshooting and repair methods, and wiring diagrams shall be provided as part of project close out procedure.

1.05 DELIVERY, STORAGE, AND HANDLING
A. Deliver to the job site in manufacturer's original, unopened package.
1.06 COORDINATION BY GENERAL CONTRACTOR

A. Coordinate with the following:
   1. Fire Alarm System.
   2. Electrical.
   3. Pocket cover door (if required).
   4. Floor and ceiling finish.

B. Assure accurate installation of header, jamb, and trim. Provide “As-Built” dimensions for opening and storage pocket. Supervise unloading and handling of materials.

C. Permanent power shall be in-place and ready for final connection when fire doors are erected. Assure access to and proper clearance for motor operators.

D. After testing the fire alarm system, automatic-closing fire doors shall be re-set to the original position.

E. Store boxes flat (not more than three high) in a dry area and protect from elements that may damage materials. Replace damaged materials at no cost to the owner.

1.07 WARRANTY

A. Materials and installation shall be warranted against defects in workmanship for a period of five (5) years from the date of substantial completion.

PART 2 – PRODUCTS

2.01 MANUFACTURER AND MODEL

A. Basis of Design - Horizontal sliding accordion folding fire doors shall be Won-Door FireGuard model FG60 as manufactured by Won-Door Corporation, Salt Lake City, Utah.

B. Products of other manufacturers demonstrating complete compliance with each of the fire rating and performance criteria of the product specified will be considered for approval. Written requests for substitutions will be considered by the architect up to ten days prior to the bid date.

2.02 ACCORDION FIRE DOORS - GENERAL

A. Provide power operated self-closing fire doors of configurations indicated on the drawings.
   1. Fire rating as required.

B. Fire Rating: Fire Doors shall be listed by Underwriters Laboratory as special purpose fire doors having a 60 minute fire protection rating in accordance with the requirements of UL 10B and NFPA 252.

C. Sound Rating: In fire door locations noted on drawings, include continuous sound attenuation blanket on interior faces of accordion panels.

D. Closing and Opening Operation: Automatic Closing System including motor operator and releasing devices shall be a Microprocessor-based system rated to UL864 (Releasing Device Control Unit) and shall commence closing upon activation by fire alarm system and/or by low battery charge.
1. Obstruction Detection: Contact with an obstruction shall cause the door to stop, reverse enough to remove pressure on the leading edge, pause, and then re-close when in an alarm condition.

2. While the door is opening under motor power, constant pressure to the leading edge in the direction of opening shall cause the door to continue to open until the leading edge is released. This is termed motor-assisted opening.

3. Constant pressure to the leading edge while not under motor power shall prevent motor operation and allow the door to be opened manually.

E. The doors shall be power operated and shall be capable of being operated manually in the event of power failure.

F. The doors shall be openable by a simple method from both sides without special knowledge or effort.

G. The force required to operate the door shall not exceed 30 pounds to set the door in motion and 15 pounds to close the door or open it to the minimum required width.

H. The door shall be openable with a force not to exceed 15 pounds when a force of 250 pounds is applied perpendicular to the door adjacent to the operating device.

I. The door assembly shall comply with the applicable fire protection rating and, where rated, shall be self-closing or automatic-closing by smoke detection, and shall be installed in accordance with NFPA 80.

J. The door assembly shall have an integrated standby power supply.

K. The door assembly power supply shall be electrically supervised.

L. The door assembly shall be capable of opening to the minimum required width within 10 seconds after activation of the operating device.

M. Exit Hardware Operation: Provide fire exit hardware on both sides of door.

1. In emergency mode, a slight pressure on the hardware will cause the door to open a minimum of 32 inches, pause for 3 seconds, and then automatically close.

2. The open distance shall be field programmable, up to the entire opening width.

3. The pause before re-close shall be field programmable up to 30 seconds.

4. The exit hardware shall have the ability when not in the emergency (fire) mode to be used to open the door and move it back into the storage pocket.

**2.03 COMPONENTS**

A. Door Construction: Two parallel, accordion-type walls of panels independently suspended with no floor tracks, pantographs, or interconnections except at the lead-post.

1. Panels shall be formed of 24-gauge enamel coated steel V-grooved for strength and resilience. Panels shall be connected by full height 24-gauge enamel coated steel hinges. Panels shall be modular in design and capable of in-place repair-ability.

2. Perimeter Seals: shall consist of continuous extruded vinyl sweeps attached to the top and bottom of the fire door to form a smoke and draft seal.

3. Hanging weight shall be 5.5 pounds per square foot (6.5 lbs. per sq. ft. for TR models) when extended across the opening.

4. Finish: All steel parts factory applied enamel.

5. Color: Manufacturer’s standard platinum.
B. Suspension System: Two tracks, on 8 inch centers, attached to overhead structural support.
   1. Tracks: 14 gauge cold rolled steel or .125 aluminum.
   2. Panel hangers: Panels supported from a steel hanger pin and a ball bearing roller.
   3. Lead Post hangers: 8 wheel ball bearing trolley.
C. Power Supply: 120 volt power source to power supply for main power. On loss of AC power, the 12v/24v battery back-up system shall provide full operation capability.
D. Automatic Closing System shall be listed to UL864 including capability to send and receive signals from the Fire Control Panel and shall consist of the following:
   1. Microprocessor based Electronic Control box with these features:
      a. Ability to monitor dual power sources continually for peak performance including:
         1) Detect a missing battery, bad battery, or low battery condition.
         2) Detect if the charging circuit is bad.
         3) Detect fuse failures.
         4) Detect high or low AC conditions.
      b. Ability to monitor the health of the drive train.
      c. Ability to monitor inputs including: Sticky door block, exit hardware, and patron hardware.
      d. Ability to run a “watch dog” monitoring circuit which will force a software restart in the event the software hangs, including the ability to track the number of resets that occur for diagnostic purposes.
      e. Ability to withstand voltages up to 120 volts AC on the fire alarm input circuit without damage including the ability to indicate that the alarm circuit has not been wired as a dry contact, “no voltage” circuit when errant voltages are applied to the circuit.
      f. Ability to communicate with other microprocessors in the assembly via an internal buss system.
      g. Ability to indicate trouble or supervised information both locally and at a remote location.
   2. Motor Operator Assembly including: A DC gear-motor, drive sprocket, clutch, and position sensors. The motor shall drive the fire door by means of a chain attached to a stabilizer bar.
   3. Leading Edge Obstruction Detector: shall be pressure sensitive such that each contact with an obstruction shall cause the door to stop, reverse enough to remove pressure on the leading edge, pause, and then re-close when in an alarm condition. The leading edge obstruction detector shall be fully functional at all times, including during the initial closing cycle.
   4. Exit Hardware will be located on both sides of the fire door.
E. A key switch module shall be provided.

2.04 RELATED CONSTRUCTION
A. Track Support Construction: Provide supports attached to structure and mounting surface for tracks; comply with door manufacturer’s instructions and recommendations. Headers, if
furnished & installed by the general contractor or other sections, shall be parallel with the finished floor within +/- 1/8” tolerance over the entire length of the opening.

B. Pocket Construction: Provide pocket for concealment of accordion folding fire door when open; comply with door manufacturer's instructions and recommendations to ensure pocket and soffit are built to the dimensions specified, plumb and level.

C. Pocket Door: Maintain full pocket clear width when pocket door is open.

D. Striker Recess: mount 16 gauge steel striker in wall recess deep enough to prevent striker from protruding beyond face of wall; construct recess to maintain fire rating of wall.

PART 3 – EXECUTION

3.01 EXAMINATION
A. Verify that adjacent construction is suitable for installation of door.
B. Verify that electrical utilities have been installed and are accessible.
C. Verify that door opening is plumb and header is level and of correct dimensions.
D. Notify Architect of any unacceptable conditions or varying dimensions.

3.02 INSTALLATION
A. Install fire doors in accordance with manufacturer's instructions, shop drawings, and NFPA 80.
B. Install fire doors plumb and level.
C. Installation shall be performed by factory trained and certified installers with a minimum of three years’ experience installing electrically operated accordion folding fire doors.

3.03 ADJUSTING
A. Adjust door installation to provide uniform clearances and smooth, quiet, non-binding operation.
B. Test that all operations are functional and meet the requirements of local codes.

3.04 CLEANING
A. Clean surfaces using manufacturer's recommended means and methods.

3.05 PROTECTION
A. Protect installed work from damage.

3.06 STORAGE OF WASTE AND RECYCLING
A. Store and recycle waste in accordance with Section 01 7419 Construction Waste Management and Disposal.

END OF SECTION
SECTION 08 3810
SOUND CONTROL WINDOWS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Furnish and install FACTORY PREGLAZED Sound Control Windows specified herein and per the locations and orientations shown on the Contract Documents-site installation of glazing into frames is not acceptable. Verify all dimensions and requirements and coordinate with other trades as necessary

1. Sound Control Windows, Frames, Stops, Glazing, Sound Absorbing Material and Concealed Fasteners
2. Installation of Sound Control Windows.

1.2 RELATED SECTIONS:

A. Specified elsewhere:

1. Division 1: Administrative Provisions
2. Section 09 9000: Finish painting of window frames

1.3 QUALITY ASSURANCE

A. Acoustic Performance:

1. The manufacturer shall submit certified laboratory test results indicating a Sound Transmission Class (STC) rating of at least 53 when tested in accordance with ASTM E 90-90 and E413-87.

B. Warranty:

1. The window systems shall be guaranteed against defective materials and/or workmanship for a period of one (1) year from date of acceptance of the installations.

1.4 SUBMITTALS

A. Submit shop drawings, manufacture’s data, and product performance certification in accordance with General Conditions.

B. Shop drawings:

1. Provide full size details of frames and sound gasket components.
2. Provide installation details applicable to the construction in which the Sound Control Windows will be installed.
3. Indicate construction, sizes, thicknesses, reinforcing, anchoring, and finishes of all materials.
C. Manufacturer’s data:

1. Provide illustrations and descriptions of all frame details which will be exposed on window units for design review by Architect and project Acoustics Consultant.

2. Provide complete installation and adjustment information.

D. Certification:

1. Provide certified laboratory test reports from a Navlap certified acoustics laboratory showing that a fully operating installation of the specific Sound Control Window assembly proposed for installation has been measured in accordance with ASTM E 90-90 and has met or exceeded the scheduled STC ratings. The test results shall be representative of the performance of the proposed Sound Control Window assembly.

E. Notification of work completion:

1. After installation and prior to acceptance testing, provide a letter to the Architect and the project Acoustics Consultant, co-signed by the General Contractor’s project representative, indicating that all Sound Control Window Units have been installed and gaskets have been adjusted to form an airtight seal around the full perimeter of each window unit panel.

1.5 SEQUENCING AND DELIVERY

A. Upon award of contract and before commencement of building construction, submit to the Architect any special requirements (scheduling, opening conditions, etc.) which are necessary to assure successful installation.

B. Protect pre-glazed window units during transit, handling and storage to prevent damage, soiling, and deterioration.

C. Deliver preglazed window units to General Contractor with complete installation drawings and instructions for installation by the General Contractor.

D. Deliver pre-glazed window units to project site only after the building has been closed in. Store window units in the building in a dry location and stack in accordance with manufacture’s instructions.

E. Protect pre-glazed window unit assemblies, especially sound gaskets, from damage before, during and after their installation.

2.0 PRODUCTS

2.1 APPROVED MANUFACTURER’S:

A. The acoustical window units shall be QuietLite Acoustical Windows manufactured by NoiseBarriers, LLC., Libertyville, Il.

Manufacturer’s Rep:
2.2 MATERIALS

A. Window frames shall be 1 ¼ in. thick fabricated from not less than 12 ga. steel, reinforced and filled with sound-absorbing acoustic fill. Inside and outside corners shall be mitered and interlocked to hairline measurements, made square, continuously welded, and ground smooth, flush, and invisible.

B. Stops shall be in 1 in. thick and readily removable, fabricated from not less than 16 gauge rolled steel sections predrilled and aligned with frame to form tight square acoustical joint. Stop fasteners shall be concealed.

C. Acoustic seals for glazing shall be vibration-isolating resilient gaskets, U-shaped and continuous of santoprene UV grade 65-75 Duro black. Self-contained, sound-absorptive interior perimeter of not less than 22 gauge steel shall be perforated and prefinished black. Desiccant material shall be incorporated into multiple glazed units.

D. Assembly of acoustic window units including frames, stop, glazing, acoustic seals, sound-absorbing material, and concealed fasteners shall take place at the factory to insure required noise reduction is achieved. Glazing shall not need to be removed to facilitate fastening or anchoring at the job site.

E. Finish – Unless otherwise specified, steel window frame assemblies shall receive one shop coat of gray primer. Stainless steel shall not be painted.

F. Lights for single-and double-glazed units shall be minimum ¼ in. laminated safety glass consisting of multi-layer clear float with clear plastic interlayer. Bullet-resistant glazing (if required) shall be certified to meet UL 752 specifications. **Note:** This project requires one (1) layer of 3/8" thick laminated safety glass and one (1) layer of 5/8" laminated safety glass in a window unit 11" thick.

2.3 ACOUSTICAL PERFORMANCE CHARACTERISTICS

A. At least 10 days prior to bidding, manufacturer shall submit laboratory test data certifying Sound Transmission Loss and Sound Transmission Class (STC) when tested in accordance with ASTM E 90-90 of not less than the following:

<table>
<thead>
<tr>
<th>Window Type</th>
<th>Octave Band Center Frequency, Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>125 250 500 1K 2K 4K STC</td>
</tr>
</tbody>
</table>

| Double glazed | 34 43 52 54 60 67 53 |

2.4 FABRICATION

Two River Theater Addition and Alterations 08 3810 – 3 SOUND CONTROL WINDOWS
A. Assemble windows using all welded construction conforming to pertinent requirements of AWS D1-1. Assembly and adjustment of window units, frames, stop, glazing, acoustic seals, sound-absorbing material and concealed fasteners shall be performed at the factory. Each entire unit shall be shipped to the job site ready for installation and subsequent operation.

B. Reinforce as required to withstand operating loads.

C. Painting and cleaning:
   1. On surfaces which are inaccessible after assembly, apply protective coating of the manufacturer’s standard rust-inhibitive primer.
   2. After assembly, and prior to inspection, thoroughly clean all surfaces.
   3. After inspection, and completion of repairs and revisions required by the inspection, apply a shop coat of rust inhibitive primer to exposed surfaces.

3.0 EXECUTION

3.1 EXAMINATION

Before commencing installation, examine the substrate and surrounding conditions to verify that there is nothing to prevent proper and timely execution of the installation. Start of work shall indicate acceptance of the substrate and surrounding conditions.

3.2 INSTALLATION

A. Installation of window units, seals, and final adjustments for window operation and for the design attenuation shall be performed by factory trained personnel under the supervision of the manufacturer.

B. Install items plumb (or as indicated on the contract documents), straight, square, level, and in their proper elevation, plane and location.

C. Adjust all gaskets to achieve an airtight seal around the entire perimeter of each window unit.

D. After installation, adjust windows for smooth and easy operation.

E. All work shall be complete in every detail and the finished work shall be clean for Architect prior to final acceptance.

3.3 ADJUST AND CLEAN

A. Check and readjust operation finish hardware in work just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work.

B. Immediately after erection, sand smooth all rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
3.4 ACCEPTANCE TESTING

A. Before acceptance of the installed Sound Control Window Units, and at any time within the project guaranteed period, the Owner, Architect, or project Acoustics Consultant may request that acoustic performance testing of the installations be performed. Ideally, this testing shall be performed by an independent acoustics consultant at the expense of the Installing Contractor under the supervision of the project Acoustics Consultant, and expenses for the project Acoustics Consultant to supervise the testing shall be paid by the Installing Contractor. Alternatively, the project Acoustics Consulting may be independently retained by the Installing Contractor to perform this testing.

B. The installations shall be deemed acceptable if the Sound Control Window Units meet or exceed a Noise Isolation Class (NIC) which is not more than six (6.) points below the specified STC rating.

END OF SECTION
SECTION 08 4413
GLAZED ALUMINUM CURTAIN WALL - 450

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: Kawneer Architectural Aluminum Storefront Systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units.
   1. Types of Kawneer Aluminum Storefront Systems include:
      a. Trifab™ VG 450 (2" Sightline) Framing System – 2" x 4-1/2" nominal dimension; Non-Thermal; Front Plane, Structural Silicone or Weatherseal Glazed, Stick Fabrication. Note: These units to be installed in "non-acoustical" critical areas.
B. Related Sections:
   1. 07 2713 - Air Barriers
   2. 07 9005 - Joint Sealants
   3. 08 4413 - Glazed Aluminum Curtain Walls
   4. 08 6300 - Metal-Framed Skylights
   5. 08 8000 - Glazing

1.3 DEFINITIONS
A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufacturers Association (AAMA) – AAMA Glossary (AAMA AG).

1.4 PERFORMANCE REQUIREMENTS
A. Storefront System Performance Requirements:
   1. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft² at a static air pressure differential of 6.24 psf.
   2. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 8 psf as defined in AAMA 501.
   3. Uniform Load: A static air design load of 20 psf shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.

1.5 SUBMITTALS
A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, hardware, finishes, and installation instructions for each type of aluminum-framed storefront system indicated.
B. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances and installation details.
C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.
D. Samples for Verification: For aluminum-framed storefront system and components required.
E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type of aluminum-framed storefront.

F. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12” lengths of full-size components and showing details of the following:
   1. Joinery, including concealed welds.
   2. Anchorage.
   5. Flashing and drainage.

G. Other Action Submittals:
   1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.6 QUALITY ASSURANCE
   A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.
   B. Manufacturer Qualifications: A manufacturer capable of providing aluminum-framed storefront system that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.
   C. Source Limitations: Obtain aluminum-framed storefront system through one source from a single manufacturer.
   D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum-framed storefront system and are based on the specific system indicated. Refer to Division 01 Section “Product Requirements.” Do not modify size and dimensional requirements.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect’s approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
   E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
      1. Build mockup for type of storefront elevation indicated, in location(s) designated by Architect.
   F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section “Project Management and Coordination”.
   H. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.

1.7 PROJECT CONDITIONS
   A. Field Measurements: Verify actual dimensions of aluminum-framed storefront openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.8 WARRANTY
   A. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty.
      1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.
1.9 MANUFACTURERS

A. Basis-of-Design Product:
   1. Kawneer Company Inc.
   2. Trifab™ VG 450 Framing System (Non-Thermal, 2" Sightline)
   3. System Dimensions: 2" x 4-1/2"
   4. Glass: Front Plane

B. Subject to compliance with requirements, provide a comparable product by the following:
   1. Manufacturer: VistaWall Architectural Products (oldcastlebe.com)

C. Substitutions: Refer to Substitutions Section for procedures and submission requirements.
   1. Pre-Contract (Bidding Period) Substitutions: Submit written requests ten (10) days prior to bid date.
   2. Post-Contract (Construction Period) Substitutions: Submit written request in order to avoid storefront installation and construction delays.
   3. Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.
   4. Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for storefront system performance criteria, and (2) has been engaged in the design, manufacturer and fabrication of aluminum storefronts for a period of not less than ten (10) years.
   5. Test Reports: Submit test reports verifying compliance with each test requirement required by the project.
   6. Samples: Provide samples of typical product sections and finish samples in manufacturer's standard sizes.

D. Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

1.10 MATERIALS

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

B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum framing members, trim hardware, anchors, and other components.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

E. Sealant: For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

F. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

1.11 STOREFRONT FRAMING SYSTEM / GLAZING

A. Glazing: As specified in Division 08 Section “Glazing”.

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.
C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:
   1. Structural Sealant: ASTM C 1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.
      a. Color: Black
   2. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.

1.12 ACCESSORY MATERIALS
A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants".

1.13 FABRICATION
A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fit joints; make joints flush, hairline and weatherproof.
   3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
   4. Physical and thermal isolation of glazing from framing members.
   5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

B. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

C. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.

D. Storefront Framing: Fabricate components for assembly using manufacturer’s standard installation instructions.

E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

1.14 ALUMINUM FINISHES
A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Factory Finishing: (Color as selected by Architect from standard range)
PART 2 - EXECUTION

2.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight aluminum- framed storefront system installation.
   1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
   2. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
   3. Proceed with installation only after unsatisfactory conditions have been corrected.

2.2 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum-framed storefront system, accessories, and other components.
B. Install aluminum-framed storefront system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.
D. Install aluminum-framed storefront system and components to drain condensation, water penetrating joints, and moisture migrating within aluminum-framed storefront system to the exterior.
E. Separate aluminum and other corrosive surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

2.3 FIELD QUALITY CONTROL

A. Field Tests: Architect shall select storefront units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount.
   1. Testing: Testing shall be performed by a qualified independent testing agency. Refer to Testing Section for payment of testing and testing requirements. Testing Standard per AAMA 503, including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 Water Infiltration Test.
      a. Air Infiltration Tests: Conduct tests in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft², whichever is greater.
      b. Water Infiltration Tests: Conduct tests in accordance with ASTM E 1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 6.24 psf.
B. Manufacturer's Field Services: Upon Owner's written request, provide periodic site visit by manufacturer's field service representative.

2.4 ADJUSTING, CLEANING AND PROTECTION

A. Clean aluminum surfaces immediately after installing aluminum-framed storefronts. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION
SECTION 08 4414
GLAZED ALUMINUM CURTAIN WALLS - 451

1.1 GENERAL - 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: Kawneer Architectural Aluminum Storefront Systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units.
   1. Types of Kawneer Aluminum Storefront Systems include:
      a. Trifab™ VG 451 Framing System – 2” x 4-1/2” nominal dimension; Non-Thermal; Front, Center, Back, Multi-Plane, Structural Silicone or Weatherseal Glazed (Type B); Screw Spline, Shear Block, Stick or Punched Opening Fabrication.
      Note: These units to be installed in the "acoustic critical" areas.

B. Related Sections:
   1. 07 2713 - Air Barriers
   2. 07 9005 - Joint Sealants
   3. 08 4413 - Glazed Aluminum Curtain Walls
   4. 08 6300 - Metal-Framed Skylights
   5. 08 8000 - Glazing

1.3 DEFINITIONS

A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufacturers Association (AAMA) – AAMA Glossary (AAMA AG).

1.4 PERFORMANCE REQUIREMENTS

A. Storefront System Performance Requirements:
   1. Wind loads: Provide storefront system; include anchorage, capable of withstanding wind load design pressures of 26.5 lbs./sq.ft. inward and 36.5 lbs./sq. ft. outward. The design pressures are based on the International 2015 Building Code; NJ Edition.
   2. Air Leakage: The test specimen shall be tested in accordance with ASTM E 283. Air Leakage rate shall not exceed 0.06 cfm/ft² at a static air pressure differential of 6.2 psf with interior seal, or, rate shall not exceed 0.06 cfm/ft² at a static air pressure differential of 1.6 psf without interior seal. CSA A440 Fixed Rating.
   3. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 8 psf as defined in AAMA 501.
   4. Uniform Load: A static air design load of 35 psf shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.
   5. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:
      a. Temperature Change (Range): 0 deg F; 180 deg F.
      b. Test Interior Ambient-Air Temperature: 75 deg F.
      c. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5 for a minimum 3 cycles.
6. Sound Transmission Class (STC) and Outdoor-Indoor Transmission Class (OITC): When tested to AAMA Specification 1801 and in accordance with ASTM E1425 and ASTM E90, the STC and OITC Rating shall not be less than:
   a. Glass to Exterior – 38 (STC) and 31 (OITC).
   b. Glass to Center – 37 (STC) and 30 (OITC).
   c. Glass to Interior – 38 (STC) and 30 (OITC).

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, hardware, finishes, and installation instructions for each type of aluminum-framed storefront system indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances and installation details.

C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.

D. Samples for Verification: For aluminum-framed storefront system and components required.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type of aluminum-framed storefront.

F. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12” lengths of full-size components and showing details of the following:
   1. Joinery.
   2. Anchorage.
   5. Flashing and drainage.

G. Other Action Submittals:
   1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of providing aluminum-framed storefront system that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

C. Source Limitations: Obtain aluminum-framed storefront system through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum-framed storefront system and are based on the specific system indicated. Refer to Division 01 Section “Product Requirements”. Do not modify size and dimensional requirements.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Build mockup for type(s) of storefront elevation(s) indicated, in location(s) designated by Architect.
F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section “Project Management and Coordination”.


H. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.

1.7 PROJECT CONDITIONS
A. Field Measurements: Verify actual dimensions of aluminum-framed storefront openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.8 WARRANTY
A. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty.
   1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

PART 2 - PRODUCTS
2.1 MANUFACTURERS
A. Basis-of-Design Product:
   1. Kawneer Company Inc.
   2. Trifab™ VG 451 (Non-Thermal)
   3. System Dimensions: 2” x 4-1/2”
   4. Glass: Center, Exterior or Interior

B. Subject to compliance with requirements, provide a comparable product to the Architect for approval.
   1. Manufacturer: VistaWall Architectural Products (www.oldcastlebe.com)

C. Substitutions: Refer to Substitutions Section for procedures and submission requirements
   1. Pre-Contract (Bidding Period) Substitutions: Submit written requests ten (10) days prior to bid date.
   2. Post-Contract (Construction Period) Substitution: Submit written request in order to avoid storefront installation and construction delays.
   3. Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.
   4. Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for storefront system performance criteria, and (2) has been engaged in the design, manufacturer and fabrication of aluminum storefronts for a period of not less than ten (10) years.
   5. Test Reports: Submit test reports verifying compliance with each test requirement required by the project.
   6. Samples: Provide samples of typical product sections and finish samples in manufacturer's standard sizes.

D. Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

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

B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum framing members, trim hardware, anchors, and other components.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

E. Sealant: For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

F. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

2.3 STOREFRONT FRAMING SYSTEM

A. Thermal Barrier (Trifab™ VG 451T):
   1. Kawneer IsoLock™ Thermal Break with a 1/4" separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.
      a. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, non-ferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposes shall be stainless steel.

D. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

E. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

F. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

2.4 GLAZING SYSTEMS

A. Glazing: As specified in Division 08 Section “Glazing”.

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:
1. Structural Sealant: ASTM C 1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.
   a. Color: Black

2. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.

2.5 ENTRANCE DOOR SYSTEMS
   A. Entrance Door Hardware: As specified in Division 08 7100, Section "Door Hardware".

2.6 FABRICATION
   A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
      1. Profiles that are sharp, straight, and free of defects or deformations.
      2. Accurately fit joints; make joints flush, hairline and weatherproof.
      3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
      4. Physical and thermal isolation of glazing from framing members.
      5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
      7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
   B. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
   C. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
   D. Storefront Framing: Fabricate components for assembly using manufacturer’s standard installation instructions.
   E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.7 ALUMINUM FINISHES
   A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
   B. Factory Finishing: to be one of the following or comparable and approved by Architect. Colors to be selected by Architect from standard range.
      4. Kawneer Permafluor™ (70% PVDF), AAMA 2605, Fluoropolymer Coating
      5. Kawneer Permadize™ (50% PVDF), AAMA 2604, Fluoropolymer Coating (Kawneer Permacoat™ AAMA 2604, Powder Coating
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight framed aluminum storefront system installation.

1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76 mm) of opening.
3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum-framed storefront system, accessories, and other components.
B. Install aluminum-framed storefront system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.
D. Install aluminum-framed storefront system and components to drain condensation, water penetrating joints, and moisture migrating within aluminum-framed storefront to the exterior.
E. Separate aluminum and other corroding surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

A. Field Tests: Architect shall select storefront units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount.

1. Testing: Testing shall be performed by a qualified independent testing agency. Refer to Testing Section for payment of testing and testing requirements. Testing Standard per AAMA 503, including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 Water Infiltration Test.
   a. Air Infiltration Tests: Conduct tests in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft², whichever is greater.
   b. Water Infiltration Tests: Conduct tests in accordance with ASTM E 1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 6.2 psf.
B. Manufacturer's Field Services: Upon Owner's written request, provide periodic site visit by manufacturer's field service representative.
3.4 ADJUSTING, CLEANING AND PROTECTION

A. Clean aluminum surfaces immediately after installing aluminum-framed storefronts. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION
SECTION 08 4415
GLAZED ALUMINUM CURTAIN WALL - 1600 SYSTEM 1

1.1 GENERAL – 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: Kawneer Architectural Aluminum Curtain Wall Systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of curtain wall framing.
   1. Types of Kawneer Aluminum Curtain Wall include:
      a. 1600 Wall System™ Curtain Wall – 2-1/2”, outside glazed pressure plate format.
         1) System depth: 6” or 7-1/2” for 1” insulating glazing and 1/4” monolithic glazing. Note: This system is to be installed at “punched” wall openings.

B. Related Sections:
   1. 07 2713 - Air Barriers
   2. 07 9005 - Joint Sealants
   3. 08 6300 - Metal-Framed Skylights
   4. 08 8000 - Glazing

1.3 DEFINITIONS
A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufactures Association (AAMA) – AAMA Glossary (AAMA AG).

1.4 PERFORMANCE REQUIREMENTS
A. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
   1. Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads. Failure also includes the following:
      a. Thermal stresses transferring to building structure.
      b. Glass breakage.
      c. Loosening or weakening of fasteners, attachments, and other components.
      d. Failure of operating units.

B. Delegated Design: Design glazed aluminum curtain walls, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Wind loads: Provide Curtain Wall system; include anchorage, capable of withstanding wind load design pressures of 26.5 lbs./sq. ft. inward and 36.5 lbs./sq. ft. outward. The design pressures are based on the 2015 International Building Code, NJ Edition.

D. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft² at a static air pressure differential of 6.24 psf.

E. Water Resistance, (static): The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a static air pressure differential of 12 psf as defined in AAMA 501.

F. Water Resistance, (dynamic): The test specimen shall be tested in accordance with AAMA 501.1. There shall be no leakage at an air pressure differential of 12 psf (575 Pa) as defined in AAMA 501.
G. Uniform Load: A static air design load of 40 psf (1915 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member at design load. At structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.

H. Seismic: When tested to AAMA 501.4, system must meet design displacement of 0.010 x the story height and ultimate displacement of 1.5 x the design displacement.

I. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than: 0.66 (clear).

Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than 66frame and 60glass (clear)

J. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than: 0.43 (HP glass).

K. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than 71frame and 71glass (HP glass).

L. Sound Transmission Loss: When tested to ASTM E90 and ASTM E1425, the Sound Transmission Class (STC) and Outdoor/Indoor Transmission Class (OITC) shall not be less than: STC 31 or OITC 26 based upon 1" (25.4) insulating glass (1/4", 1/2" AS, 1/4"),


2. Small – Missile Impact: For aluminum-framed systems located above 30 feet (9.1 m) of grade.

1.5 SUBMITTALS
A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified preconstruction testing agency, for glazed aluminum curtain walls, indicating compliance with performance requirements.

F. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed curtain wall systems, made from 12" lengths of full-size components and showing details of the following:
   1. Joinery
   2. Glazing

1.6 QUALITY ASSURANCE
A. Installer Qualifications: Installer who has had successful experience with installation of the same or similar systems required for the project and other projects of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of fabricating glazed aluminum curtain walls that meet or exceed performance requirements.

C. Source Limitations: Obtain aluminum curtain wall system through one source from a single manufacturer.
D. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockups for type(s) of curtain wall elevation(s) indicated, in location(s) designated by Architect.

F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section “Project Management and Coordination”.

1.7 PROJECT CONDITIONS
A. Field Measurements: Verify actual locations of structural supports for glazed aluminum curtain walls by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY
A. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty.
1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

PART 2 - PRODUCTS
2.1 MANUFACTURERS
A. Basis-of-Design Product:
1. Kawneer Company Inc.
   a. 1600 Wall System™ 1 Curtain Wall – 2-1/2", outside glazed pressure plate format.
      1) System depth: 6" or 7-1/2" for 1" insulating glazing and 1/4"monolithic glazing.

B. Subject to compliance with requirements, provide a comparable product by the following manufacturer: Vista Wall Architectural Products (www.oldcastlebe.com)

C. Substitutions: Refer to Substitutions Section for procedures and submission requirements.
1. Pre-Contract (Bidding Period) Substitutions: Submit written requests ten (10) days prior to bid date.
1. Post-Contract (Construction Period) Substitutions: Submit written request in order to avoid curtain wall installation and construction delays.
2. Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.
3. Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for curtain wall system performance criteria, and (2) has been engaged in the design, manufacturer and fabrication of aluminum curtain walls for a period of not less than ten (10) years. (Company Name).
4. Test Reports: Submit test reports verifying compliance with each test requirement required by the project.
5. Samples: Provide samples of typical product sections and finish samples in manufacturer's standard sizes.

D. Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.
2.2 MATERIALS
A. Aluminum Extrusions: Alloy and temper recommended by glazed aluminum curtain wall manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.
B. Aluminum sheet alloy: Shall meet the requirements of ASTM B209.
C. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim hardware, anchors, and other components.
D. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
E. Pressure Plate: Pressure plate shall be aluminum and fastened to the mullion with stainless steel screws.
F. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
G. Sealant: For sealants required within fabricated curtain wall system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.
H. Thermal Barrier: Thermal separator shall be extruded of a silicone compatible elastomer that provides a minimum 1/4" separation.
I. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of glazed curtain wall members are nominal and in compliance with AA Aluminum Standards and Data.

2.3 CURTAIN WALL FRAMING
A. Framing Members: Manufacturer's standard extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
B. Glass: 1" insulating glass option.
C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
D. Framing Sealants: Shall be suitable for glazed aluminum curtain wall as recommended by sealant manufacturer.
E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.
F. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
G. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
H. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle curtain wall material and components to avoid damage. Protect curtain wall material against damage from elements, construction activities, and other hazards before, during and after installation.
2.4 GLAZING
A. Glazing: Comply with Division 08 Section "Glazing". Following glazing options are available.
   1. 1600 Wall System™1 Curtain Wall.
      a. System depth: 6" or 7-1/2" for 1" insulating glazing and 1/4" monolithic glazing.
B. Glazing Gaskets: Gaskets to meet the requirements of ASTM C864.
C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
E. Glazing Sealants: As recommended by manufacturer for joint type.

2.5 OPERABLE UNITS
A. Doors: Comply with Division 08 Section "Aluminum-Framed Entrances and Storefronts".
B. Windows: Comply with Division 08 Section "Aluminum Windows".

2.6 FABRICATION
A. Form or extrude aluminum shapes before finishing.
B. Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fitted joints.
   3. Physical and thermal isolation of glazing from framing members.
   4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   5. Provisions for field replacement of glazing from exterior.
   6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
   7. Internal weeping system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
C. Curtain Wall Framing: Fabricate components for assembly using shear block system following manufacturer's standard installation instructions.
D. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.7 ALUMINUM FINISHES
A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
B. Factory Finishing - to be one of the following or comparable and approved by Architect. Colors to be selected by Architect from standard range.
   1. AA-M10C21A44 / AA-M45C22A44, AAMA 611, Coating (Color: T.B.D.)

PART 3 - EXECUTION
3.1 EXAMINATION
A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install curtain wall systems plumb, level, and true to line, without warp or rack of frames with manufacturer’s prescribed tolerances and installation instructions. Provide support and anchor in place.
   1. Dissimilar Materials: Provide separation of aluminum materials from sources of corrosion or electrolytic action contact points.
   2. Glazing: Glass shall be outside glazed and held in place with extruded aluminum pressure plates anchored to the mullion using stainless steel fasteners spaced no greater than 9" on center.
   3. Water Drainage: Each light of glass shall be compartmentalized using joint plugs and silicone sealant to divert water to the horizontal weep locations. Weep holes shall be located in the horizontal pressure plates and covers to divert water to the exterior of the building.

B. Related Products Installation Requirements:
   1. Sealants (Perimeter): Refer to Joint Treatment (Sealants) Section.
   2. Glass: Refer to Glass and Glazing Section.

3.3 FIELD QUALITY CONTROL

A. Field Tests: Architect shall select curtain wall units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer’s representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount.
   1. Testing: Testing shall be performed per AAMA 503 by a qualified independent testing agency. Refer to Testing Section for payment of testing and testing requirements.
      a. Air Infiltration Tests: Conduct tests in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft², whichever is greater.
      b. Water Infiltration Tests: Conduct tests in accordance with ASTM E 1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 8 psf.

B. Manufacturer’s Field Services: Upon Owner’s written request, provide periodic site visit by manufacturer’s field service representative.

3.4 ADJUSTING, CLEANING AND PROTECTION

A. Protection: Protect installed product’s finish surfaces from damage during construction. Protect aluminum curtain wall system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

B. Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer’s instructions prior to owner’s acceptance. Remove construction debris from project site and legally dispose of debris.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION
1.1 GENERAL- 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: Kawneer Architectural Aluminum Curtain Wall Systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of curtain wall framing.
   1. Types of Kawneer Aluminum Curtain Wall include:
      a. 1600 Wall System™2 Curtain Wall – 2-1/2” x 6” or 2-1/2” x 7-1/2”, outside glazed, structural silicone glazed (SSG) format with 1” insulating glass and 1/4” monolithic glazing. Note: This system is to be installed at large curtain wall systems.

B. Related Sections:
   1. 07 2713 - Air Barriers
   2. 07 9005 - Joint Sealants
   3. 08 6300 - Metal-Framed Skylights
   4. 08 8000 - Glazing

1.3 DEFINITIONS

A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufactures Association (AAMA) – AAMA Glossary (AAMA AG).

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
   1. Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads. Failure also includes the following:
      a. Thermal stresses transferring to building structure.
      b. Glass breakage.
      c. Loosening or weakening of fasteners, attachments, and other components.
      d. Failure of operating units.

B. Delegated Design: Design glazed aluminum curtain walls, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Wind loads: Provide Curtain Wall system; include anchorage, capable of withstanding wind load design pressures of 26.5 lbs./sq. ft., inward and 36.5 lbs./sq. ft. outward. The design pressures are based on the 2015 International Building Code, NJ Edition.

D. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft² at a static air pressure differential of 6.24 psf.

E. Water Resistance, (static): The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a static air pressure differential of 12 psf as defined in AAMA 501.

F. Water Resistance, (dynamic): The test specimen shall be tested in accordance with AAMA 501.1. There shall be no leakage at an air pressure differential of 12 psf as defined in AAMA 501.
G. Uniform Load: A static air design load of 40 psf shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member at design load. At structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.

H. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than: 0.57 (clear glass).

I. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than 68_FRAME and 59_GLASS (clear glass).

J. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than: 0.36 (HP glass).

K. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than 75_FRAME and 72_GLASS (HP glass).
   or Condensation Index (I): when tested to CSA-A440-00, the Condensation Index shall not be less than 65_FRAME and 62.2_GLASS (HP glass).

L. Sound Transmission Loss: When tested to ASTM E90, the Sound Transmission Class (STC) shall not be less than 31 and the outdoor-indoor transmission class (OITC) shall not be less than 25 based upon 1" laminated glass (1/4" laminated, 1/2" AS, 1/4" laminated).

   1. Small – Missile Impact: For aluminum-framed systems located above 30 feet of grade.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified preconstruction testing agency, for glazed aluminum curtain walls, indicating compliance with performance requirements.

F. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed curtain wall systems, made from 12" lengths of full-size components and showing details of the following:
   1. Joinery
   2. Glazing

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Installer who has had successful experience with installation of the same or similar systems required for the project and other projects of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of fabricating glazed aluminum curtain walls that meet or exceed performance requirements.

C. Source Limitations: Obtain aluminum curtain wall system through one source from a single manufacturer.

D. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated
by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Build mockups for type of curtain wall elevation indicated, in location(s) designated by the Architect.

F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section “Project Management and Coordination”.

1.7 PROJECT CONDITIONS
A. Field Measurements: Verify actual locations of structural supports for glazed aluminum curtain walls by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY
A. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty.
   1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Basis-of-Design Product:
   1. Kawneer Company Inc.
   2. 1600 Wall System™ 2 Curtain Wall
      a. Frame depth options: 2-1/2” x 6” or 2-1/2” x 7-1/2”, outside glazed, structural silicone glazed (SSG) format, with 1” insulating glass and 1/4” monolithic glazing.

B. Subject to compliance with requirements, provide a comparable product by the following:
   1. Manufacturer: VistaWall Architectural Products (www.oldcastlebe.com)

C. Substitutions: Refer to Substitutions Section for procedures and submission requirements.
   a. Pre-Contract (Bidding Period) Substitutions: Submit written requests ten (10) days prior to bid date.
   b. Post-Contract (Construction Period) Substitutions: Submit written request in order to avoid curtain wall installation and construction delays.
   c. Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.
   d. Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for curtain wall system performance criteria, and (2) has been engaged in the design, manufacturer and fabrication of aluminum curtain walls for a period of not less than ten (10) years.
   e. Test Reports: Submit test reports verifying compliance with each test requirement required by the project.
   f. Samples: Provide samples of typical product sections and finish samples in manufacturer’s standard sizes.
D. Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

22 MATERIALS
A. Aluminum Extrusions: Alloy and temper recommended by glazed aluminum curtain wall manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.
B. Aluminum sheet alloy: Shall meet the requirements of ASTM B209.
C. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim hardware, anchors, and other components.
D. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
E. Pressure Plate: Pressure plate shall be aluminum and fastened to the mullion with stainless steel screws.
F. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
G. Sealant: For sealants required within fabricated curtain wall system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.
H. Thermal Barrier: Thermal separator shall be extruded of a silicone compatible elastomer that provides a minimum 1/4" separation.
I. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of glazed curtain wall members are nominal and in compliance with AA Aluminum Standards and Data.

23 CURTAIN WALL FRAMING
A. Framing Members: Manufacturer's standard extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
B. Glass: 1" and 1-5/16" insulating glass option. 1/4" or 1" for Spandrel applications.
C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
D. Framing Sealants: Shall be suitable for glazed aluminum curtain wall as recommended by sealant manufacturer.
E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.
F. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
G. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
H. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle curtain wall material and components to avoid damage. Protect curtain wall material against damage from elements, construction activities, and other hazards before, during and after installation.

2.4 GLAZING
A. Glazing: Comply with Division 08 Section “Glazing”. Following glazing options are available.
   1. 1600 Wall System™2 Curtain Wall: Outside glazed, structural silicone glazed (SSG) format with 1” insulating glass.
B. Glazing Gaskets: Gaskets to meet the requirements of ASTM C864.
C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
E. Glazing Sealants: As recommended by manufacturer for joint type.

2.5 OPERABLE UNITS
A. Doors: Comply with Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
B. Windows: Comply with Division 08 Section “Aluminum Windows”.

2.6 FABRICATION
A. Form or extrude aluminum shapes before finishing.
B. Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fitted joints.
   3. Physical and thermal isolation of glazing from framing members.
   4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   5. Provisions for field replacement of glazing from exterior.
   6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
   7. Internal weeping system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
C. Curtain Wall Framing: Fabricate components for assembly using shear block system following manufacturer's standard installation instructions.
D. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.7 ALUMINUM FINISHES
A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
B. Factory Finishing: (Colors selected by Architect from standard range)

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install curtain wall systems plumb, level, and true to line, without warp or rack of frames with manufacturer’s prescribed tolerances and installation instructions. Provide support and anchor in place.

1. Dissimilar Materials: Provide separation of aluminum materials from sources of corrosion or electrolytic action contact points.

2. Glazing: Glass shall be outside glazed and held in place with extruded aluminum pressure plates anchored to the mullion using stainless steel fasteners spaced no greater than 9” on center.

3. Water Drainage: Each light of glass shall be compartmentalized using joint plugs and silicone sealant to divert water to the horizontal weep locations. Weep holes shall be located in the horizontal pressure plates and covers to divert water to the exterior of the building.

B. Related Products Installation Requirements:

1. Sealants (Perimeter): Refer to Joint Treatment (Sealants) Section.

2. Glass: Refer to Glass and Glazing Section.


3.3 FIELD QUALITY CONTROL

A. Field Tests: Architect shall select curtain wall units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer’s representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount.

1. Testing: Testing shall be performed per AAMA 503 by a qualified independent testing agency. Refer to Testing Section for payment of testing and testing requirements.

   a. Air Infiltration Tests: Conduct tests in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft², whichever is greater.

   b. Water Infiltration Tests: Conduct tests in accordance with ASTM E 1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 8 psf.

B. Manufacturer’s Field Services: Upon Owner’s written request, provide periodic site visit by manufacturer’s field service representative.

3.4 ADJUSTING, CLEANING AND PROTECTION

A. Protection: Protect installed product’s finish surfaces from damage during construction. Protect aluminum curtain wall system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

B. Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer’s instructions prior to owner’s acceptance. Remove construction debris from project site and legally dispose of debris.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION
SECTION 08 6300
METAL FRAMED SKYLIGHTS

PART 1 GENERAL

1. SUMMARY
   A. Section Includes: Custom fabricated fixed metal framed skylights.
   B. Related Sections:
      1. Division 01 - Administrative, procedural, and temporary work requirements.
      2. Section 07 5323 – EPDM Thermostat Single Ply Roofing.

2. REFERENCES
   A. American Architectural Manufacturers Association (AAMA):
      2. 501.2 - Field Check of Metal Curtain Walls for Water Leakage.
      3. 501.3 - Field Check of Water Penetration Through Installed Exterior Windows, Curtain Walls and Doors by Uniform Air Pressure Difference.
   C. ASTM International (ASTM):

E. Insulating Glass Certification Council (IGCC) - Classification of Insulating Glass Units.

3. SYSTEM DESCRIPTION

A. Complete, weather and air tight skylight assembly.

B. Performance Requirements:
   1. Structural members: Sufficient size to support design loads in accordance with Building Code.
   2. Deflection of framing members: Maximum L/175 when subject to uniform load deflection test in accordance with ASTM E330 under specified loading.
   3. Water penetration: No water penetration when system is tested in accordance with ASTM E331.
   4. Water penetration; defined as appearance of uncontrolled water other than condensation on interior surface of any part of skylight.
      a. Drain water entering at joints or glazing reveals and all condensation occurring within unit construction to exterior.
      b. Air Infiltration: Maximum 0.06 cubic feet per minute per square foot of fixed area when tested in accordance with ASTM E283.
      c. Thermal movement: Design, fabricate, and install skylight assembly to be free from objectionable distortion and stresses in fastening and joinery due to expansion and contraction when subjected to temperature variance.

4. SUBMITTALS

A. Submittals for Review:
   1. Shop Drawings: Submit plan, section, elevation, and perspective drawings as necessary to depict each specified skylight. Include flashing, connection, and termination details.
   2. Product Data: Manufacturer's data sheets on each product to be used, including:
      a. Preparation instructions and recommendations.
      b. Storage and handling requirements and recommendations.
      c. Installation methods.

B. Quality Control Submittals:
   1. Manufacturer's certification that skylight system was designed, fabricated, installed in accordance with specified requirements.

5. QUALITY ASSURANCE

A. Include design, engineering, fabrication glazing, and erection under single manufacturer.

B. Manufacturer Qualifications:
   1. Regularly engaged in work of this Section for minimum 10 years.
   2. Satisfactory completion of projects of similar scope and complexity.

6. DELIVERY, STORAGE, AND HANDLING

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

B. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.
7. WARRANTIES
   A. Provide manufacturer’s 10 year warranty against defective materials, delamination, seal failure, and defects in manufacture and workmanship in conjunction with the single ply roofing system.

2. PRODUCTS

2.1. MANUFACTURERS
   A. Basis of Design: Carlisle SynTec Systems SunWeld Skylights, PO Box 7000, Rltner Hwy, Carlisle, PA 17013.

2.2. MATERIALS
   A. Aluminum Extrusions:
      1. ASTM B221, 6063-T5, 6061-T6, or 6063-T6 alloy and temper.
   B. Insulated Units: Nominally 1-5/16 inches thick, consisting of 1/4 inch thick [heat strengthened] clear glass exterior lite, 1/2 inch air space, and 7/16 inch thick clear heat strengthened laminated interior lite with 0.060 PVB interlayer.

2.3. FABRICATION
   A. Factory fabricate and preassemble skylights in largest size assemblies consistent with shipping and handling.
   B. Shape and Size: As indicated on drawings
   C. Fabricate flashings, trim, closures, and other accessory items from minimum 0.032 inch thick aluminum.
   D. Attach cap retainers using stainless steel fasteners located so that glazing strips are compressed to provide uniform compression seal, maximum 12 inches on center.
   E. Clips for attachment of rafter bars: Aluminum or stainless steel, shop-riveted, bolted, or welded to rafter bars to attain fully rated structural loading.
   F. Welding: Heliarc process. Dress exposed welds where practical.
   G. Waterproofing not reliant on additional continuous exterior silicone sealant beads. Horizontal flush butt joints may rely on continuous silicone seal.
   H. Use silicone or neoprene setting blocks for support of glass, sized and located in accordance with glass manufacturer's recommendations. At no point shall glass contact metal.
   I. Provide properly designed weep system for drainage to exterior without excessive air infiltration.

2.4. FINISHES
   A. Aluminum: Standard color organic coating to AAMA 603.8
3. EXECUTION

3.1. PREPARATION

A. If not originally coated, coat aluminum surfaces in contact with masonry, concrete, or dissimilar materials with heavy coat of zinc chromate or bituminous paint.

3.2. INSTALLATION

A. Install skylights in accordance with manufacturer's instructions and approved Shop Drawings.
B. Install skylights plumb and true without warping or racking of panels.
C. Anchor system in accordance with approved Shop Drawings.
D. During erection, provide for thermal movement from minimum ambient air temperature range of 100 degrees F without creating undue stresses.
E. Apply sealant where indicated on Shop Drawings. Before application, clean surfaces as recommended by sealant manufacturer.
F. Allowable Tolerances:
   1. Maximum variation from plane or location shown on Shop Drawings: 1/8 inch in 12 feet or 1/2 inch in total length.
   2. Maximum offset from true alignment between two members abutting end-to-end, edge-to-edge in line, or separated by less than 3 inches: 1/32 inch.

3.3. PROTECTION

A. Protect installed products until Final Completion.

3.4. ADJUSTING

A. Touch-up, repair, or replace damaged products prior to Substantial Completion.

END OF SECTION
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. Commercial door hardware for the following:
      a. Swinging doors.
      b. Other doors to the extent indicated.
   2. Cylinders for doors specified in other Sections.

B. Related Sections include the following:
   1. Division 8 Section "Hollow Metal Doors and Frames"
   2. Division 8 Section "Flush Wood Doors" for integral intumescent seals provided as part of fire-rated labeled assemblies.
   3. Division 8 Section "Overhead Coiling Doors" for door hardware provided as part of overhead door assemblies.
   4. Division 8 Section "Glazed Aluminum Curtain Wall Systems" for entrance door hardware, including cylinders.

C. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.
   1. Cylinders for locks specified in other Sections.
   2. When an Interchangable Core system is specified, permanent cores to be installed by Owner.

1.3 SUBMITTALS

A. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Samples for Initial Selection: For each finish, color, and texture required for each type of door hardware indicated.

C. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.

D. Warranty: Special warranty specified in this Section.

E. Other Action Submittals:
1. Keying Schedule: Prepared by or under the supervision of a certified Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by lock manufacturer.

1. Installer's responsibilities include supplying and installing door hardware and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
2. Installer shall have warehousing facilities in Project's vicinity.

B. Architectural Hardware Consultant Qualifications: A person who is currently certified by DHI as an Architectural Hardware Consultant or Architectural Openings Consultant 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.

C. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer wherever possible, unless otherwise indicated.

D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according UBC Standard 7-2.

1. Test Pressure: Test at atmospheric pressure. After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches or less above the sill.

E. Keying Conference: Conduct conference to comply with requirements in Division 1 Section "Project Management and Coordination." In addition to Owner Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant and Owner's security consultant, if applicable. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2. Preliminary key system schematic diagram.
3. Requirements for key control system.
4. Address for delivery of keys.

1.5 DELIVERY, STORAGE, AND HANDLING

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

B. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system if required, for subsequent delivery to Owner.
1.6 COORDINATION

A. Coordinate layout and installation of recessed closers with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 3.

B. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Existing Openings: Where new 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 for proper operation.

1.7 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. Failures include, but are not limited to, the following:
   a. Structural failures including excessive deflection, cracking, or breakage.
   b. Faulty operation of operators and door hardware.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: For Grade 1 locks, 10 years from date of Substantial Completion.
   a. Exit Devices: Five years from date of Substantial Completion.
   b. Manual Closers: 10 years from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Maintenance Service: Beginning at Substantial Completion, provide six months’ full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door hardware operation. Provide parts and supplies same as those used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this Section and Door Schedule.
B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated on Door Schedule. Products are identified by using door hardware designations, as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Door Schedule.

C. On Door Schedule where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified. Any substitutions from the specified manufacturers must be approved in writing by the architect 10 days prior to bid date.

### 2.2 BUTT HINGES, GENERAL

A. Quantity: 3 Hinges per door, up to 7'11" in height, 4 hinges per door over 8'0"

B. Hinge Base Metal: Unless otherwise indicated, provide the following:

1. Exterior Hinges: Non-ferous material or stainless steel
2. Interior Hinges: Steel, plated
3. Hinges for Fire-Rated Assemblies: Steel, plated

C. Hinge Options: Where indicated in door hardware sets or on Drawings:

1. Button Tips

D. Fasteners: Comply with the following:

2. Wood Screws: For wood doors and frames.
3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.

### 2.3 CONTINUOUS GEAR HINGES

A. Gear Hinges: BHMA A156.1. Listed under Category A in BHMA's "Certified Product Directory."

B. Template Hinge Dimensions: BHMA A156.7.

C. Manufacturers:

1. Architectural Builders Hardware, Inc. (ABH)
2. Hager Companies (HAG).
3. McKinney Products Company; an ASSA ABLOY Group company (MCK).
2.4 LOCKS AND LATCHES, GENERAL

A. Accessibility Requirements: Where indicated to comply with accessibility requirements, comply with [the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.

B. Latches and Locks for Means of Egress Doors: Comply with NFPA 101. Latches shall not require more than 15 lbf to release the latch. Latch retraction shall occur with 40 deg or less, lever depression. Locks shall not require use of a key, tool, or special knowledge for operation.

C. Lock Trim:

1. Lever Trim – Sentinel: Forged or Cast.
   a. TownSteel Mfg.

D. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:


E. Backset: 2-3/4", unless otherwise indicated.

F. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, and as follows:

1. Strikes for Bored Locks and Latches: BHMA A156.2.
2. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
3. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.

2.5 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: All mechanical locks and latches to be ANSI certified Grade 1. Function numbers and descriptions indicated in door hardware sets comply with the following:

1. Bored Locks: BHMA A156.2.

B. Bored Locks: BHMA A156.2 Grade 1: Series 4000. Listed under Category F in BHMA's "Certified Product Directory."

C. Mortise Locks: BHMA A156.2 Grade 1 Series 1000. Listed under Category F in BHMA's "Certified Product Directory."

1. Manufacturers:
   a. TownSteel Mfg. Basis of Design
   b. Schlage Lock Co.
   c. Sargent Mfg.
2.6 EXIT DEVICES

A. Exit Devices: BHMA A156.3, Grade 1 Listed under Category G in BHMA’s “Certified Product Directory.” Where devices are called out, provide rim type for single doors and surface vertical rod type on pairs.

B. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with [the U.S. Architectural & Transportation Barriers Compliance Board’s “Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG).” ANSI A117.1FED-STD-795, “Uniform Federal Accessibility Standards.” Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.

C. Exit Devices for Means of Egress Doors: Comply with NFPA 101. Exit devices shall not require more than 15 lbf to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

D. Panic Exit Devices-Fire Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

E. Through Bolts: For exit devices and trim on non-fire-rated wood doors fire-rated wood doors.

F. Manufacturers:
   1. TownSteel Mfg (TS)  Basis of Design
   2. Precision Hardware, Inc. (PH).
   3. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company (CR).

2.7 LOCK CYLINDERS

A. Standard Lock Cylinders: BHMA A156.5 Grade 1.

B. Cylinders: Manufacturer’s standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:
   1. Number of Pins Six.
   2. Bored-Lock Type: Cylinders with tailpieces to suit locks.

C. Permanent Cores: N/A
   1. Interchangeable Cores: N/A

D. Construction Keying: Comply with the following:

E. Manufacturer: Same manufacturer as for locks and latches.
2.8 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference, and as follows:

1. Existing System: Master key or grand master key locks to Owner's existing system.

B. Keys: Nickel silver.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
   a. Notation: "DO NOT DUPLICATE".

2. Quantity: In addition to one extra key blank for each lock, provide the following:
   b. Master Keys: Five.

2.9 KEY CONTROL SYSTEM

A. Key Control Cabinet: BHMA A156.5, Grade 2; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.

1. Wall-Mounted Cabinet: Cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock. MMF Mfg.

2.10 DOOR CLOSERS

A. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." ANSI A117.1. FED-STD-795, "Uniform Federal Accessibility Standards

1. Comply with the following maximum opening-force requirements:
   a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
   b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

B. Door Closers for Means of Egress Doors: Comply with NFPA 101. Door closers shall not require more than 30 lbf (133 N) to set door in motion and not more than 15 lbf to open door to minimum required width.

C. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
D. **Surface Closers:** BHMA A156.4, Grade 1  Provide type of arm required for closer to be located on non-public side of door, unless otherwise indicated.

1. **Manufacturers:**
   a. TownSteel Mfg. (TS) Basis of Design
   b. DORMA Architectural Hardware; (DAH).
   c. LCN Closers; an Ingersoll-Rand Company (LCN).
   d. Norton Door Controls; an ASSA ABLOY Group company (NDC).

**2.11 MISCELLANEOUS DOOR HARDWARE**

A. **Auxiliary Hardware:** BHMA A156.16, Grade 1.

1. **Manufacturers:**
   a. Don-Jo Mfg., Inc. (DJO). Basis of Design
   b. Rockwood Manufacturing Company (RM).
   c. Trimco (TBM).

B. **Electric Strikes:** BHMA A156.16 Grade 1

Manufacturers:

1. Trine-Axion Basis of Design
2. Von Duprin
3. HES

**Strikes for Exit Devices:** 4800F

**Strikes for Mortise locks:** 4100

**Electric Power Transfer Manufacturers:**

1. Don-Jo
2. ABH
3. Von Duprin

C. Coordinate all electrical products with access control supplier and electrician.

D. **Automatic Handicapped Door Operator,** base of design Horton 7000 Series.

**2.12 FABRICATION**

A. **Manufacturer's Nameplate:** Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. **Base Metals:** Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and
BHMA A156.18. Do not furnish manufacturer’s standard materials or forming methods if different from specified standard.

C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.

2. Steel Machine or Wood Screws: For the following fire-rated applications:
   a. Mortise hinges to doors.
   b. Strike plates to frames.
   c. Closers to doors and frames.

3. Steel Through Bolts: For the following fire-rated applications unless door blocking is provided:
   a. Surface hinges to doors.
   b. Closers to doors and frames.
   c. Surface-mounted exit devices.

4. Spacers for Sex Bolts: For through bolting of hollow-metal doors.
5. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."

2.13 FINISHES

A. Standard: BHMA A156.18, as indicated in door hardware sets.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 **PREPARATION**

A. **Steel Doors and Frames**: Comply with DHI A115 Series.
   1. **Surface-Applied Door Hardware**: Drill and tap doors and frames according to ANSI A250.6.

B. **Wood Doors**: Comply with DHI A115-W Series.

3.3 **INSTALLATION**

A. **Mounting Heights**: Mount door hardware units at heights indicated unless otherwise indicated or required to comply with governing regulations.
   1. **Standard Steel Doors and Frames**: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
   2. **Custom Steel Doors and Frames**: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
   3. **Wood Doors**: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
   1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
   2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. **Key Control System**: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

D. **Thresholds**: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

3.4 **FIELD QUALITY CONTROL**

A. **Independent Architectural Hardware Consultant**: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
   1. Independent Architectural Hardware Consultant 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: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

B. Occupancy Adjustment: Approximately six months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware, if required by contract.

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 that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 1 Section "Demonstration and Training."

REFER TO THE FOLLOWING DOOR HARDWARE SCHEDULE:
## Kaplan Gaunt DeSantis, Architects

Addition to Two River Theater

### Hardware Set 1

1 Pair Doors 100.2  
Exterior  
From Lobby 100

(2) 3’0 x 7’0 x 1-3/4 ALD x HMF

Each Pair to Have:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Description</th>
<th>Item No.</th>
<th>Finish</th>
<th>Function</th>
<th>Mfg</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cylinder</td>
<td>626</td>
<td>TS</td>
<td>To suit locking device</td>
<td></td>
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<tr>
<td>1</td>
<td>Latch Protector</td>
<td>630</td>
<td>TS</td>
<td>To suit locking device</td>
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<tr>
<td>1</td>
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<td>626</td>
<td>HO</td>
<td>7000 Series</td>
<td></td>
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</table>

Balance of Hardware by Door Manufacturer.

Note: Panic exit device to have electrified trim. Coordinate exit device operation with ADA operator.

Card reader by security contractor.

Power supply by electrical contractor, coordinate voltage requirements with electrical contractor.

### Hardware Set 1A

1 Door 100.1  
Lobby 100  
From Corridor 108

3’0 x 7’0 x 1-3/4 WDD x HMF

Each Door to Have:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Description</th>
<th>Item No.</th>
<th>Finish</th>
<th>Function</th>
<th>Mfg</th>
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<tr>
<td>3</td>
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<td>NRP</td>
<td>DJ</td>
<td></td>
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<tr>
<td>1</td>
<td>Exit Device</td>
<td>ED1103</td>
<td>TS</td>
<td>626</td>
<td></td>
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<tr>
<td>1</td>
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<td>E309M Trim</td>
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<td></td>
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<tr>
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<td>4800F</td>
<td>DJ</td>
<td>628</td>
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<td>TS</td>
<td>689</td>
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<tr>
<td>3</td>
<td>Silencers</td>
<td>608</td>
<td>TS</td>
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</table>

Card reader by security contractor.

Power supply by electrical contractor, coordinate voltage requirements with electrical contractor.

### Hardware Set 2

1 Door 101.2  
Exterior  
From Stair 1-101

3’0 x 7’0 x 1-3/4 HMD x HMF

Each Door to Have:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Description</th>
<th>Item No.</th>
<th>Finish</th>
<th>Function</th>
<th>Mfg</th>
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<td>4BE x CSK</td>
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<tr>
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<td>130SA</td>
<td>NGP</td>
<td>628</td>
<td></td>
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<tr>
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Card reader by security contractor.

Power supply by electrical contractor, coordinate voltage requirements with electrical contractor.

# Hardware Set 2B

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Contractor to supply relay for interface for electrified exit device and ADA operator.

Card reader by security contractor.

Power supply by electrical contractor, coordinate voltage requirements with electrical contractor.
<table>
<thead>
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<th>Hardware Set 3</th>
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<tr>
<td>1 Door 201.1</td>
<td>Stair 1-101 From Corridor 208</td>
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<tr>
<td>1 Door 101.1</td>
<td>Lobby 100 To Stair 1</td>
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<td>1 Door 203.1</td>
<td>Stair 3-203 From Corridor 208</td>
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<td>1 Door 102.1</td>
<td>Stair 2 From Loading Dock 117</td>
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<td>1 Door 103.1</td>
<td>Metal Shop To Stair 3</td>
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3'0 x 7'0 x 1-3/4 WDD x HMF x 60 mins.

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<tr>
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Note:
Card reader by security contractor
Power supply by electrical contractor, coordinate voltage requirements with electrical contractor.

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<td>1 Door 302.1</td>
<td>Stair 3-302 From Corridor 308</td>
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<td>1 Door 303.2</td>
<td>Stair 3-303 From Main Rehearsal 310</td>
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3'0 x 7'0 x 1-3/4 WDD x HMF x 60 mins.

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<tr>
<td>1</td>
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<td>1</td>
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Hardware Set 4

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<td>To</td>
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<td>3' x 7' x 1-3/4 HMD x HMF x 45 mins.</td>
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Each Door to Have:

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<td>K1050</td>
<td>8 x 34</td>
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<td>130 SA</td>
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Note:
Card reader by security contractor
Power supply by electrical contractor, coordinate voltage requirements with electrical contractor.

Hardware Set 5

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<td>From</td>
<td>Jan 1003</td>
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<td>1 Pair Doors 208.2</td>
<td>Corridor 228</td>
<td>From</td>
<td>Utilities 221</td>
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<td>1 Pair Doors 216.1</td>
<td>Conference 216</td>
<td>From</td>
<td>Closet 216A</td>
<td></td>
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<tr>
<td>1 Pair Doors 216.2</td>
<td>Conference 216</td>
<td>From</td>
<td>Closet 216B</td>
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<tr>
<td>1 Pair Doors 309.1</td>
<td>Rehersal Space 309</td>
<td>From</td>
<td>Closet 309a</td>
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<tr>
<td>1 Pair Doors 308.6</td>
<td>Corridor 308</td>
<td>From</td>
<td>Utilities 320</td>
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(2) 3' x 7' x 1-3/4 WD x HMF

Each Pair to Have:

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<td>Sentinel</td>
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<td>Except Closets</td>
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<td>Flush Bolts</td>
<td>1557-12&quot;</td>
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<td></td>
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<td>575-ASA</td>
<td>Drs 100.3, 208.2, 308.6</td>
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<td>2080</td>
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<td>DJ</td>
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Hardware Set 6

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<tr>
<td>1 Door 102.2</td>
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<td>Stair 2</td>
<td></td>
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<td>3' x 7' x 1-3/4 HMD x HMF</td>
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Each Door to Have:

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<th>Function</th>
<th>Mfg</th>
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<td>Exit only</td>
<td>F</td>
<td>TS</td>
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<tr>
<td>1</td>
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<td>CLP 108</td>
<td></td>
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<td>TDC40-CUSH</td>
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<tr>
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<td>4BE x CSK</td>
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<td>130 SA</td>
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<td>NGP</td>
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<td>Night Latch</td>
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<td>689</td>
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**Each Door to Have:**

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<td>630</td>
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<td>1</td>
<td>Door Closer</td>
<td>TDC 40 CUSH</td>
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<td>130SA</td>
<td>8 x 34</td>
<td>4BE x CSK</td>
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<tr>
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<td>Rain Drip</td>
<td>17</td>
<td>628</td>
<td>NGP</td>
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<td>Saddle</td>
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### Hardware Set 7

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<td>3'0 x 7'0 x 1-3/4 HMD x HMF</td>
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<td>1 Door 105a.1 Exterior</td>
<td>From Elevator Machine Room 105a</td>
<td>3'0 x 7'0 x 1-3/4 HMD x HMF</td>
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**Each Door to Have:**

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<th>Mfg</th>
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<td>Night Latch</td>
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<td>Panic Device Trim</td>
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<td>626</td>
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<tr>
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<td>630</td>
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<td>TDC40-CUSH</td>
<td>689</td>
<td>TS</td>
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<td>NGP</td>
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<tr>
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<td>Saddle</td>
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### Hardware Set 8

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<tr>
<td>1 Door 207.1 Lobby 200 To Men 207</td>
<td>3'0 x 7'0 x 1-3/4 WD x HMF</td>
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<tr>
<td>1 Door 306.1 Lobby 300 To Women 306</td>
<td>3'0 x 7'0 x 1-3/4 WD x HMF</td>
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<td>1 Door 307.1 Lobby 300 To Men 307</td>
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**Each Door to Have:**

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<th>Finish</th>
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<td>Wall Bumper</td>
<td>1407</td>
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<td>DJ</td>
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<td>Silencers</td>
<td>608</td>
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Two River Theater
Addition and Alterations
08 7100 - 16
DOOR HARDWARE
### Hardware Set 9

<table>
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<th>Item No.</th>
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<td>1 Door 107.1 Lobby 101 To Men 107</td>
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<td>1 Door 317a.1 Office 317 To Restroom 317a</td>
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Each Door to Have:

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<td>630</td>
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### Hardware Set 10

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Each Pair to Have

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<tr>
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<td>Exit Device trim</td>
<td>ED5600-08</td>
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<td>C</td>
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<td>4BE x CSK</td>
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### Hardware Set 10 a

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Each Pair to Have

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<td>2</td>
<td>Exit Device trim</td>
<td>ED5600-08</td>
<td>626</td>
<td>C</td>
<td>TS</td>
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<td>Dust Proof Strike</td>
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<td>626</td>
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<td>630</td>
<td>DJ</td>
<td>DJ</td>
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<th>Mfg</th>
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<tbody>
<tr>
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<td>4.5 x 4.5</td>
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<td>Lockset MSS-L-07 Sentinel</td>
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<td>A</td>
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<td>TS</td>
</tr>
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<td>Door Closer TDC 40</td>
<td>689</td>
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<td>DJ</td>
<td>DJ</td>
</tr>
<tr>
<td>1</td>
<td>Kick Plate K1050 8 x 34*</td>
<td>4BE x CSK</td>
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<td>DJ</td>
<td>DJ</td>
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<tr>
<td>3</td>
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<tr>
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<tr>
<td>Office 113</td>
<td>STC 50</td>
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<td>1 Door 116.7</td>
<td>Office 113</td>
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<td>Paint Shop 116</td>
<td>STC 50</td>
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<td>1 Door 311a.1</td>
<td>Costume Repair 311</td>
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<tr>
<td>Office 311a</td>
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<tr>
<td>1 Door 116.1</td>
<td>Paint Shop 116</td>
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<td>Metal Shop 115</td>
<td>STC 50</td>
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<td>1 Door 110.1</td>
<td>Storage 110</td>
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<td>From Storage 110a</td>
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3'0 x 7'0 x 1-3/4 HMD x HMF

Each Door to Have:

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<tr>
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<th>Description</th>
<th>Item No.</th>
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<th>Function</th>
<th>Mfg.</th>
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<tbody>
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<tr>
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<td>Sentinel</td>
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</tr>
<tr>
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<td>ED5500-36</td>
<td>Dr 116.1, 110.1</td>
<td>626</td>
<td>B</td>
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<tr>
<td>1</td>
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<td>ED5500E-08</td>
<td>Dr 110.1</td>
<td>626</td>
<td>C</td>
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<td>1</td>
<td>Exit Device Trim</td>
<td>ED5500E-01</td>
<td>Dr 116.1</td>
<td>626</td>
<td>D</td>
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<tr>
<td>1</td>
<td>Door Closer</td>
<td>TDC 40</td>
<td>None Dr 311a.1</td>
<td>626</td>
<td>DJ</td>
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<tr>
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<td>30</td>
<td>8 x 34</td>
<td>4BE x CSK</td>
<td>630</td>
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<tr>
<td>1</td>
<td>Wall Bumper</td>
<td>1407</td>
<td>90° Drs</td>
<td>630</td>
<td>DJ</td>
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<td>130SA</td>
<td>STC Doors</td>
<td>NGP</td>
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<tr>
<td>1</td>
<td>Auto Dr Bottom</td>
<td>420 NA</td>
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<td>1</td>
<td>Wall Bumper</td>
<td>1407</td>
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<td>626</td>
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<tr>
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<td>60FP</td>
<td>STC Doors</td>
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<td>Silencers</td>
<td>608</td>
<td>None STC Drs</td>
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**Note:** Card reader by security contractor

**Power supply by electrical contractor, coordinate voltage requirements with electrical contractor.**

### Hardware Set 13

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<td>1 Door 103.2</td>
<td>Exterior</td>
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<td>Stair 3-103</td>
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3'0 x 7'0 x 1-3/4 HMD x HMF 60 mins

Each Door to Have:

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<tr>
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<td>4800F</td>
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<td>630</td>
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<td>1407</td>
<td>90 deg doors</td>
<td>630</td>
<td>DJ</td>
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<tr>
<td>1</td>
<td>Kick Plate</td>
<td>30</td>
<td>8 x 34</td>
<td>4BE x CSK</td>
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</tr>
<tr>
<td>3</td>
<td>Silencers</td>
<td>608</td>
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<tr>
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<td>STC Doors</td>
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<td>420 NA</td>
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<td>NGP</td>
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**Note:** Card reader by security contractor

**Power supply by electrical contractor, coordinate voltage requirements with electrical contractor.**

### Hardware Set 14

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Each Pair to Have:

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**Two River Theater**

**Addition and Alterations**

**08 7100 - 18**

**DOOR HARDWARE**
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<td>Corridor 208 To Office 209</td>
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<tr>
<td>1 Door 210.1</td>
<td>Corridor 208 To Office 210</td>
</tr>
<tr>
<td>1 Door 211.1</td>
<td>Corridor 208 To Office 211</td>
</tr>
<tr>
<td>1 Door 212.1</td>
<td>Corridor 208 To Office 212</td>
</tr>
<tr>
<td>1 Door 213.1</td>
<td>Corridor 208 To Office 213</td>
</tr>
<tr>
<td>1 Door 214.1</td>
<td>Corridor 208 To Office 214</td>
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<td>1 Door 215.1</td>
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<td>Corridor 208 To Office 217</td>
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Each Door to Have:

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<th>Function</th>
<th>Mfg.</th>
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<td>Sentinel</td>
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<td>689</td>
<td>TS</td>
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<td>K1050</td>
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<td>630</td>
<td>DJ</td>
</tr>
<tr>
<td>1</td>
<td>Wall Bumper</td>
<td>1407</td>
<td>90 deg doors</td>
<td>630</td>
<td>DJ</td>
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</tbody>
</table>

Hardware Set 16

| 1 Door 208.3 | Corridor 208 From Janitor 220 |
| 1 Door 222.1 | Lobby 200 To Utilities 222 STC 50 |
| 1 Door 228.1 | Corridor 208 To Utilities 228 |
| 1 Door 308.3 | Corridor 308 From Janitor 319 |

Each Door to Have:

<table>
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<tr>
<th>Quantity</th>
<th>Description</th>
<th>Item No.</th>
<th>Finish</th>
<th>Function</th>
<th>Mfg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Hinges</td>
<td>BB74545</td>
<td>4.5 x 4.5</td>
<td>652</td>
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</tr>
<tr>
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<td>Lockset</td>
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<td>Sentinel</td>
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<td>Sentinel</td>
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<td>Kick Plate</td>
<td>K1050</td>
<td>8 x 34</td>
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Hardware Set 17

| 1 Door 209a.1 | Office 209 To Closet 209a |
| 1 Door 210.1  | Prop Shop 219 To Closet 219b |
| 1 Door 211.2  | Office 211 From Office 212 |
| 1 Door 212.2  | Office 212 From Closet 212a |
| 1 Door 213.3  | Office 211 From Closet 211a |

Each Door to Have:

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Each Pair to Have

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<tr>
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<td>1 Pair Doors 308.3</td>
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Each Pair to Have

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## Hardware Set 28

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<td>1 Corner Pad</td>
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## Hardware Set 29

<table>
<thead>
<tr>
<th>Description</th>
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<td>1 Astragal</td>
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<td></td>
</tr>
<tr>
<td>1 Coordinator</td>
<td>2080</td>
<td>626</td>
<td>DJ</td>
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</tr>
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<td>2 Kick Plates</td>
<td>K1050</td>
<td>8 x 34</td>
<td>4BE x CSK</td>
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</tr>
<tr>
<td>2 Silencers</td>
<td>608</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Finish Codes
- **626**: TownSteel
- **630**: National Guard Products
- **652**: Don Jo
- **689**: TR
- **689**: Tine
- **689**: National Guard Products
- **689**: Non-removable pin
- **689**: Beveled 4 edges
- **689**: Counter-sunk screws
- **689**: Electric Power Transfer

### Function Codes
- **A**: Entry lock, lock with key and button, inside lever always free.
- **B**: Storeroom Lock, keyside lever always locked, inside always free.
- **C**: Classroom Lock, lock/unlock outside lever with key, inside always free.
- **D**: Passage Latch, both levers always free.
- **E**: Privacy Latch, lock with button, and emergency key, inside always free.
- **F**: Exit Only, no outside trim.

### General Notes:
- All electric strikes to be fail-safe.
SECTION 08 7113
AUTOMATIC DOOR OPERATORS

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
This section includes the following types of automatic door operators:
1. Low-energy door operators for swinging doors.

B. Related Sections:
1. Division 7 Sections for caulking to the extent not specified in this section.
2. Division 8 Section “Door Hardware” for hardware to the extent not specified in this Section.
3. Division 26 and 28 Sections for electrical connections including conduit and wiring for automatic entrance door operators and access control devices.

1.3 REFERENCES
A. References: Comply with the version year adopted by the Authority Having Jurisdiction.
3. CUL – Approved for use in Canada.
5. NFPA 80 - Fire Doors and Windows.
7. NFPA 105 - Installation of Smoke Door Assemblies.

B. American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA).

C. Underwriters Laboratories (UL).
1. UL Listed R-9469 Fire Door Operator with Automatic Closer.
2. UL10C – Positive Pressure Fire Tests of Door Assemblies.
3. UL 325 - Standard for Safety for Door, Drapery, Gate, Louver, and Window Operators and Systems.
4. UL991 Listed - Tests for Safety-Related Controls Employing Solid-State Device.
5. UL244A – Solid – State Controls for Appliances.
7. UL1310 – Class 2 Power Units.

D. Canadian Standards Association (CSA).
   1. CAN/CSA-C22.2 NO 223-M91 – Power Supplies With Extra-Low-Voltage Class 2 Outputs.

E. American Association of Automatic Door Manufacturers (AAADM).


   1. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.

H. National Association of Architectural Metal Manufacturers (NAAMM).
   1. Metal Finishes Manual for Architectural Metal Products.

I. International Code Council (ICC).
   2. CBC: California Building Code.

1.4 DEFINITIONS

A. Double Egress Doors: A pair of doors that swing with the two doors moving in opposite directions with no mullion between them.

B. Double Swing Doors: A pair of doors that swing with the two doors moving in opposite directions with a mullion between them; each door functioning as a single swing door.

C. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to activate the operation of the door.
   1. Knowing act: Consciously initiating the powered opening of a low energy door using acceptable methods including wall mounted switches such as push plates and controlled access devices such as keypads, card readers and key switches.

D. Safety Device: A device that detects the presence of an object or person within a zone where contact could occur and provides a signal to stop the movement of the door.

E. AAADM: American Association of Automatic Door Manufacturers.
1.5 PERFORMANCE REQUIREMENTS

A. General: Provide automatic door operators that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer’s corresponding standard systems.

B. Automatic door equipment accommodates medium to heavy pedestrian traffic and have the following minimum performance characteristics:
   1. Up to 700 pound weight of doors, 48 inches maximum door width per operator.

C. Operator capable of operating within temperature ranges of -31°F to 160°F.

D. Opening Force requirements: Doors shall open with a manual force, not to exceed 30lbf to set the door in motion and 15 lbf to fully open the door applied at 1” from the latch edge of the door. The force required to prevent a stopped door from opening or closing shall not exceed 15 lbf measured 1” from the latch edge of the door at any point during opening or closing.

E. Break Away Device: Swinging automatic entrances shall require no more than 50 lbf applied 1” from the latch edge of the door. When the door(s) is opened in the breakout mode, powered operated components excluding spring power shall not operate the doors.

F. Closing Time:
   1. Doors shall be field adjustable to close from 90 degrees to 10 degrees in 3 seconds or longer as applicable per ANSI/BHMA A156.19 standards.
   2. Doors shall be field adjusted to close from 10 degrees to fully closed in not less than 1.5 seconds.

1.6 SUBMITTALS

A. Comply with Division 01 - Submittal Procedures.

B. Product Data: Manufacturer’s product sheets including installation details, material descriptions, dimensions of individual components and profiles, fabrication, operational descriptions and finishes.

C. Shop Drawings: Submit manufacturer’s shop drawings, including elevations, sections and details, indicating dimensions, materials, operator, motion/presence sensor control device, anchors, hardware, finish, options and accessories.
   1. Indicate required clearances, and location and size of each field connection.
   2. Indicate locations and elevations of entrances showing activation and safety devices.
   3. Wiring Diagrams: For power, signal, and activation / safety device wiring.

D. Samples: Submit manufacturer’s samples of aluminum finish.
E. Manufacturers Field Reports: Submit manufacturer’s field reports from AAADM certified technician of inspection and approval of doors for compliance with ANSI/BHMA A156.19 after completion of installation.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door opening installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include spare parts list.

G. Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section.

1.7 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 10 years of documented experience in manufacturing of doors and equipment of similar to that indicated for this Project and that have a proven record of successful in-service performance.
   1. A manufacturer with company certificate issued by AAADM.

B. Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum 5 years documented experience installing and maintenance of units similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Certified Inspector Qualifications: Certified by AAADM.

D. Source Limitations for Automatic Operators: Obtain each type of door operator and sensor components specified in this Section from a single source, same manufacturer unless otherwise indicated.

E. Certifications: Operators shall be certified by the manufacturer to meet performance design criteria in accordance with the following standards.
   3. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.
   4. UL Listed R-9489 Fire Door Operator with Automatic Closer.

F. Emergency Exit door requirements: Comply with requirements of authorities having jurisdiction for automatic entrance doors serving as a required means of egress.
1.8 COORDINATION

A. Coordinate door operators with doors, frames and related work to ensure proper size, thickness, hand, function and finish. Coordinate hardware for automatic entrances with hardware required for rest of the project.

B. Electrical System Roughing-in: Coordinate layout and installation of power door operators with connections to power supplies and access control system as applicable.

1.9 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Automatic Door Operators shall be free of defects in material and workmanship for a period of one (1) year from the date of substantial completion.

C. During the warranty period a factory-trained technician shall perform service and affect repairs. An inspection shall be performed after each adjustment or repair.

D. During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal business hours.

E. Manufacturer shall have in place a dispatch procedure that shall be available 24 hours a Day, 7 Days a week for emergency call back service.

PART 2 - PRODUCTS

2.1 MANUFACTURER

Manufacturer:

A. ASSA ABLOY Entrance Systems, 1900 Airport Road, Monroe, NC

B. Horton Automatics

C. Dorma Door Control

2.2 AUTOMATIC SWING DOOR OPERATOR

A. Model: Besam SW200i low energy automatic door operator (Basis of Design):

1. Configuration: Operator to control single swinging doors and pairs of swinging doors as indicated on the drawings and specified below:
   a. Traffic Pattern: Two way.
   b. Pairs of Doors: Two way.
   a. Automatic operator shall be capable of operating and controlling up to a 700 pound door, 48 inches in width.
      a) Emergency Breakaway: Where inswing doors also serve as required exits, provide emergency breakaway feature to allow doors to swing in the direction of egress. Forces to comply with ANSI/BHMA A156.10. Discontinue power to automatic door operator when door is in emergency breakaway position, and to automatically reset when door is manually returned to the full closed position.
   b. Operator can be field upgraded to a full energy operator by the addition of the required safety sensors, and guard rails to comply with ANSI/BHMA A156.10 American National Standard for Power Operated Pedestrian Doors.
   c. Electrical Characteristics: Maximum power consumption is 300 watts (2.5 amps at 120 VAC), 50/60hz, built-in thermal overload protection.
   d. Battery Convenience Mode: Operator to maintain continuous operation by battery power during power failure. Battery is continuously monitored and provides a warning signal if the battery is not working properly.

3 Door Operation:
   a. Opening Cycle The adjustable speed operator mechanically powers the drive shaft and the torque control maintains constant speed throughout the opening cycle regardless of stack pressures or wind speed. Operator shall allow manual door operation with operational forces as indicated to fully open the door applied at 1” from the latch edge of the door.
      1) Manual push force shall be adjustable from 5 lbf to 15 lbf maximum.
   b. Hold Open: The operator shall stop and hold the door open at the selected door opening angle for an adjustable period of time (1.5 seconds to 30 seconds).
   c. Closing Cycle: Spring close with speed controlled power assist.
      1) Upon loss of power, dynamic braking will control the door insuring controlled closing.
      2) Selectable Torque Control: Automatically adjusts torque without changing the closing speed of the operator.
         a) When the torque control is activated, the closing speed shall remain constant regardless of stack pressures or wind speed.
         b) Torque Cancellation: The torque control is deactivated whenever there is a signal received from door mounted sensors.
         c) The torque control is disabled during manual use of the door.
   d. Wind Force Dampening: The operator electromechanically counteracts wind forces, slowing down the door movement to safely open or close the door.
   e. Stack Pressure Compensation: Operator shall counteract positive stack pressures, negative stack pressures, and sudden changes of stack pressures. The operator never allows the door to open or close faster than the speed control settings, regardless of pressures.
   f. Obstruction Control: The operator will stop and reverse the door movement.
   g. Electric Lock Management:
1) Internal module for electrified locking integration.
2) Electric Lock Output: Selectable 12 VDC, maximum 1200 mA / 24 VDC, maximum 600 mA.
3) Lock monitoring prevents operator(s) from opening door(s) until release of electrified lock.
4) Operator pulls door closed before opening, automatically unjamming electric latch hardware.
5) Sequenced operation between operators for pairs of doors allowing lock release and astragal coordination.

h. Lock Retry Circuit: If attempt to fully close the door is unsuccessful, the operator will automatically reverse open 10 degrees and reclose in an attempt to successfully close the door.
i. Selectable Alarm Reset: The operator can be field set so that after receiving an alarm signal, the operator will not accept any activation impulses and will operate only as a manual door closer until manually reset.
j. Electronic Controls: Solid state integrated circuit controls the operation and switching of the swing power operator. The electronic control provides low voltage power supply for all means of actuation. The controls include time delay (1 to 30 seconds) for normal cycle.
k. Control Switch: Automatic door operators shall be equipped with the following type of multi-position function switch:
l. (3) position rocker switch mounted on end cap (On-Auto-Hold)
   1) 3 position toggle switch remotely mounted (On-Auto-Hold).

4. Operator Interface:
a. Safety Sensor Integration for overhead presence safety device and door mounted reactivation safety sensors.

2.3 ACTIVATION AND SAFETY DEVICES

A. General: Provide activation and safety devices in accordance with ANSI/BHMA standards, for condition of exposure and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated. Coordinate activation and safety devices with door operation and door operator mechanisms.

B. Knowing Act Activation Device:
   1. Push Plate: Hard wired, 4-1/2 inch square, 6 inch round, stainless steel push plate switches engraved with "Push to Open" with a blue handicap logo.

C. Manual Operation:
   1. Operator shall allow manual door operation (without power assist) with operational forces adjustable from 5 lbf to 15 lbf maximum.

D. Safety Devices:
   1. Door Mounted Presence Sensor (DMPS): Shall be the Besam door mounted infrared presence safety device (mounted at top of each door); adjustable to provide detection field sizes and functions required by ANSI/BHMA A156.10.
a. Unit to provide detection during the travel of the door.
b. Upon detection the sensor shall provide a signal to stop or reverse the door action.
c. The door mounted safety sensor devices shall be mounted on the swing (pull) side of the door (1 safety sensor per leaf), providing detection on one side of the door only.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, wall and floor construction, and other conditions affecting performance.

B. Examine roughing-in for electrical source power to verify actual locations of wiring connections.

C. Proceed only after such discrepancies or conflicts have been resolved.

3.2 INSTALLATION

A. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints.

B. Operators: Install automatic operators plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.
   1. Install surface mounted hardware using concealed fasteners to greatest extent possible.
   2. Set headers, carrier assemblies, tracks, operating brackets and guides level and true to location with anchorage for permanent support.

C. Door Operators: Connect door operators to electrical power distribution system including smoke evacuation system and/or fire detection system.

D. Sealants: Comply with requirements specified in division 7 Section “Joint Sealants” to seal between the operator housing and the adjacent wall surface.

E. Signage: Apply signage on both sides of each door and sidelite as required by ANSI/BHMA A156.19 and manufacturers installation instructions.

3.3 FIELD QUALITY CONTROL

A. Manufacturers Field Services:
   1. Manufacturer’s representative shall provide technical assistance and guidance for installation of doors.
2. Before placing doors into operation, AAADM certified technician shall inspect and approve doors for compliance with ANSI/BHMA A156.19. Certified technician shall be approved by manufacturer.

3.4 ADJUSTING

A. Adjust door operators, controls and hardware for smooth and safe operation and for weather tight closure. Adjust doors in compliance with ANSI/BHMA A156.19.

3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by automatic operator installation.

B. Clean metal surfaces promptly after installation. Remove excess sealants, compounds, dirt and other substances. Repair damages finish to match original finish.

3.6 DEMONSTRATION

A. Engage a factory-authorized representative to train Owner's maintenance personnel to adjust, operate, and maintain safe operation of the door.

END OF SECTION
SECTION 08 8000
GLAZING

PART 2 PRODUCTS

1.01 MANUFACTURERS

A. Glass Fabricators:
   5. Substitutions:  Refer to Section 01 6000 - Product Requirements.

B. Float Glass Manufacturers:
   5. PPG Industries, Inc:  ppgideascapes.com/#sle.
   6. Substitutions:  Refer to Section 01 6000 - Product Requirements.

C. Laminated Glass Manufacturers:
   3. Substitutions:  Refer to Section 01 6000 - Product Requirements.

D. Fire-Resistance-Rated Glass Manufacturers:  Provide products as required to achieve indicated fire-rating period.
   1. SAFTIFIRST, a division of O'Keeffe's Inc; SuperLite II-XL:  www.safti.com/#sle.
   4. Substitutions:  Refer to Section 01 6000 - Product Requirements.

E. Fire-Protection-Rated Glass Manufacturers:  Provide products as required to achieve indicated fire-rating period.
   1. SAFTIFIRST, a division of O'Keeffe's Inc; SuperLite I-XL:  www.safti.com/#sle.
   2. SCHOTT North America Inc; PYRAN Platinum 20:  www.us.schott.com/#sle.
   5. Substitutions:  Refer to Section 01 6000 - Product Requirements.

1.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
   1. Design Pressure:  Calculated in accordance with ASCE 7.
   2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
   3. Seismic Loads:  Design and size glazing components to withstand seismic loads and sway displacement in accordance with the requirements of ASCE 7.
   4. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
   5. Glass thicknesses listed are minimum.

B. Vapor Retarder and Air Barrier Seals:  Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
   1. In conjunction with vapor retarder and joint sealer materials described in other sections.
2. To utilize the inner pane of multiple pane insulating glass units for the continuity of the vapor retarder and air barrier seal.
3. To maintain a continuous vapor retarder and air barrier throughout the glazed assembly from glass pane to heel bead of glazing sealant.

C. Thermal and Optical Performance: Provide glass products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.

1.03 GLASS MATERIALS
A. Float Glass: Provide float glass based glazing unless noted otherwise.
   1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.
   2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and FT.
   4. Tinted Type: ASTM C1036, Class 2 - Tinted, Quality-Q3, color and performance characteristics as indicated.
   5. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.
B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
   1. Laminated Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 test requirements for Category II.
   2. Polyvinyl Butyral (PVB) Interlayer: 0.030 inch (0.762 mm) thick, minimum.

1.04 INSULATING GLASS UNITS
A. Manufacturers:
   1. Any of the manufacturers specified for float glass.
   2. Fabricator certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.
   8. Substitutions: Refer to Section 01 6000 - Product Requirements.
B. Insulating Glass Units: Types as indicated.
   1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
   2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
   3. Metal Edge Spacers: Aluminum, bent and soldered corners.
   5. Edge Seal:
      a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
   7. Purge interpane space with dry air, hermetically sealed.
C. Type IG-1 - Insulating Glass Units: Vision glass, double glazed.
   1. Applications: Exterior glazing unless otherwise indicated.
   2. Space between lites filled with air.
3. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
   a. Tint: Clear
   b. Coating: Self-cleaning type, on #1 surface.
   c. Coating: Low-E (passive type), on #2 surface.
4. Inboard Lite: Annealed float glass, 1/4 inch thick, minimum.
   a. Tint: Clear.
5. Total Thickness: 1 5/16 inch.
6. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.25, nominal.

D. Type IG-2 - Insulating Glass Units: Safety glazing.
1. Applications:
   a. Glazed lites in exterior doors.
   b. Glazed sidelights and panels next to doors.
   c. Other locations required by applicable federal, state, and local codes and regulations.
   d. Other locations indicated on drawings.
2. Space between lites filled with air.
3. Glass Type: Same as Type C except use fully tempered float glass for both outboard and inboard lites.
4. Total Thickness: 1 5/16 inch.
5. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.25, nominal.

1.05 BASIS OF DESIGN - INSULATING GLASS UNITS
A. Basis of Design - Insulating Glass Units: Vision glazing, with Low-E coating.
1. Applications: Exterior insulating glass glazing unless otherwise indicated.
2. Space between lites filled with Argon gas.
3. Total Thickness: 1 5/16 inch.
4. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.25, nominal.
8. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum, Solarban 60 Starphire Low E.
   a. Coating: No coating on outboard lite.
   b. Glass Tint: Low E
   a. Coating: No coating on inboard lite.

END OF SECTION
SECTION 08 8300
MIRRORS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Glass mirrors.
   1. Annealed float glass.
   2. Tempered safety glass.
B. Polycarbonate mirrors.

1.02 RELATED REQUIREMENTS
A. Section 10 2800 - Toilet, Bath, and Laundry Accessories: Metal mirror frames.

1.03 REFERENCE STANDARDS
F. GANA (GM) - GANA Glazing Manual; 2009.
H. GANA (TIPS) - Mirrors: Handle with Extreme Care (Tips for the Professional on the Care and Handling of Mirrors); 2011.

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data on Mirror Types: Submit structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
C. Samples: Submit two samples, 12x12 inch in size, illustrating mirrors design, edging, and coloration.
D. Manufacturer's Certificate: Certify that mirrors, meets or exceeds specified requirements.
E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Mirror Glazing: One of each type and size.

1.05 QUALITY ASSURANCE
A. Perform Work in accordance with GANA (GM) and GANA (SM) for glazing installation methods.
   1. Maintain one copy on project site.
B. Fabricate, store, transport, receive, install, and clean mirrors in accordance with recommendations of GANA (TIPS).

1.06 FIELD CONDITIONS
A. Do not install mirrors when ambient temperature is less than 50 degrees F.
B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.07 WARRANTY
A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
B. Provide five year manufacturer warranty for reflective coating on mirrors and replacement of same.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Mirrors:
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Mirror Design Criteria: Select materials and/or provide supports as required to limit mirror material deflection to 1/200, or to the flexure limit of glass, with full recovery of glazing materials, whichever is less.

B. Mirror Glass; Clear, annealed float glass; ASTM C1036, with copper and silver coatings, and protective overcoating.
   1. Thickness: 1/4 inch.
   2. Edges: Square and lapped.
   3. Size: As noted on drawings.

2.03 GLAZING COMPOUNDS

A. Acrylic Sealant; ASTM C920, Type S, Grade NS, Class 12-1/2, Uses M and A; single component, solvent curing, non-bleeding; cured Shore A hardness of 15 to 25; clear color.

B. Polyurethane Sealant; ASTM C920, Type S, Grade NS, Class 25, Uses M and A; single component, chemical curing, non-staining, non-bleeding, Shore A Hardness Range 20 to 35

C. Silicone Sealant; ASTM C920, Type S, Grade NS, Class 25, Uses M and A; single component; chemical or solvent curing; non-bleeding, non-staining, cured Shore A hardness of 15 to 25

2.04 ACCESSORIES

A. Mirror Attachment Accessories: Stainless steel clips.

B. Mirror Adhesive: Chemically compatible with mirror coating and wall substrate.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that openings for mirrored glazing are correctly sized and within tolerance.

B. Verify that surfaces of mirror frames or recesses are clean, free of obstructions, and ready for installation of mirrors.

3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous mirror frames or recesses with substrate compatible primer or sealer. Prime surfaces scheduled to receive sealant.

C. Prepare installation in accordance with ASTM C1193 for solvent release sealants, and install sealant in accordance with manufacturer's instructions.

3.03 INSTALLATION

A. Install mirrors in accordance with GANA (TIPS) and manufacturers recommendations.

B. Set mirrors plumb and level, and free of optical distortion.

C. Set mirrors with edge clearance free of surrounding construction including countertops or backsplashes.

D. Frameless Mirrors: Set mirrors in proper place with adhesive, applied in accordance with adhesive manufacturer's instructions.
3.04 CLEANING

A. Remove wet glazing materials from finish surfaces.
B. Remove labels after work is complete.
C. Clean mirrors and adjacent surfaces.

END OF SECTION
SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

GENERAL

1.1 SECTION INCLUDES
A. Gypsum board wall panels
B. Gypsum Board soffit and ceiling panels
C. Accessories and Trim

1.2 REFERENCES
B. ASTM C475 – Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board
C. ASTM C514 – Standard Specifications for Nails for the Application of Gypsum Board
F. 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. to 0.112 in. in Thickness
G. 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
H. ASTM C1047 – Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base
I. ASTM C1396 – Standard Specification for Gypsum Board
J. ASTM C1629 – Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels
N. ASTM G21 – Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
O. California Department of Public Health CDPH/EHLB/Standard Method Version 1.1, 2010
P. CAN/ULC-S101 – Fire Endurance Tests of Building Construction and Materials
Q. CAN/ULC-S102 – Surface Burning Characteristics of Building Materials and Assemblies
R. CAN/ULC-A82-20 Series – Methods of Testing Gypsum and Gypsum Products
S. CAN/ULC-A82.27 – Gypsum Board
T. CAN/ULC-A82-31 – Gypsum Board Application
1.3 SUBMITTALS

A. Refer to Section 01 3000 Administrative/Submittal Procedures.
B. Product Data: Submit manufacturer current technical literature for each component.
C. Samples:
   1. Board: Submit sample of each panel product specified, 6 inches square.
   2. Trim: Submit sample of each type of trim specified, 12 inches long.
   3. Texture: Submit sample, 12 inches by 12 inches, of textured coated gypsum board.
D. Quality Assurance Submittals
   1. Provide products manufactured in North America only.
   2. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
   3. Manufacturer Instructions: Provide manufacturer’s written installation instructions
E. Closeout Submittals
   1. Refer to Section 01 7800 Closeout Submittals.

1.4 QUALITY ASSURANCE

A. Qualifications: Installer shall have experience with installation of gypsum board under similar conditions.
B. Deliver materials in manufacturer’s original packages, indicating manufacturer and product name.
C. Store gypsum in accordance with GA-238 and manufacturer recommendations.

1.5 PROJECT CONDITIONS

A. In accordance with ASTM C840.

PART 2 - PRODUCTS

2.1 MANUFACTURER

B. Equivalent Design: Manufacturer with products of equivalent design may include, but are not limited to:

1. National Gypsum Company
2. USG Corporation

2.2 GYPSUM BOARD WALL PANELS

A. Standard Gypsum Board Products

1. Fire Rated Gypsum Board: Gypsum core panel with a specially formulated core for use in fire-resistant Type X designs. Complying with ASTM C1396, Type X.
   a. Basis of Design: CertainTeed Type X, manufactured by CertainTeed Gypsum, Inc.
   b. Thickness: 5/8 inch
   c. Width: 48 inches
   d. Length: Use longest length available to avoid joints
   e. Edges: Tapered
   f. GREENGUARD Gold Certification

B. Moisture and Mold Resistant Products

1. Fire Rated Moisture and Mold Resistant Gypsum Board: Gypsum core panel with enhanced core formulated for resistance to moisture and mold; for use in fire-resistant Type X designs. Surfaced with moisture/ mold resistant paper on front, back, and long edges. Complying with ASTM C1396C1396M, Type X.
   a. Basis of Design: CertainTeed M2Tech® Type X Gypsum Board by CertainTeed Gypsum, Inc.
   b. Thickness: 5/8 inch
   c. Width: 48 inches
   d. Length: Use longest length available to avoid joints
   e. Edges: Tapered
   f. GREENGUARD Gold Certification
   g. Mold Resistance: Panel score of 10 (highest rating available) when tested in accordance with ASTM D3273

2. Noise-Reducing Gypsum Board (see Section 09 2117)

2.3 GYPSUM BOARD CEILING AND SOFFIT PANELS

A. Exterior Soffit Board

1. Fire Rated Exterior Soffit Board: Gypsum core soffit panel with enhanced fire and sag resistant core for use in fire resistive Type X designs. Complying with ASTM C1396C1396M, Type X.
   a. Basis of Design: CertainTeed Exterior Soffit Board Type X, manufactured by CertainTeed Gypsum, Inc.
   b. Thickness: 5/8 inch
   c. Width: 48 inches
   d. Length: 8 feet, 12 feet (Use longest length available to avoid joints)
   e. Edges: Tapered
f. GREENGUARD Gold Certification

B. Interior Ceiling Board

   b. Thickness: 5/8 inch
   c. Width: 48 inches
   d. Length: Use longest length available to avoid joints
   e. Edges: Tapered
   f. GREENGUARD Gold Certification

2. Regular Gypsum Ceiling Board: Gypsum Core panel with enhanced sag resistant core. Complying with ASTM C1396.
   a. Basis of Design: CertainTeed Interior Ceiling Board, manufactured by CertainTeed Gypsum, Inc.
   b. Thickness: 5/8 inch
   c. Width: 48 inches
   d. Length: Use longest length available to avoid joints
   e. Edges: Tapered
   f. GREENGUARD Gold Certification

2.4 INDEPENDENT ENVIRONMENTAL CERTIFICATIONS

A. VOC Content
   1. GREENGUARD Certification per UL Standard 2818

B. Recycled Content
   1. Third-party validated Type I Environmental Label per ISO 14024 Environmental Labels and Declarations - Type I Environmental labeling – Principles and Procedures

C. Environmental Product Declarations
   1. Third-party verified Type III Environmental Product Declaration per ISO 14025 – Environmental Labels and Declarations – Type III Environmental Declarations – Principles and Procedures

2.5 ACCESSORIES

A. Interior Trim: Complying with ASTM C1047.
   1. Corner Bead:  
      Basis-of-Design: Subject to compliance with requirements provide; AQUABE#AD Water-Activated Drywall Corners, manufactured by CertainTeed Gypsum, Inc.
   2. Casing Beads: L-Bead
   3. Control Joint

B. Fasteners:
   1. Screws: As recommended by panel manufacturer.
2. Adhesive: Recommended by panel manufacturer.

C. Joint Treatment

1. Tape: ASTM C475/C475M
2. Joint Compound: Comply with ASTM C475/C475

D. Texture Finishes

1. Primer
2. Wall Texture: Fine
3. Ceiling Texture: Fine

E. Sealant

1. Refer to Section 07 9005 Joint Sealants.
2. Acoustical Sealant: Nondrying, non-hardening, non-skinning, non-staining, non-bleeding, gunnable type as recommended by panel manufacturer.

F. Insulation

1. Refer to Section 09 2117 Acoustic Insulation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine gypsum board panels for damage and existence of mold. Install undamaged panels
B. Examine gypsum board in accordance with GA-231 for water damage.

3.2 INSTALLATION

A. Comply with ASTM C840.

3.3 FINISHING

A. General: Comply with ASTM C840.

1. Level 1: Plenums, service corridors; above ceilings
2. Level 2: Areas of water resistant gypsum backing board under tile; exposed areas where appearance is not critical.
3. Level 3: Areas to receive heavy or medium textured coatings; heavy-grade wallcoverings.
4. Level 4: Areas to receive flat sheen paint finish; light textured coatings; lightweight wallcoverings.
5. Level 5: Areas to receive gloss, semi-gloss sheen paints; critical lighting conditions.
3.4 PROTECTION

A. Protect installed products from damage during remainder of the construction period.

B. Remove and replace panels that are damaged.

END OF SECTION
SECTION 09 2117
GYPSUM BOARD ASSEMBLIES - ACOUSTIC

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. Acoustically enhanced composite gypsum panels.

1.3 REFERENCES
   B. ASTM C475: Standard Specification for Joint Compound and Joint Tape for Finishing
      Gypsum Board
   E. ASTM C919: Standard Practice for Use of Sealants in Acoustical Applications
   F. 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 to .112 in in Thickness.
   G. 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
   H. ASTM C1396: Standard Specification for Gypsum Board
   I. ASTM C1629: Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum
      Panel Products and Fiber-Reinforced Cement Panels
   K. ASTM D3273: Standard Test Method for Resistance to Growth of Mold on the Surface of
      Interior Coatings in an Environmental Chamber
   M. ASTM E90: Standard Test Method for Laboratory Measurement of Airborne Sound
      Transmission Loss of Building Partitions and Elements
   O. ASTM E413: Standard Classification for Rating Sound Insulation
   P. CAN/ULC-S101: Fire Endurance Tests of Building Construction and Materials
   Q. CAN/ULC-S102: Standard Method of Test for Surface Burning Characteristics of Building
      Materials and Assemblies
   R. CAN/CSA-A82.20 Series: Methods of Testing Gypsum and Gypsum Products
   S. CAN/CSA-A82.27: Gypsum Board
T. CAN/CSA-A82.31: Gypsum Board Application
V. Gypsum Association: GA-214 “Recommended Levels of Gypsum Board Finish”

1.4 SUBMITTALS
A. Submit in accordance with Section 01 3000.
B. Product Data: For each type of product indicated.
C. Informational Submittals: Submit manufacturer’s instructions, special procedures, and perimeter conditions requiring special attention.

1.5 QUALITY ASSURANCE
A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 (UL 263, CAN/ULC-S101) by a testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Fire-Resistance Ratings: Indicated by design designations from ULI/UL and/or ULC “Fire Resistance Directory” and Products Certified for Canada.
B. Single Source Responsibility: Except where specified otherwise, obtain gypsum board products, joint treatment, and accessories from single manufacturer or from manufacturers recommended by prime manufacturer of gypsum board products.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Store materials protected against damage from weather, direct sunlight, surface contamination, construction traffic, or other causes.
   1. Store CertainTeed SilentFX® QuickCut Gypsum Board in flat stacks to prevent sagging.
   2. Protect CertainTeed Joint Compounds from freezing.
   3. Protect materials to keep them dry.
   4. Protect CertainTeed SilentFX® QuickCut Gypsum Board panels to prevent damage to edges, ends, and surfaces.

PART 2 — PRODUCTS

2.1 SOUND ATTENUATING GYPSUM BOARD
A. Acceptable Manufacturers:
   1. CertainTeed Gypsum, Inc.
      a. Basis of Design: CertainTeed SilentFX® QuickCut Gypsum Board
         1. Laminated noise-reducing gypsum board consisting of two layers of dense gypsum board encased in smooth, moisture and mold resistant paper facings laminated together with a viscoelastic polymer compound. Meeting ASTM C1766 and ASTM C1396.
2. Type and Thickness: Type X, 5/8 inch thick where indicated and as otherwise required to meet fire rating for specific element (5/8 inch elsewhere).
3. Size: 48 by not less than 96 inches (longest length possible to minimize joints).
4. Surface Paper: 100% recycled moisture and mold resistant paper on face, back and long edges.
5. Mold Resistance Rating:
   a. Score of 10 (best possible) tested in accordance with ASTM D3273
6. Abuse-Resistance per ASTM C1629: Surface Abrasion – Level 2, Soft Body Impact – Level 1
7. GREENGUARD Certified.

2.2 ACOUSTICAL SEALANT
A. Acceptable Manufacturers
   1. Green Glue Company
      a. Basis of Design: Green Glue Noise-proofing Sealant

2.3 MOISTURE AND MOLD RESISTANT SETTING-TYPE JOINT COMPOUND
A. Acceptable Manufacturers
   1. CertainTeed Gypsum, Inc.
      a. Basis of Design: CertainTeed® M2Tech® 90 Moisture and Mold Resistant Setting Compound
   2. Packaging: (18 lbs. or 24.25 lbs.)
   3. Mold Resistance Rating:
      a. Score of 10 (best possible) tested in accordance with ASTM D3273
   4. GREENGUARD Gold Certification.
   5. Substitutions: Submit in accordance with Section 01 6000.

2.4 MOLD RESISTANT READY-MIXED JOINT COMPOUND
A. Acceptable Manufacturers
   1. CertainTeed Gypsum, Inc.
      a. Basis of Design: CertainTeed Mold Resistant Lite Ready-Mixed Joint Compound
   2. Packaging: 3.5 US Gal
   3. Mold Resistant Rating:
      a. Score of 10 (best possible) tested in accordance with ASTM D3273
   4. Substitutions: Submit in accordance with Section 01 6000.

2.5 MOLD RESISTANT GLASS FIBER DRYWALL TAPE
A. Acceptable Manufacturers
   1. Saint-Gobain Technical Fabrics
      a. Basis of Design: “FibaTape Mold-X10™”
   2. Dimensions: 1-7/8 inches wide by 300 feet long
3. Mold Resistance Rating:
   a. Score of 10 (highest possible) tested in accordance with ASTM D3273
4. Substitutions: Submit in accordance with Section 01 6000.

2.6 TRIMS AND ACCESSORIES
A. General: Except as otherwise specifically indicated, provide trim and accessories by manufacturer of gypsum board materials, made of galvanized steel or zinc alloy and configured for concealment in joint compound.
   1. Include corner beads, edge trim, and other units necessary for project conditions. Provide accessories as required in order to achieve details indicated, whether or not specific accessories are shown on the drawings.

2.7 MISCELLANEOUS
A. Fasteners:
   1. Screws for attaching gypsum board to light gauge steel and wood framing members:
      a. Type (S) Drywall Screws per ASTM C 1002.
         i. Length: minimum 1-1/4"
   2. Nails for attaching gypsum board to wood framing and furring:
      a. Nails per ASTM C 514.
         i. Length: minimum 1-3/8"

PART 3 — EXECUTION
3.1 NOISE-REDUCING GYPSUM BOARD INSTALLATION
A. Comply with GA-216, ASTM C 840 and manufacturer’s written instructions.
B. Install CertainTeed SilentFX QuickCut Gypsum Board per application instructions.
C. Cut boards at penetrations, edges, and other obstructions of work; fit within ¼” against abutting construction, unless otherwise indicated.
   1. Install boards with a ¼ inch gap around all wall perimeter edges.
   2. Allow no board joint gaps greater than 1/8 inch.
D. Apply acoustic sealant at perimeter of assembly and around all penetrations.
E. Install putty pads at all receptacles and switch locations.
F. Apply fasteners so screw/nail heads bear tightly against face paper; countersink slightly and avoid damaging face paper.
G. Space wall framing members a maximum of 24 inches o.c.
H. Space ceiling framing members a maximum of 24 inches o.c. for 5/8” SilentFX QuickCut installed perpendicular to framing only.
I. Vertical installation: Install gypsum board with long edges parallel with framing in contact with edges of adjacent boards without forcing. Stagger vertical board joints not less than one stud.
cavity on opposite sides of wall. Screw/nail attach boards at perimeter and within field of board to each stud.

1. Space fasteners 8 inches o.c. for nails and 12 inches o.c. for screws (or other spacing if recommended by manufacturer or to meet fire rated assembly details for specific application) and set back a minimum of 3/8 inch from edges and ends of boards.

J Horizontal Installation: Install gypsum board with long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of stud flanges, and stagger end joints of adjacent boards not less than one stud spacing. Screw/nail-attach boards at perimeter and within field of board to each stud.

1. Space fasteners 8 inches o.c. for nails and 12 inches o.c. for screws (or other spacing if recommended by manufacturer or to meet fire rated assembly details for specific application) and set back a minimum of 3/8 inch from edges and ends of boards.

3.2 MOISTURE AND MOLD RESISTANT JOINT TREATMENT

1. Apply mold resistant glass fiber joint tape to all joints and interior angles.
   a. Embed taped joints and interior angles with minimum one coat of moisture and mold resistant setting compound. Coat fastener heads with one coat of moisture and mold resistant setting compound. Apply appropriate top coats of either moisture and mold resistant setting-type compound or mold resistant ready-mixed compound.

2. Level of Finish per GA-216:
   a. Level I: All joints and interior angles set in joint compound.
   b. Level II: One coat on all joints and interior angles; fastener heads covered with one coat of joint compound.
   c. Level III: One coat on all joints and interior angles; fastener heads and accessories covered with two coats of joint compound.
   d. Level IV: All joints and interior angles have tape embedded in joint compound. Two additional coats on all joints and interior angles. Fastener heads and accessories covered with two separate coats of joint compound.
   e. Level V: Final skim coating of all surfaces; recommended where gloss paints and/or critical lighting will be experienced.

END OF SECTION
SECTION 09 2236
METAL SUSPENSION SYSTEMS

PART I - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract apply to this section. This includes General and Supplementary Conditions of Division 01 (1) Specification Sections.

1.2 SUMMARY

A. Section includes Drywall System components for gypsum and plaster board assemblies
B. Related Sections
   1. Section 09 2116 & 2117 – Gypsum Board, Framing & Accessories
   2. Section 09 5100 – 5103 – Acoustic Ceilings
   3. Division 15 – Heating, Ventilating and Air Conditioning (HVAC)
   4. Division 16 – Electrical

1.3 REFERENCES

A. ASTM A641 – Specification for Steel Sheet, Zinc-Coated (galvanized) Carbon Steel Wire
B. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (galvanized) or Zinc-Iron Alloy-Coated (galvannealed) by the Hot-Dip Process
C. ASTM A1008 – Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
D. ASTM D610 – Standard Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces
F. ASTM C636 – Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
G. ASTM C645 – Standard Specification for Nonstructural Steel Framing Members
H. ASTM C754 – Installation of Steel Framing Members to Receive Screw-Attached Gypsum Board
L. ASTM C1002 – Standard Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases
M. ASTM E119 – Fire Test of Building Construction and Materials
N. CISCA (Ceilings & Interior Systems Construction Association) – Ceilings Systems Handbook
1.4 SUBMITTALS

A. Product Data
   1. Submit manufacturer’s published technical information for each product indicated

B. Shop Drawings
   1. Submit reflected ceiling plans drawn to scale prescribed by Architect
      a. Include coordinated penetrations and ceiling-mounted items
      b. Include any necessary details or drawings from the manufacturer regarding recommended installation

C. Samples
   1. Submit 12 inch long samples of suspension system components, including main runner, cross tee, wall angle
   2. Submit representative manufacturer’s sample of each suspension member indicated

D. Certifications
   1. Provide manufacturer’s written certification that products submitted meet or exceed all specified requirements

1.5 QUALITY ASSURANCE

A. Source Limitations
   1. Drywall Suspension System
      a. Obtain all drywall framing components through one source from a single manufacturer

B. Installer Qualifications
   1. Must be experienced in the installation of systems similar to those specified herein

C. Fire Resistance Ratings
   1. When drywall ceiling is functioning as the fire protective barrier, specific performance is referenced in UL Fire Resistance Directory, tested according to ASTM E119. Installation in accordance with specific UL Design referenced.

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery of drywall suspension system will be in the original unopened packages with the manufacturer’s label intact

B. Handling and storage should be in accordance with the manufacturer’s Material Safety Data Sheets (MSDS)

C. Product cartons should be handled carefully to avoid damage

1.7 COORDINATION

A. Coordinate the installation of the drywall suspension system with any and all trades whose work is impacted by that installation
1.8 EXTRA MATERIALS

A. Provide extra materials in the manufacturer's unopened packaging, with the manufacturer's label intact, as detailed below
   1. Suspension System Components – Minimum 5% of each type installed

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. CertainTeed Ceilings
   1. Address: P.O. Box 860 Valley Forge, PA 19482
   2. Telephone: 800-233-8990
   3. Web: www.certainteed.com

2.2 SUSPENSION SYSTEM

A. Manufacturer: CertainTeed Ceilings
B. Product
   1. Name: 1-1/2" Drywall System
C. Physical Characteristics
   1. Double web design manufactured of hot-dipped galvanized steel
   2. Knurled face for ease of screw installation
   3. Cross-tees feature staked-on end tabs to facilitate tightness, ease of installation
   4. System incorporates G40 hot-dipped galvanization as standard galvanization
      a. G90 available in components for extreme or exterior environments
D. Components
   1. Main Runners
      a. DWS12-13-20
         i. Size: L:144" x H:1.6" x W:1.5"
         ii. DWS12-13-20 G90: [available G90 galvanization]
   2. Cross Tees
      a. DWS1.16-13-20
         i. Size: L:14" x H:1.6" x W:1.5"
      b. DWS2-13-20
         i. Size: L:24" x H:1.6" x W:1.5"
      c. DWS2.16-13-20
         i. Size: L:26" x H:1.6" x W:1.5"
      d. DWS2.16-13-20
         i. Size: L:36" x H:1.6" x W:1.5"
         ii. DWS3-13-20 G90: [available G90 galvanization]
      e. DWS4-13-20
         i. Size: L:48" x H:1.6" x W:1.5"
      f. DWS4.16-13-20
         i. Size: L:50" x H:1.6" x W:1.5"
      g. DWS6-13-20
         i. Size: L:72" x H:1.6" x W:1.5"
         ii. DWS6-13-20 G90: [available G90 galvanization]
   3. Wall Molding
      a. DWA1.5-1.5
         i. Size: L:144" x Leg: 1.5" x Leg2: 1.5"
         ii. DWA1.5-1.5 G90: [available G90 galvanization]
      b. DWA2-2
         i. Size: L:144" x Leg: 2" x Leg2: 2"
E. Structural Classification
   1. Main Runners classified as heavy duty, per ASTM C635
      a. Suspension system shall not deflect more than $1/360^{th}$ of the span

PART 3 – EXECUTION

3.1 EXAMINATION

A. Ascerten acceptability of substrates and building conditions under which the ceiling system is to be installed. Do not proceed with the installation until any and all unacceptable conditions have been rectified. The CertainTeed Drywall System can be installed in both interior and exterior applications.

3.2 INSTALLATION

A. Install the ceiling system in accordance with the following:
   1. Manufacturer’s printed instructions
   2. ASTM C636
   3. Ceilings & Interior Systems Construction Association (CISCA) recommendations
   4. Applicable local code requirements
   5. Approved shop drawings

END OF SECTION
SECTION 09 3000
TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications.
B. Tile for wall applications.
C. Tile for shower receptors.
D. Cementitious backer board as tile substrate.
E. Stone thresholds.
F. Ceramic accessories.
G. Ceramic trim.
H. Non-ceramic trim.

1.02 RELATED REQUIREMENTS

A. Section 07 9005 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.
B. Section 09 2116 - Gypsum Board Assemblies: Tile backer board.

1.03 REFERENCE STANDARDS

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).

O. ANSI A118.1 - American National Standard Specifications for Dry-Set Cement Mortar; 2012 (Revised).


Q. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2012 (Revised).


AH. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.


1.04 ADMINISTRATIVE REQUIREMENTS
   A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 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 in size illustrating pattern, color variations, and grout joint size variations.
   E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
   F. Master Grade Certificate: Submit for each type of tile, signed by the tile manufacturer and tile installer.
   G. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.
   H. 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: 5 percent of each size, color, and surface finish combination.

1.06 QUALITY ASSURANCE
   A. Maintain one copy of and ANSI A108/A118/A136.1 and TCNA (HB) on site.
   B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.
   C. Installer Qualifications: Company specializing in performing tile installation, with minimum of five years of documented experience.

1.07 MOCK-UP
   A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.
   B. Construct tile mock-up where indicated by Architect, incorporating all components specified for the location.
      1. Minimum size of mock-up is 4 feet wide by height of wainscot.
      2. Approved mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING
   A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.09 FIELD CONDITIONS
   A. Do not install solvent-based products in an unventilated environment.
   B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

PART 2 PRODUCTS
2.01 TILE
   A. Manufacturers: All products by the same manufacturer.
      1. Nemo Tile: nemotile.com
      2. Substitutions: See Section 01 6000 - Product Requirements.
   B. Porcelain Tile, Type 2: ANSI A137.1, standard grade.
      1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
      2. Edges: Cushioned.
4. Color(s): Selected by Architect from manufacturer's standard range.
5. Pattern: As indicated on drawings.
6. Trim Units: Matching bullnose, double bullnose, cove base, and cove shapes in sizes coordinated with field tile.

2.02 TRIM AND ACCESSORIES
A. Thresholds: Marble, white, honed finish; 4 inches wide by full width of wall or frame opening; 1/16 inch thick; beveled one long edge with radiused corners on top side; without holes, cracks, or open seams, in compliance with ICC A117.1, latest edition.
   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. Manufacturers:
   5. Merkrete, by Parex USA, Inc; www.merkrete.com/sle.
   7. Substitutions: See Section 01 6000 - Product Requirements.
B. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4 or ANSI A118.15.
   1. Applications: Use this type of bond coat where indicated and where no other type of bond coat is indicated.
   2. Products:
      e. Merkrete, by Parex USA, Inc; Merkrete 735 Premium Flex: www.merkrete.com/sle.
      g. Substitutions: See Section 01 6000 - Product Requirements.
C. Epoxy Adhesive and Mortar Bond Coat: ANSI A118.3.
   1. Applications: Where indicated on drawings.
   2. Products:
      c. LATICRETE International, Inc; LATICRETE LATAPOXY 300 Adhesive: www.laticrete.com/#sle.
      d. Merkrete, by Parex USA, Inc; Merkrete Pro Epoxy: www.merkrete.com/sle.
      e. ProSpec, an Oldcastle brand; B-7000 Epoxy Mortar and Grout: www.prospec.com.
      f. Substitutions: See Section 01 6000 - Product Requirements.
   1. Applications:
   2. Use Type I in areas subject to prolonged moisture exposure.
   3. Products:
c. Custom Building Products; ReliaBond Ceramic Tile Adhesive - Type 1: www.custombuildingproducts.com.
e. Merkrete, by Parex USA, Inc; Merkrete Merstik: www.merkrete.com/sle.
f. ProSpec, an Oldcastle brand; B-4050 Multi-Purpose Adhesive: www.prospec.com.
g. Substitutions: See Section 01 6000 - Product Requirements.

E. Water Based Adhesive: Multi-purpose type mastic.
1. Applications:
2. Products:
a. Stauf USA, LLC; M420 Spot Tack: www.staufusa.com/#sle.

1. Applications:
2. Products:
d. Merkrete, by Parex USA, Inc; Merkrete 7D10 Dust Less Thin Set: www.merkrete.com/sle.
e. ProSpec, an Oldcastle brand; Permalastic System: www.prospec.com.
f. Substitutions: See Section 01 6000 - Product Requirements.

G. Mortar Bond Coat For Exterior Glue Plywood: ANSI A118.11.
1. Applications: Where thin-set installation is indicated over plywood.
2. Products:
e. Merkrete, by Parex USA, Inc; Merkrete Merstik: www.merkrete.com/sle.
g. Substitutions: See Section 01 6000 - Product Requirements.

H. Mortar Bed Materials: Pre-packaged mix of Portland cement, sand, latex additive, and water.
1. Products:
b. Merkrete, by Parex USA, Inc; Merkrete Underlay C: www.merkrete.com/sle.
c. PROFLEX Products, Inc; MSI - Mud Set Installation: www.proflex.us.
d. Substitutions: See Section 01 6000 - Product Requirements.

2.04 GROUTS
A. Manufacturers:
5. Merkrete, by Parex USA, Inc; Merkrete Duracolor Non-Sanded Color Grout: www.merkrete.com/sle.
7. Substitutions: See Section 01 6000 - Product Requirements.
B. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified 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.
3. Color(s): As selected by Architect from manufacturer's full line.
4. Products:
   e. Merkrete, by Parex USA, Inc; Merkrete Pro Grout: www.merkrete.com/sle.
   g. Substitutions: See Section 01 6000 - Product Requirements.

C. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
   1. Applications: Where indicated.
   2. Color(s): As selected by Architect from manufacturer's full line.
   3. Products:
      e. Merkrete, by Parex USA, Inc; Merkrete Pro Epoxy: www.merkrete.com/sle.
      f. ProSpec, an Oldcastle brand; B-7000 Epoxy Mortar and Grout: www.prospec.com.
      g. Stuart Dean Company, Inc; Marcoat GS: www.stuartdean.com.
      h. Substitutions: See Section 01 6000 - Product Requirements.

D. Stain Resistant Grout Additive: Liquid admixture for sanded and unsanded cement-based grouts; mix with dry grout material in place of water.
   1. Applications: Where indicated.
   2. Products:
      a. Substitutions: See Section 01 6000 - Product Requirements.

2.05 MAINTENANCE MATERIALS

A. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.
   1. Applications: Between tile and plumbing fixtures.
   2. Color(s): As selected by Architect from manufacturer's full line.
   3. Products:
      b. Custom Building Products; Commercial 100% Silicone Caulk: www.custombuildingproducts.com.
      d. Merkrete, by Parex USA, Inc; Merkrete Colored Caulking: www.merkrete.com/sle.
      e. ProSpec, an Oldcastle brand; ProColor Advantage Caulk: www.prospec.com.
      f. Substitutions: See Section 01 6000 - Product Requirements.

B. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
   1. Composition: Water-based colorless silicone.
   2. Products:
      b. Substitutions: See Section 01 6000 - Product Requirements.

C. Tile Sealer: Stain protection for natural stone.
   1. Products:
b. STONETECH, a division of LATICRETE international, Inc; STONETECH Heavy Duty Stone Sealer: www.laticrete.com/#sle.
c. Substitutions: See Section 01 6000 - Product Requirements.

D. Grout Release: Temporary, water-soluble pre-grout coating.
1. Products:
   b. Substitutions: See Section 01 6000 - Product Requirements.

2.06 ACCESSORY MATERIALS

A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
1. Type: Fluid-applied.
2. Thickness: 20 mils, maximum.
3. Crack Resistance: No failure at 1/16 inch gap, minimum.
4. Products:
   b. Merkrete, by Parex USA, Inc; Merkrete Fracture Guard: www.merkrete.com/sle.
   c. Substitutions: See Section 01 6000 - Product Requirements.

B. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
1. Fluid or Trowel Applied Type:
2. Bonded Sheet Membrane Type:
   a. Material: PVC sheet membrane with polyester fleece laminated to both sides, 40 mils thick, nominal.
   c. Products:
      1) COMPOTITE Corporation; Composeal Gold: www.compotite.com.
      2) LATICRETE International, Inc; LATICRETE HYDRO BAN Sheet Membrane: www.laticrete.com/#sle.
      4) Substitutions: See Section 01 6000 - Product Requirements.

C. Waterproofing Membrane at Showers and Tiled Tubs: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
1. Fluid or Trowel Applied Type:
   b. Thickness: 25 mils, minimum, dry film thickness.
   c. Products:
      1) AVM Industries, Inc; System 750 (AVM Yellow) with polyester fabric reinforcing at edges, corners, joints, and cracks: www.avmindustries.com.
      2) LATICRETE International, Inc; LATICRETE HYDRO BAN: www.laticrete.com/#sle.
      3) Merkrete, by Parex USA, Inc; Merkrete Hydro Guard 2000: www.merkrete.com/sle.
      4) Substitutions: See Section 01 6000 - Product Requirements.
2. Mortar Bonded Sheet Type:
   b. Products:
      1) COMPOTITE Corporation; Composeal 40 mil Blue: www.compotite.com.
      2) Substitutions: See Section 01 6000 - Product Requirements.
3. Peel-and-Stick Sheet Type:

D. Waterproofing Membrane Under Thick Mortar Bed at Shower:
   1. Material: Chlorinated polyethylene sheet, 40 mils thick, minimum; complying with ASTM D4068.
   2. Products:
      b. Substitutions: See Section 01 6000 - Product Requirements.

E. Reinforcing Mesh: 2 by 2 inch size weave of 16/16 wire size; welded fabric, galvanized.

F. Membrane at Walls:

G. Metal Lath: ASTM C847, Flat diamond mesh, of weight to suit application, galvanized finish.

H. Underlayment at Floors: Specifically designed for bonding to thin-set setting mortar; not primarily a waterproofing material and having the following characteristics:
   2. Crack Resistance: No failure at 1/16 inch gap, minimum; comply with ANSI A118.12.
   4. Uncoupling Function: Allow for separation between membrane and the mortar adhering tile to the membrane when subjected to excessive substrate movement.
   5. Suitable for installation over green concrete.
   6. Do Not Use: Gypsum or cementitious based self-leveling underlayment.
   7. Type: Fluid or Trowel Applied.
   8. Type: Thin-Set Mortar Adhered Sheet.
      a. Products:
         3) Substitutions: See Section 01 6000 - Product Requirements.
      a. Products:
         1) Custom Building Products; Crack Buster Pro Crack Prevention Mat Underlayment: www.custombuildingproducts.com.
         2) Substitutions: See Section 01 6000 - Product Requirements.

I. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.
   1. Products:
      a. Substitutions: See Section 01 6000 - Product Requirements.

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 the following limits:
   1. Moisture Emission Rate: Not greater than 3 lb per 1000 sq ft per 24 hours, test in accordance with ASTM F1869.
   2. Alkalinity (pH): Verify pH range of 5 to 9, test in accordance with ASTM F710.
E. Verify that required floor-mounted utilities are in correct location.

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.
D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.
E. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION - GENERAL
A. Install tile, thresholds, and stair treads 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 ceramic accessories rigidly in prepared openings.
G. Install non-ceramic trim in accordance with manufacturer's instructions.
H. Install thresholds where indicated.
I. Sound tile after setting. Replace hollow sounding units.
J. Keep control and expansion joints free of mortar, grout, and adhesive.
K. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
L. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
M. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS
A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
   1. Use uncoupling membrane under all tile unless other underlayment is indicated.
   2. Where waterproofing membrane is indicated, install in accordance with TCNA (HB) Method F122, with latex-Portland cement grout.
   3. Where epoxy bond coat and grout are indicated, install in accordance with TCNA (HB) Method F131.
B. Install tile-to-tile floor movement joints in accordance with TCNA (HB) Method EJ171F.

3.05 INSTALLATION - FLOORS - MORTAR BED METHODS
A. Waterproofing Membrane: Install as recommended by manufacturer and as specified in the section in which the product is specified.
B. Mortar Bed Thickness: 5/8 inch, unless otherwise indicated.

3.06 INSTALLATION - SHOWER WALLS
A. At tiled shower receptors install in accordance with TCNA (HB) Method B415, mortar bed floor, and W244, thin-set over cementitious backer unit walls.
B. At shower walls install in accordance with TCNA (HB) Method B412, over cementitious backer units with waterproofing membrane.
C. Grout with standard grout as specified above.

3.07 INSTALLATION - WALL TILE
A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at toilet rooms.
B. Over gypsum wallboard on wood or metal studs install in accordance with TCNA (HB) Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.
   1. Where mortar bed is indicated, install in accordance with TCNA (HB) Method W222, one coat method.
   2. Where waterproofing membrane is indicated other than at showers and bathtub walls, install in accordance with TCNA (HB) Method W222, one coat method.
C. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.08 CLEANING
A. Clean tile and grout surfaces.

3.09 PROTECTION
A. Do not permit traffic over finished floor surface for 4 days after installation.

3.10 SCHEDULE
A. Breakroom, Kitchenette, and Locker Area:
   1. Tile: Quarry tile.
   2. Base: Coved base quarry tile.

END OF SECTION
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract apply to this section. This includes General and Supplementary Conditions of Division 01 (1) Specification Sections.

1.2 SUMMARY

A. Section includes acoustic panels and suspension systems for ceilings
B. Related Sections
   1. Section 09 - Gypsum Board Assemblies
   2. Division 15 – Heating, Ventilating and Air Conditioning (HVAC)
   3. Division 16 – Electrical

1.3 REFERENCES

A. ASTM A641 - Specification for Steel Sheet, Zinc-Coated (galvanized) Carbon Steel Wire
B. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (galvanized) or Zinc-Iron Alloy-Coated (galvannealed) by the Hot-Dip Process
C. ASTM C423 – Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
E. ASTM C636 – Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
F. ASTM E84 – Test Method for Surface Burning Characteristics of Building Materials
G. ASTM E119 – Fire Test of Building Construction and Materials
H. ASTM E580 – Practice for Application of Ceiling Suspension Systems for Acoustic Tile and Lay-in Panels in Areas Requiring Seismic Restraint
I. ASTM E795 – Practice for Mounting Test Specimens During Sound Absorption Tests
J. ASTM E1111 – Test Method for Measuring Interzone Attenuation of Ceiling Systems
K. ASTM E1264 – Classification for Acoustic Ceiling Products
L. ASTM E1414 – Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
M. ASTM E1477 – Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating Sphere Reflectometer
N. ISO 14024 Environmental Labels and Declarations - Type I Environmental Labeling - Principles and Procedures
O. ISO 14025 - *Environmental Labels and Declarations -- Type III Environmental Declarations -- Principles and Procedures*

P. ISO 14644 – *Classification of Air Cleanliness*

Q. CISCA (Ceilings & Interior Systems Construction Association) – *Ceilings Systems Handbook*

R. CISCA (Ceilings & Interior Systems Construction Association) – *Acoustical Ceilings – Use and Practice*

S. CISCA (Ceilings & Interior Systems Construction Association) – *Guidelines For Seismic Restraint Direct Hung Suspended Ceiling Assemblies*


### 1.4 SUBMITTALS

A. **Product Data**
   1. Submit manufacturer’s published technical information for each product indicated

B. **Shop Drawings**
   1. Submit reflected ceiling plans drawn to scale prescribed by Architect
      a. Include coordinated penetrations and ceiling-mounted items
      b. Include any necessary details or drawings from the manufacturer regarding recommended installation

C. **Samples**
   1. Submit representative manufacturer’s sample of each panel indicated
   2. Submit representative manufacturer’s sample of each suspension member indicated

D. **Certifications**
   1. Provide manufacturer’s written certification that products submitted meet or exceed all specified requirements
   2. Provide laboratory reports that certify compliance with specified tests

### 1.5 QUALITY ASSURANCE

A. **Source Limitations**
   1. Acoustic Ceiling Panel
      a. Obtain each type through one source from a single manufacturer
   2. Suspension System
      a. Obtain each type through one source from a single manufacturer

B. **Installer Qualifications**
   1. Must be experienced in the installation of systems similar to those specified herein

C. **Surface Burning Characteristics**
   1. ASTM E1264
      a. Class A
   2. ASTM E84
      a. Flame spread of 25 or less
      b. Smoke developed of 50 or less

### 1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery of acoustic ceiling products will be in the original unopened packages with the manufacturer’s label intact
B. Handling and storage should be in accordance with the manufacturer's Material Safety Data Sheets (MSDS)
C. Individual panels should be handled carefully to avoid damage

1.7 PROJECT CONDITIONS
A. Environmental Limitations
   1. Install acoustic panels only in conditions that are within the manufacturer's published limits for temperature and humidity
   2. Areas receiving ceiling panels should be free of construction debris and dust
   3. Mechanical, sprinkler and electrical trades shall have completed their work above the ceiling structure prior to commencement of the ceiling panel installation

1.8 COORDINATION
A. Coordinate the installation of the acoustic ceiling system with any and all trades whose work is impacted by that installation

1.9 EXTRA MATERIALS
A. Provide extra materials in the manufacturer's unopened packaging, with the manufacturer's label intact, as detailed below
   1. Acoustic Panels – Minimum [5%] of each type installed
   2. Suspension System Components – Minimum [5%] of each type installed

PART 2 - PRODUCTS
2.1 MANUFACTURER
A. CertainTeed Ceilings
   1. Address: P.O. Box 860 Valley Forge, PA 19482
   2. Telephone: 800-233-8990
   3. Web: www.certainteed.com/ceilings

2.2 ACOUSTIC CEILING UNITS
A. Acoustical Ceiling Panel (ACP) – [Type ACP-1]
   1. Name: Adagio
   2. Physical Characteristics
      a. Type: XX (per ASTM E1264)
      b. Form: NA (per ASTM E1264)
      c. Pattern: [G (Overtone)], [E (White Nubby)] per (ASTM E1264)
      d. Size: (2’x2’)
      e. Thickness: 1.5”
      f. Edges: Reveal for 15/16” grid
      g. Finished Surface: Laminated
         1) Mold / mildew inhibitor option: BioShield
      h. Finished Surface Color: White
      i. Core Composition: Composite: Fiberglass / Wet-felted mineral fiber
      j. Recycled Content: 30%
         1) 12% (post-consumer)
         2) 18% (pre-consumer)
   3. Performance Criteria
      a. Noise Reduction Coefficient (NRC) per ASTM C423 (E-400 mounting)
         1) 0.90
b. Articulation Class (AC) per ASTM E1111
   1) 200

c. Light Reflectance (LR) per ASTM E1477
   1) [0.90 (Overtone)], [0.84 (White Nubby)]

d. Ceiling Attenuation Class (CAC) per ASTM E1414
   1) 36 [Adagio 2x2]

e. Humidity Resistance
   1) Warranted to withstand relative humidity of up to 90% at 104°F without sagging, warping or delaminating for 10-years

f. Flame Spread Classification per ASTM E84: Class A

4. Independent Certifications [requires third-party documentation]
   a. VOC content
      1) Third-party certification of compliance (Overtone only)
         1. Per California Department of Public Health CDPH/EHLB/Standard Method Version 1.1, 2010
   b. Recycled content
      1) Third-party verified Type I Environmental Label
         1. Per ISO 14024 Environmental Labels and Declarations - Type I Environmental Labeling - Principles and Procedures

2.3 SUSPENSION SYSTEM

A. Manufacturer: CertainTeed Ceilings

B. Product
   1. Name: 15/16” Classic Stab

C. Physical Characteristics
   1. Structural Classification: Intermediate Duty, (per ASTM C635)
   2. Double web design manufactured of hot-dipped galvanized steel
   3. Flange Size:
      a. 9/16”
   4. Color: White

D. Components
   1. Main Runners
      a. Size: 12’
   2. Cross Tees
      a. Size: (2’)
   3. Edge Molding
      a. Type: (angle)
      b. Profile: As selected by the Architect

E. Attachment Devices: Anchors sufficient for five-times design load indicated in ASTM C635 (Table 1). Wire for hangers of size and type to suit intended application, complying with ASTM C641, Class 1 zinc coating, not less than 12 gauge
   1. Seismic Restraints: Pursuant to CISCA recommendations, ASTM E580 and local code requirements
      a. Suspended Ceilings Framing Systems and Seismic Perimeter Clip
PART 3 – EXECUTION

3.1 EXAMINATION

A. Ascertain acceptability of substrates and building conditions under which the ceiling system is to be installed. Do not proceed with the installation until any and all unacceptable conditions have been rectified.

3.2 PREPARATION

A. Unless otherwise directed by the reflected ceiling plan, measure the space in which the ceiling system is to be installed and establish a layout that balances border widths at opposite ends of the ceiling.

B. When possible, coordinate the ceiling system layout to avoid the use of less than half width panels at the perimeter.

3.3 INSTALLATION

A. Install the ceiling system in accordance with the following:
   1. Manufacturer’s printed instructions
   2. ASTM C636
   3. Ceilings & Interior Systems Construction Association (CISCA) recommendations
   4. Applicable local code requirements
   5. Approved shop drawings

3.4 MAINTENANCE

A. Replace any and all damaged ceiling system components

B. Clean any and all exposed surfaces in accordance with the manufacturer’s printed instructions

END OF SECTION
SECTION 09 5101
SUSPENDED ACOUSTICAL CEILINGS - ECOPHON

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract apply to this section. This includes General and Supplementary Conditions of Division 01 (1) Specification Sections.

1.2 SUMMARY

A. Section includes acoustic panels and suspension systems for ceilings

B. Related Sections
   1. Section 09 - Gypsum Board Assemblies
   2. Division 15 – Heating, Ventilating and Air Conditioning (HVAC)
   3. Division 16 – Electrical

1.3 REFERENCES

A. ASTM A641 - Specification for Steel Sheet, Zinc-Coated (galvanized) Carbon Steel Wire
B. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galv-annealed) by the Hot-Dip Process
C. ASTM C423 – Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
E. ASTM C636 – Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
F. ASTM E84 – Test Method for Surface Burning Characteristics of Building Materials
G. ASTM E119 – Fire Test of Building Construction and Materials
H. ASTM E580 – Practice for Application of Ceiling Suspension Systems for Acoustic Tile and Lay-in Panels in Areas Requiring Seismic Restraint
I. ASTM E795 – Practice for Mounting Test Specimens During Sound Absorption Tests
J. ASTM E1111 – Test Method for Measuring Interzone Attenuation of Ceiling Systems
K. ASTM E1264 – Classification for Acoustic Ceiling Products
L. ASTM E1414 – Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
M. ASTM E1477 – Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating Sphere Reflectometer
N. DIN 5036 – Radiometric and Photometric Properties of Materials
P. ISO 11654 – Sound Absorbers for Use in Buildings – Rating of Sound Absorption
Q. ISO 14644 – Classification of Air Cleanliness
R. CISCA (Ceilings & Interior Systems Construction Association) – Ceilings Systems Handbook
S. CISCA (Ceilings & Interior Systems Construction Association) – Acoustical Ceilings – Use and Practice
T. CISCA (Ceilings & Interior Systems Construction Association) – Guidelines For Seismic Restraint Direct Hung Suspended Ceiling Assemblies
U. Danish Society of Indoor Climate – Indoor Climate Label
V. Nordic Council of Ministers – Nordic Swan Eco-label
W. Swedish Asthma & Allergy Association
X. Building Information Foundation RTS – Emission Classification of Building Materials
Y. California Department of Public Health CDPH/EHLB/Standard Method Version 1.1, 2010

1.4 SUBMITTALS
A. Product Data
   1. Submit manufacturer’s published technical information for each product indicated
B. Shop Drawings
   1. Submit reflected ceiling plans drawn to scale prescribed by Architect
      a. Include coordinated penetrations and ceiling-mounted items
      b. Include any necessary details or drawings from the manufacturer regarding recommended installation
C. Samples
   1. Submit representative manufacturer’s sample of each panel indicated
   2. Submit representative manufacturer’s sample of each suspension member indicated
D. Certifications
   1. Provide manufacturer’s written certification that products submitted meet or exceed all specified requirements
   2. Provide laboratory reports that certify compliance with specified tests

1.5 QUALITY ASSURANCE
A. Source Limitations
   1. Acoustic Ceiling Panel
      a. Obtain each type through one source from a single manufacturer
   2. Suspension System
      a. Obtain each type through one source from a single manufacturer
B. Installer Qualifications
   1. Must be experienced in the installation of systems similar to those specified herein
C. Surface Burning Characteristics
   1. ASTM E1264
      a. Class A
   2. ASTM E84
      a. Flame spread of 25 or less
      b. Smoke developed of 50 or less
1.6 DELIVERY, STORAGE AND HANDLING
   A. Delivery of acoustic ceiling products will be in the original unopened packages with the
      manufacturer’s label intact
   B. Handling and storage should be in accordance with the manufacturer’s Material Safety Data
      Sheets (MSDS)
   C. Individual panels should be handled carefully to avoid damage

1.7 PROJECT CONDITIONS
   A. Environmental Limitations
      1. Install acoustic panels only in conditions that are within the manufacturer’s published limits for
         temperature and humidity
      2. Areas receiving ceiling panels should be free of construction debris and dust
      3. Mechanical, sprinkler and electrical trades shall have completed their work above the ceiling
         structure prior to commencement of the ceiling panel installation

1.8 COORDINATION
   A. Coordinate the installation of the acoustic ceiling system with any and all trades whose work is
      impacted by that installation

1.9 EXTRA MATERIALS
   A. Provide extra materials in the manufacturer’s unopened packaging, with the manufacturer’s label
      intact, as detailed below
      1. Acoustic Panels – Minimum 5% of each type installed
      2. Suspension System Components – Minimum 5% of each type installed

PART 2 - PRODUCTS

2.1 MANUFACTURER
   A. CertainTeed Ceilings
      1. Address: P.O. Box 860 Valley Forge, PA 19482
      2. Telephone: 800-233-8990
      3. Web: www.certainteen.com/ceilings

2.2 ACOUSTIC CEILING UNITS
   A. Acoustical Ceiling Panel (ACP) – [Type ACP-1]
      1. Name: Ecophon Focus F
      2. Physical Characteristics
         a. Type: XII (per ASTM E1264)
         b. Form: 2 (per ASTM E1264)
         c. Pattern: E (per ASTM E1264)
         d. Size: metric only
            1) 23.4” x 23.4”
         e. Thickness: 3/4”
         f. Edges: reinforced, painted and beveled
            1) Tongue and groove (2 supporting edges)
            2) Kerfed (2 non-supporting edges)
         g. Finished Surface: Akutex FT
         h. Finished Surface Color: White 500
1) Ecophon Color options: Color as selected by Architect from standard range
   i. Panel Backing: Single layer of smooth, resin-bonded glass tissue
   j. Core composition: glasswool
   k. Recycled Content: 71%
      1) 1% (pre-consumer)
      2) 70% (post-consumer)
3. Performance Criteria
   a. Sound Absorption Rating per ISO 11654 (E-20 mounting)
      1) Class C absorber
   b. Noise Reduction Coefficient (NRC) per ASTM C423
      1) 0.80 (E-20 mounting)
   c. Light Diffusion per DIN 5036
      1) 99%
   d. Light Reflectance (LR) per ASTM E1477
      1) Minimum 0.85
   e. Humidity Resistance per ISO 4611
      1) Warranted to withstand relative humidity of up to 95% at 104°F without sagging, warping or delaminating for 10-years
   f. Clean Room Classification
      1) Class 5 per ISO 14644-1
   g. Flame Spread Classification per ASTM E84
      1) Class A
4. Independent Certifications and Recommendations
   a. VOC content
      1) Third-party certification of compliance
         1. Per California Department of Public Health CDPH/EHLB/Standard Method Version 1.1, 2010
   b. Indoor Climate Label (highest class for ceiling panels)
      1) Danish Society of Indoor Climate
   c. Nordic Swan Eco-label
      1) Nordic Council of Ministers
   d. Recommended by Swedish Asthma and Allergy Association
   e. M1 emission classification
      1) Building Information Foundation RTS – Emission Classification of Building Materials

2.3 SUSPENSION SYSTEM

A. Components

1. Acoustic ceiling tile adhesive (see drawings)
2. Accessories
   a. Screws for panel attachment
      i. Connect installation screws (F 4033)
   b. Leveling splines
      i. Connect spline (#0209)
   c. Connect wall spring spacer (#0087)
3. Edge Molding
   a. Type: (angle and channel)
   b. Profile: As selected by the Architect

PART 3 – EXECUTION

3.1 EXAMINATION
A. Ascertain acceptability of substrates and building conditions under which the ceiling system is to be installed. Do not proceed with the installation until any and all unacceptable conditions have been rectified.

3.2 PREPARATION

A. Unless otherwise directed by the reflected ceiling plan, measure the space in which the ceiling system is to be installed and establish a layout that balances border widths at opposite ends of the ceiling.
B. When possible, coordinate the ceiling system layout to avoid the use of less than half width panels at the perimeter.

3.3 INSTALLATION

A. Install the ceiling system in accordance with the following:
   1. Manufacturer’s printed instructions
   2. Ceilings & Interior Systems Construction Association (CISCA) recommendations
   3. Applicable local code requirements
   4. Approved shop drawings

3.4 MAINTENANCE

A. Replace any and all damaged ceiling system components
B. Clean any and all exposed surfaces in accordance with the manufacturer’s printed instructions

END OF SECTION
SECTION 09 5102
SUSPENDED ACOUSTICAL CEILINGS – SYMPHONY F

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract apply to this section. This includes General and Supplementary Conditions of Division 01 (1) Specification Sections.

1.2 SUMMARY

A. Section includes acoustic panels and suspension systems for ceilings
B. Related Sections
   1. Section 09 - Gypsum Board Assemblies
   2. Division 23 (15) – Heating, Ventilating and Air Conditioning (HVAC)
   3. Division 26 (16) – Electrical

1.3 REFERENCES

A. ASTM A641 - Specification for Steel Sheet, Zinc-Coated (galvanized) Carbon Steel Wire
B. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galv-annealed) by the Hot-Dip Process
C. ASTM C423 – Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
E. ASTM C636 – Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
F. ASTM E84 – Test Method for Surface Burning Characteristics of Building Materials
G. ASTM E119 – Fire Test of Building Construction and Materials
H. ASTM E580 – Practice for Application of Ceiling Suspension Systems for Acoustic Tile and Lay-in Panels in Areas Requiring Seismic Restraint
I. ASTM E795 – Practice for Mounting Test Specimens During Sound Absorption Tests
J. ASTM E1111 – Test Method for Measuring Interzone Attenuation of Ceiling Systems
K. ASTM E1264 – Classification for Acoustic Ceiling Products
L. ASTM E1414 – Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
M. ASTM E1477 – Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating Sphere Reflectometer
N. ISO 14024 Environmental Labels and Declarations - Type I Environmental Labeling - Principles and Procedures
O. ISO 14025 - Environmental Labels and Declarations -- Type III Environmental Declarations -- Principles and Procedures
P. CISCA (Ceilings & Interior Systems Construction Association) – Ceilings Systems Handbook
Q. CISCA (Ceilings & Interior Systems Construction Association) – Acoustical Ceilings – Use and Practice
R. CISCA (Ceilings & Interior Systems Construction Association) – Guidelines For Seismic Restraint Direct Hung Suspended Ceiling Assemblies
S. California Department of Public Health CDPH/EHLB/Standard Method Version 1.1, 2010
   (Emission testing method for CA Specification 01350)
T. Health Product Declaration Standard v1.0 – hpdcollaborative.org
U. Canadian Food Inspection Agency – Accepted Construction Product for use in food establishments operating under the authority of the CFIA.
1.4 SUBMITTALS

A. Product Data
   1. Submit manufacturer’s published technical information for each product indicated

B. Shop Drawings
   1. Submit reflected ceiling plans drawn to scale prescribed by Architect
      a. Include coordinated penetrations and ceiling-mounted items
      b. Include any necessary details or drawings from the manufacturer regarding recommended installation

C. Samples
   1. Submit 6” x 6” manufacturer’s sample of each panel indicated
   2. Submit representative manufacturer’s sample of each suspension member indicated

D. Certifications
   1. Provide manufacturer’s written certification that products submitted meet or exceed all specified requirements

1.5 QUALITY ASSURANCE

A. Source Limitations
   1. Acoustic Ceiling Panel and Suspension System
      a. Obtain each type through one source from a single manufacturer

B. Installer Qualifications
   1. Must be experienced in the installation of systems similar to those specified herein

C. Surface Burning Characteristics
   1. ASTM E1264
      a. Class A
   2. ASTM E84
      a. Flame spread: 20
      b. Smoke developed: 10

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery of acoustic ceiling products will be in the original unopened packages with the manufacturer’s label intact

B. Handling and storage should be in accordance with the manufacturer’s Material Safety Data Sheets (MSDS)

C. Individual panels should be handled carefully to avoid damage

1.7 PROJECT CONDITIONS

A. Environmental Limitations
   1. Install acoustic panels only in conditions that are within the manufacturer’s published limits for temperature and humidity

1.8 COORDINATION

A. Coordinate the installation of the acoustic ceiling system with any and all trades whose work is impacted by that installation

1.9 EXTRA MATERIALS

A. Provide extra materials in the manufacturer’s unopened packaging, with the manufacturer’s label intact, as detailed below
   1. Acoustic Panels – Minimum 5% of each type installed
   2. Suspension System Components – Minimum 5% of each type installed
PART 2 - PRODUCTS

2.1 MANUFACTURER

A. CertainTeed Ceilings
   1. Address: P.O. Box 860 Valley Forge, PA 19482
   2. Telephone: 800-233-8990
   3. Web: www.certainteed.com

2.2 ACOUSTIC CEILING UNITS

A. Acoustical Ceiling Panel (ACP) – [Type ACP-1]
   1. Name: Rx Symphony F
   2. Physical Characteristics
      a. Type: XII (per ASTM E1264)
      b. Form: 2 (per ASTM E1264)
      c. Pattern: E (per ASTM E1264)
      d. Size:
         1) 2'x2', 2'x4'
      e. Thickness: 1”
      f. Edges: [Square, Reveal for 15/16” grid, Narrow Reveal for 9/16” grid]
      g. Finished Surface: Laminated (painted fiberglass mat)
         1) Overtone (RXS)
      h. Finished Surface Color: White
      i. Optional Panel Backing: Foil
      j. Core Composition: Fiberglass
      k. Recycled Content: 28-30%
         1) Reveal edge, narrow reveal edge
            1. Post-consumer: 30%
            2. Pre-consumer: 0%
         2) Square edge
            1. Post-consumer: 28%
            2. Pre-consumer: 0%
   3. Performance Criteria
      a. Noise Reduction Coefficient (NRC) per ASTM C423 (E-400 mounting)
         1) 0.95
      b. Articulation Class (AC) per ASTM E1111
         1) 200
      c. Light Reflectance (LR) per ASTM E1477
         1) 0.90
      d. Ceiling Attenuation Class (CAC) per ASTM C1414
         1) 24 [optional foil backing]
      e. Surface wash-ability per ASTM D 4828
         1) Tested to 2000 cycles with no sign of surface wear
      f. Humidity Resistance
         1) Warranted to withstand relative humidity of up to 95% at 104°F without sagging, warping or delaminating for 10-years
   4. Independent Certifications [requires third-party documentation]
      a. VOC content
         1) Third-party certification of compliance
            1. Per California Department of Public Health CDPH/EHLB/Standard Method Version 1.1, 2010
      b. Recycled content
         1) Third-party verified Type I Environmental Label
            1. Per ISO 14024 Environmental Labels and Declarations - Type I Environmental Labeling - Principles and Procedures
c. Environmental Product Declaration
   1) Third-party verified Type III Environmental Product Declaration
      1. Per ISO 14025 - Environmental Labels and Declarations - Type III
         Environmental Declarations -- Principles and Procedures

d. Health Product Declaration
   1) Per Health Product Declaration Standard v1.0
      1. hpdcollaborative.org

e. Canadian Food Inspection Agency
   1) Accepted Construction Product for use in food establishments operating under
      the authority of the CFIA

2.3 SUSPENSION SYSTEM

A. Manufacturer: CertainTeed Ceilings

B. Product
   1. Name: [15/16" Classic Stab, 15/16" Classic Aluminum Capped Stab, 15/16" Classic Hook,
      15/16" Classic Aluminum Capped Hook, 15/16" Classic Environmental Stab, 9/16" Elite
      Narrow Stab, 9/16" Smoothline Bolt Slot]

C. Physical Characteristics
   1. Structural Classification: [Intermediate Duty, Heavy Duty] (per ASTM C635)
   2. Double web design manufactured of hot-dipped galvanized steel
   3. Flange Size:
      a. 15/16"
      b. 9/16"
   4. Color: White

D. Components
   1. Main Runners
      a. Size: 12’
   2. Cross Tees
      a. Size: [8’, 5’, 4’, 2’, 1’]
   3. Edge Molding
      a. Type: [angle, shadow-line]
      b. Profile: As selected by the Architect

E. Attachment Devices: Anchors sufficient for five-times design load indicated in ASTM C635 (Table 1). Wire for hangers of size and type to suit intended application, complying with ASTM C641, Class 1 zinc coating, not less than 12 gauge
   1. Seismic Restraints: Pursuant to CISCA recommendations, ASTM E580 and local code requirements
      a. Suspended Ceilings Framing Systems and Seismic Perimeter Clip
   3. City of Los Angeles Research Report (RR 25978)
      a. Suspended Ceilings Framing Systems and Seismic Perimeter Clip

PART 3 – EXECUTION

3.1 EXAMINATION

A. Ascertain acceptability of substrates and building conditions under which the ceiling system is to be installed. Do not proceed with the installation until any and all unacceptable conditions have been rectified.

3.2 PREPARATION

A. Unless otherwise directed by the reflected ceiling plan, measure the space in which the ceiling system is to be installed and establish a layout that balances border widths at opposite ends of the ceiling.

B. When possible, coordinate the ceiling system layout to avoid the use of less than half width panels at the perimeter.
3.3 INSTALLATION

A. Install the ceiling system in accordance with the following:
   1. Manufacturer’s printed instructions
   2. ASTM C636
   3. Ceilings & Interior Systems Construction Association (CISCA) recommendations
   4. Applicable local code requirements
   5. Approved shop drawings

3.4 MAINTENANCE

A. Replace any and all damaged ceiling system components
B. Clean any and all exposed surfaces in accordance with the manufacturer’s printed instructions

END OF SECTION
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract apply to this section. This includes General and Supplementary Conditions of Division 01 (1) Specification Sections.

1.2 SUMMARY

A. Section includes acoustic panels and suspension systems for ceilings

B. Related Sections
   1. Section 09 - Gypsum Board Assemblies
   2. Division 15 – Heating, Ventilating and Air Conditioning (HVAC)
   3. Division 16 – Electrical

1.3 REFERENCES

A. ASTM A641 - Specification for Steel Sheet, Zinc-Coated (galvanized) Carbon Steel Wire
B. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galv-annealed) by the Hot-Dip Process
C. ASTM C423 – Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
E. ASTM C636 – Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
F. ASTM E84 – Test Method for Surface Burning Characteristics of Building Materials
G. ASTM E119 – Fire Test of Building Construction and Materials
H. ASTM E580 – Practice for Application of Ceiling Suspension Systems for Acoustic Tile and Lay-in Panels in Areas Requiring Seismic Restraint
I. ASTM E795 – Practice for Mounting Test Specimens During Sound Absorption Tests
J. ASTM E1111 – Test Method for Measuring Interzone Attenuation of Ceiling Systems
K. ASTM E1264 – Classification for Acoustic Ceiling Products
L. ASTM E1414 – Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
M. ASTM E1477 – Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating Sphere Reflectometer
N. ISO 14024 Environmental Labels and Declarations - Type I Environmental Labeling - Principles and Procedures
O. ISO 14025 - Environmental Labels and Declarations -- Type III Environmental Declarations -- Principles and Procedures
P. ISO 14644 – Classification of Air Cleanliness
Q. CISCA (Ceilings & Interior Systems Construction Association) – Ceilings Systems Handbook
R. CISCA (Ceilings & Interior Systems Construction Association) – *Acoustical Ceilings – Use and Practice*

S. CISCA (Ceilings & Interior Systems Construction Association) – *Guidelines For Seismic Restraint Direct Hung Suspended Ceiling Assemblies*

T. California Department of Public Health CDPH/EHLB/Standard Method Version 1.1, 2010

U. Health Product Declaration Standard v2.0 – hpdcollaborative.org

1.4 SUBMITTALS

A. Product Data
   1. Submit manufacturer’s published technical information for each product indicated

B. Shop Drawings
   1. Submit reflected ceiling plans drawn to scale prescribed by Architect
      a. Include coordinated penetrations and ceiling-mounted items
      b. Include any necessary details or drawings from the manufacturer regarding recommended installation

C. Samples
   1. Submit representative manufacturer’s sample of each panel indicated
   2. Submit representative manufacturer’s sample of each suspension member indicated

D. Certifications
   1. Provide manufacturer’s written certification that products submitted meet or exceed all specified requirements
   2. Provide laboratory reports that certify compliance with specified tests
   3. Provide third party verified life cycle information with published environmental product declaration (EPD)
      a. Per ISO 14025 *Environmental Labels and Declarations - Type III Environmental Declarations - Principles and Procedures*

1.5 QUALITY ASSURANCE

A. Source Limitations
   1. Acoustic Ceiling Panel
      a. Obtain each type through one source from a single manufacturer
   2. Suspension System
      a. Obtain each type through one source from a single manufacturer

B. Installer Qualifications
   1. Must be experienced in the installation of systems similar to those specified herein

C. Surface Burning Characteristics
   1. ASTM E1264
      a. Class A
   2. ASTM E84
      a. Flame spread of 25 or less
      b. Smoke developed of 50 or less

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery of acoustic ceiling products will be in the original unopened packages with the manufacturer’s label intact
B. Handling and storage should be in accordance with the manufacturer’s Safety Data Sheets (SDS)
C. Individual panels should be handled carefully to avoid damage

1.7 PROJECT CONDITIONS
A. Environmental Limitations
   1. Install acoustic panels only in conditions that are within the manufacturer’s published limits for temperature and humidity
   2. Areas receiving ceiling panels should be free of construction debris and dust
   3. Mechanical, sprinkler and electrical trades shall have completed their work above the ceiling structure prior to commencement of the ceiling panel installation

1.8 COORDINATION
A. Coordinate the installation of the acoustic ceiling system with any and all trades whose work is impacted by that installation

1.9 EXTRA MATERIALS
A. Provide extra materials in the manufacturer’s unopened packaging, with the manufacturer’s label intact, as detailed below
   1. Acoustic Panels – Minimum [5%] of each type installed
   2. Suspension System Components – Minimum [5%] of each type installed

PART 2 - PRODUCTS

2.1 MANUFACTURER
A. CertainTeed Ceilings
   1. Address: 20 Moores Road, Malvern, PA 19355
   2. Telephone: 800-233-8990
   3. Web: www.certainteed.com

2.2 ACOUSTIC CEILING UNITS
A. Acoustical Ceiling Panel (ACP) – [Type ACP-1]
   1. Name: Symphony m 75
   2. Physical Characteristics
      a. Type: IV (per ASTM E1264)
      b. Form: 2 (per ASTM E1264)
      c. Pattern: E (per ASTM E1264)
      d. Size: 2’x2’
      e. Thickness: 3/4”
      f. Edges: [Square, Reveal Beveled for 15/16” grid, Narrow Reveal Corner Beveled for 9/16” grid]
      g. Finished Surface: Laminated [painted fiberglass mat]
         1) Improved Overtone Finish (IOF)
      h. Mold/Mildew inhibitor: Anti-microbial and anti-fungal agent added to product to inhibit growth of mold & mildew
      i. Finished Surface Color: White
j. Core Composition: Wet-felted mineral fiber
k. Recycled Content: 54%
   1) 54% (pre-consumer)
   2) 0% (post-consumer)

3. Performance Criteria
   a. Noise Reduction Coefficient (NRC) per ASTM C423 (E-400 mounting)
      1) 0.75
   b. Light Reflectance (LR) per ASTM E1477
      1) 0.90
   c. Ceiling Attenuation Class (CAC) per ASTM E1414
      1) 36 (2’x2’)
   d. Surface Washability per ASTM D 4828
      1) Tested to 1000 cycles
         1. Tested with chemical sanitizers in their manufacturer’s recommended dilution
            (contact CertainTeed for details)
   e. Humidity Resistance
      1) Warranted to withstand relative humidity of up to 90% at 104°F without sagging,
         warping or delaminating for 10-years
   f. Flame Spread Classification per ASTM E84: Class A

4. Independent Environmental Certifications
   a. VOC content
      1) Third-party certification of compliance
         1. Per California Department of Public Health CDPH/EHLB/Standard Method
            Version 1.1, 2010
   b. Environmental Product Declaration
      1) Third-party verified Type III Environmental Product Declaration
         1. Per ISO 14025 - Environmental Labels and Declarations - Type III
            Environmental Declarations -- Principles and Procedures
   c. Health Product Declaration
      1) Per Health Product Declaration Standard v2.0
         1. hpd-collaborative.org

2.3 SUSPENSION SYSTEM

A. Manufacturer: CertainTeed Ceilings

B. Product
   1. As selected by Architect from standard range.

C. Physical Characteristics
   1. Structural Classification: [Intermediate Duty, Heavy Duty] (per ASTM C635)
   2. Double web design manufactured of hot-dipped galvanized steel
   3. Flange Size:
      a. 9/16”
   4. Color: White

D. Components
   1. Main Runners
      a. Size: 12’
   2. Cross Tees
      a. Size: 2’
   3. Edge Molding
      a. Type: (angle)
      b. Profile: As selected by the Architect
E. Attachment Devices: Anchors sufficient for five-times design load indicated in ASTM C635 (Table 1). Wire for hangers of size and type to suit intended application, complying with ASTM C641, Class 1 zinc coating, not less than 12 gauge
   1. Seismic Restraints: Pursuant to CISCA recommendations, ASTM E580 and local code requirements
      a. Suspended Ceilings Framing Systems and Seismic Perimeter Clip
   3. City of Los Angeles Research Report (RR 25978)
      a. Suspended Ceilings Framing Systems and Seismic Perimeter Clip

**PART 3 – EXECUTION**

3.1 EXAMINATION

A. Ascertain acceptability of substrates and building conditions under which the ceiling system is to be installed. Do not proceed with the installation until any and all unacceptable conditions have been rectified.

3.2 PREPARATION

A. Unless otherwise directed by the reflected ceiling plan, measure the space in which the ceiling system is to be installed and establish a layout that balances border widths at opposite ends of the ceiling.
B. When possible, coordinate the ceiling system layout to avoid the use of less than half width panels at the perimeter.

3.3 INSTALLATION

A. Install the ceiling system in accordance with the following:
   1. Manufacturer’s printed instructions
   2. ASTM C636
   3. Ceilings & Interior Systems Construction Association (CISCA) recommendations
   4. Applicable local code requirements
   5. Approved shop drawings

3.4 MAINTENANCE

A. Replace any and all damaged ceiling system components
B. Clean any and all exposed surfaces in accordance with the manufacturer’s printed instructions

**END OF SECTION**
SECTION 09 5200
ISOGRID SOUND ISOLATION CLIP

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnish all labor, materials, tools, and equipment to install sound isolated ceilings. Construct ceiling composite using the quick connect ceiling hanger where shown on contract drawings.

1.02 SYSTEM DESCRIPTION

A. Gypsum board shall be attached to the resiliently supported ceiling grid to isolate the material from the wall or ceiling structure thereby reducing sound and impact transmission through the ceiling.

1.03 QUALITY ASSURANCE

A. The quick connect ceiling hanger shall be designed and fabricated at the facilities of a manufacturer having a minimum of five years’ experience in furnishing similar sound control products.

1.04 SUBMITTALS

A. Submit product data
   1. Catalog cut sheet.
   2. Sound Transmission Loss Test Report per ASTM E90 documenting a minimum STC 63 floor/ceiling assembly for a 6 in. concrete slab with 2 layers of gypsum board suspended 6 in. below the bottom of the concrete slab and fiber glass batts in the cavity.
   3. Impact Insulation Test Report per ASTM E413 documenting a minimum IIC 50 floor/ceiling assembly for a bare 6 in. concrete slab with 2 layers of gypsum board suspended 6 in. below the bottom of the concrete slab and fiber glass batts in the cavity.
   3. Test reports must be from an independent laboratory accredited by the National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) or from the Institute for Research in Construction (IRC) of the National Research Council of Canada (NRC-C)

PART 2 PRODUCT

2.01 MATERIALS

A. Sound isolation clips specified shall be designed and manufactured by Kinetics Noise Control, Dublin, Ohio. Product shall be Model IsoGrid Quick Connect Ceiling Hanger.

B. Vertical Load capacity. Ceiling hangers shall have sufficient capacity to support ceiling weights as constructed. In a vertical load test comparable to a ceiling installation, the ceiling hanger shall have a minimum design load capacity of 160 lbs. Design Load capacity shall be based on...
a minimum safety factor of 5 as compared to load to failure. Anchors for attachment of the clips to the substructure shall be selected to support ceiling weights at each hanger.

C. The isolation clips shall consist of a dual deflection rubber element which supports the hanger bracket on the hanger sleeve insert.

D. The isolation clip is attached to the floor/ceiling framing or other structural deck substrate through the hanger sleeve insert running through the rubber element. The bracket and insert shall be of sufficient strength to carry the ceiling weight without bending or failure.

PART 3 EXECUTION

3.01 INSTALLATION

A. General – Install work in accordance with the manufacturer's approved product installation procedures.

END OF SECTION
PART 1 – GENERAL

1.1 SUMMARY

A. Section includes:
   1. Fire Rated Glass Floor assemblies.
   2. Section includes all work required to complete, as indicated by the Contract Documents, and furnish all glass and supplementary items necessary for the proper installation of the Structural Glass Enclosure and the Revolving Doors.

B. Related Sections include the following:
   1. Section 05 1200 - Structural Steel Framing: Steel attachment members.
   2. Section 07 8400 - Firestopping: Firestop at system junction with structure.
   3. Section 07 9005 - Joint Sealers: Perimeter sealant and back-up materials.
   4. Section 08 8000 – Glazing: including fire rated glazing.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA)
   1. AAMA 800 - Voluntary Specifications and Test Methods for Sealants

B. American Society for Testing and Materials (ASTM):
   3. ASTM C509 - Specification for Cellular Elastomeric Preformed Gasket and Sealing Material
   4. ASTM C716 - Specification for Installing Lock-Strip Gaskets and Infill Glazing Materials
   5. ASTM C719 - Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)
   7. ASTM C864 - Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
   8. ASTM C920 - Specification for Elastomeric Joint Sealants
   9. ASTM C1036 - Specification for Flat Glass
   10. ASTM C1048 - Specification for Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass
C. American Welding Society (AWS)
   1. AWS D1.3 - Structural Welding Code - Sheet Steel; 2007

D. Canadian Standards
   1. CAN/ULC S101 - Fire Endurance Tests of Building Construction and Materials

E. National Fire Protection Association (NFPA):
   1. NFPA 251 - Fire Tests of Building Construction & Materials

F. Underwriters Laboratories, Inc. (UL):
   1. UL 263 - Fire Tests of Building Construction and Materials
   2. UL 410 - Slip Resistance of Floor Surface Materials

G. American National Standards Institute (ANSI)
   1. ANSI Z97.1 - Safety Performance and Methods of Test for Safety Glazing Material Used in Buildings


I. American Society of Civil Engineers (ASCE)
   1. ANSI Z97.1 - Safety Performance and Methods of Test for Safety Glazing Material Used in Buildings

1.3 DEFINITIONS

A. Manufacturer: A firm that produces primary glass, fabricated glass or framing as defined in referenced glazing publications.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 7800.

B. Product Data:

C. Shop Drawings:
   1. Provide shop drawings showing materials in place on the building including coordination of related and adjoining work, insert drawings and erection diagrams. Show relative layout for all adjacent walls, beams, columns slabs, ceilings, etc. Drawings shall include elevations, floor plans, sections and details. Details shall be clear, to scale, and fully drawn, not outlined. Professional Engineer preparing structural calculations for submittal shall review and stamp the drawings prior to fabrication.
   2. Drawings shall include the following information:
      a. Joinery and internal weather seals.
      b. Glass, extrusion, and metal panel thicknesses.
      c. Glass manufacturer, strength, thickness, tint, coating, opacifier or ceramic frit, safety backing, and rating of insulated units.
      d. Fastener manufacturer, material alloy, plating, diameter, length, spacing, embedment and edge distances for perimeter fasteners
      e. Glazing materials identification.
f. Sealants identification by product name and manufacturer, including cleaning and priming requirements.
g. Relative layout of walls, beams, columns and slabs with dimensions noted. Field connections, weld sizes, anchorages, and fasteners, embedment length and edge distances.
h. Dimensioned position of glass edge and all glazing materials (panels, louvers, etc.) relative to daylight opening.
i. Re-glazing and glazing procedures.
j. Dimension limits of movements for all moving joints and provisions for expansion and contraction.
k. Spotting plans for preset inserts in structure or in adjacent construction.
l. Perimeter sealant joint sizes, including tolerances and minimum/maximum joint sizes required.
m. Seal and signature of professional engineer currently registered in the jurisdiction required by the project location. This shall be same engineer who signs the calculations.

D. Structural Calculations:
1. Provide structural calculations sealed by a licensed professional engineer within the United States. Where specifications and code differ, the more severe requirements shall govern. Test reports are not an acceptable substitute for calculations. Calculations shall include the following information:
a. Analysis for all applicable loads on framing members.
b. Analysis for all applicable loads on anchors, including anchors embedded in concrete.
c. Section property computations for framing members.
d. Metal alloy and temper.
e. Seal and signature of professional engineer on drawings and calculations.

E. Samples - for following products:
1. Two sample of walking surface glass
2. Two samples of Pilkington Pyrostop® fire-rated glass

F. Glazing Schedule: Use same designations indicated on drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

G. Warranties: Submit manufacturer's warranty.

H. Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements.
1. Separate certification will not be required for glazing materials bearing manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualifications according to
1. International Accreditation Service for a Type A Third-Party Inspection Body (Field Services ICC-ES Third-Party Inspections Standard Operating Procedures, 00-BL-S0400 and S0401)
2. International Accreditation Service for Testing Body-Building Materials and Systems
   a. Fire Testing
      1) ASTM Standards E 119
      2) CPSC Standards 16 CFR 1201

Two River Theater
Addition and Alterations
09 6200 - 3
SPECIALTY FLOORING
3) NFPA Standards 251
4) UL Standards 263
5) CAN Standards S 101

B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).

C. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

D. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.

E. Listing and Labels – Fire-Rated Assemblies: Under current follow-up service by Underwriters Laboratories® maintaining a current listing or certification. Label assemblies in accordance with limits of manufacturer’s listing.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Deliver, store and handle under provisions specified by manufacturer.

1.7 PROJECT CONDITIONS
A. Obtain field measurements prior to fabrication of frame units. If field measurements will not be available in a timely manner, coordinate planned measurements with the work of other sections.
   1. Note whether field or planned dimensions were used in the creation of the shop drawings

B. Coordinate the work of this sections with others effected including but not limited to: other interior components.

1.8 WARRANTY
A. Provide the Pilkington Pyrostop® and the Fireframes ClearFloor® System standard five-year manufacturer warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS (ACCEPTABLE MANUFACTURERS/PRODUCTS)
A. Frame System: Fireframes ClearFloor® System fire-rated steel frame system as supplied by Technical Glass Products 8107 Bracken Place SE, Snoqualmie, WA  98065 (800-426-0279) fax (800-451-9857) e-mail sales@fireglass.com; web site http://www.fireglass.com.

B. Fire-rated glass: Pilkington Pyrostop®.
C. Substitutions: No substitutions allowed.
2.2 PERFORMANCE REQUIREMENTS

A. System Description:
   1. Fabricated steel tube and fire-rated glazed flooring system, consisting of factory cut and finished structural steel tubing, a laminated glass load bearing floor surface and a fire glazed pressure plate, ceiling below.
   2. Provide the system with a multi laminate walking surface glass with a non-slip frit applied to the number one surface.
   3. Span Width: As indicated on drawings.

B. Structural Performance
   1. Structural Loads:
      a. Live Load: As indicated on Drawings.
      b. Dead Load: As indicated on Drawings.
      c. Seismic Loads: As indicated on Drawings.
   2. Thermal Movements: Provide steel fire-rated floor systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures.
      a. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   3. Walking surface Coefficient of Friction (CoF)
      a. General: There is no national standard for slip resistance. Use the following as guides for providing this work. Provide data that states the type of test apparatus, method of text and result. As machines and test methods vary so will results the numbers listed below are to be used as a guide.
         1) For ADA accessible areas: ADAAG recommends a CoF of 0.06 flat and 0.08 for ramps when measured with a NBS-Brungraber machine using a silastic sensor shoe on dry surfaces.
         2) For dry flat surfaces for other than ADA accessibility a CoF of 0.05 is referenced in the literature.
   4. Dimensional tolerances of building frame and other adjacent construction.
   5. Failure includes the following:
      a. Deflection exceeding specified limits.
      b. Thermal stresses transferred to building structure.
      c. Glass breakage
      d. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
      e. Noise or vibration created by wind and thermal and structural movements.
      f. Loosening or weakening of fasteners, attachments, and other components.
      g. Sealant failure.

2.3 MATERIALS-STEEL FRAMING

A. Steel Framing System: Manufacturer's standard formed steel framing members of thickness required and reinforced as required to support imposed loads.
   1. Construction: Steel tubing permanently joined with mechanical and welded connections.
      a. Structural Shapes, Plates, and Bars: ASTM A 36.
      b. Cold-Rolled Sheet and Strip: ASTM A 611.
      c. Hot-Rolled Sheet and Strip: ASTM A 570/A.
   2. Floor Fire Glazing System: Retained mechanically with screws on four sides.
   3. Insulated Steel Pressure Plates: Formed steel pressure plate with dimensions recommended by manufacturer to securely hold glazing material in place.
   4. Insulated Channel Spacer: Steel or Stainless steel.
B. Brackets and Reinforcements: to match requirements above.

C. Fasteners and Accessories:
   1. Material: Stainless steel
   2. Where fasteners are subject to loosening or turn out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
   3. Reinforce members as required to receive fastener threads.
   4. Use exposed fasteners with countersunk Phillips screw heads.
   5. Finish exposed portions to match framing system.
   6. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

A. Sealants: Manufacturer's standard sealants.

2.4 MATERIALS-GLASS

A. Glazing:
   1. Walking surface glazing ,laminated Structural Glass
      a. As provided by TGP, Technical Glass Products.
   2. Fire rated glazing: 2-13/16 Pilkington Pyrostop® 120-401

2.5 ACCESSORIES

A. Gaskets:
   1. Glazing Gasket: Manufacturer's standard pressure-glazing system of black resilient silicone glazing gaskets
   2. Setting strip: Silicone
   3. Seal between weight bearing glass units: Silicone
   4. PVB interlayer between walking surface glass and Laminated Structural Glass.
   5. Setting blocks, and shims or spacers.

B. Manufacturers Standard: Ceramic Glazing tape

C. Manufacturers standard Intumescent tape:

D. Glazing Sealants: One-Part Low Modulus, High Movement-Capable Sealant: Type S; Grade NS; Class 25 with additional movement capability of 100 percent in extension and 50 percent in compression (total 150 percent); Use (Exposure) NT; Uses (Substrates) M, G, A, and O as applicable. (Use-O joint substrates include: Metal factory-coated with a high-performance coating; galvanized steel; ceramic tile.)

2.6 SLAG-WOOL-FIBER/ROCK-WOOL-FIBER INSULATION

A. Available Manufacturers:
   1. Fibrex Insulations Inc.
   2. Owens Corning.
   3. Thermafiber.

B. Unfaced, Slag-Wool-Fiber/Rock-Wool-Fiber Board Insulation: ASTM C 612, maximum flame-spread and smoke-developed indexes of 15 and 0, respectively; passing ASTM E 136 for combustion characteristics; and of the following nominal density and thermal resistivity:
1. Nominal density of 4 lb/cu. ft., Types IA and IB, thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F.
2. Fiber Color: Regular color, unless otherwise indicated.

C. Desiccant package:
1. Desiccant cartridges, designed to last for at least 20 years before replacement.

2.7 FABRICATION

A. General:
1. Fabricate components per manufacturer’s installation instructions and with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
2. Accurately fit and secure joints and corners. Make joints flush and weatherproof
3. Prepare components to receive anchor devices.
4. Provide physical and thermal isolation of glazing from framing members.
5. Provide internal guttering to drain water from joints and condensation occurring within glazing pocket.
6. Fabricate anchors.
7. Fabricate and mark pieces for field assembly without cutting or re-finishing in the field.
8. Arrange fasteners and attachments to be concealed from view.

2.8 FINISHES, GENERAL

A. Finish after fabrication.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable. Noticeable variations in the same piece are not acceptable.

C. Interior Steel or Aluminum Finishes
1. Powder-Coat Finish: Polyester Super Durable powder coating which meets AAMA 2604 for chalking and fading. Apply manufacturer’s standard powder coating finish system applied to factory-assembled frames before shipping, complying with manufacturer’s recommended instructions for surface preparation including pretreatment, application, and minimum dry film thickness.
2. Color and Gloss: As selected by Architect from manufacturer’s standard range.
3. Acceptable Manufacturers:
   a. Tiger Drylac
   b. Additional manufacturers as approved by TGP

D. Anodized Finishes
1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: non-specular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.
3. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
4. Class II, Color Anodic Finish: AA-M12C22A32/A34 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, integrally colored or electrolytically deposited color coating 0.010 mm or thicker) complying with AAMA 611.
5. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

6. Color: [Light bronze] [Medium bronze] [Dark bronze] [Black], as selected by Architect.

7. Color: As selected by Architect from full range of industry colors and color densities.

8. High-Performance Organic Finish (2-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.

9. High-Performance Organic Finish (3-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.

10. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions.

1. Verify openings are sized to receive curtain wall system and sill plate is level in accordance with manufacturer’s acceptable tolerances.

B. Notify Architect of any conditions which jeopardize the integrity of the proposed floor system.

C. Do not proceed until such conditions are corrected.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating steel fire-rated glazed flooring system without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

3.2 INSTALLATION

A. See Fireframes ClearFloor System Installation Manual.

3.3 PROTECTION AND CLEANING

A. Framing:

1. Where steel will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where steel will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

B. System:
   1. General contractor shall assure that adequate protection is provided after installation so other trades do not damage floor surface.

C. Cleaning:
   1. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer’s instructions prior to owner’s acceptance.
   2. Remove construction debris from project site and legally dispose of debris.

3.4 ERECTION TOLERANCES

A. Maximum Variation from True Position: 1/4"

B. Maximum Offset from True Alignment: 1/8"
   1. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
   2. Alignment:
      a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
      b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
      c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
   3. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

END OF SECTION
SECTION 09 6400
WOOD DANCE FLOORING SYSTEM

PART 1 GENERAL

1.1 SUMMARY
A. Provisions of Division 01 may apply to this section

B. SECTION INCLUDES
1. A sprung dance floor system with a finished hardwood surface.

C. RELATED SECTIONS
1. Section 03 3000: Cast-in-Place Concrete.
   a. Concrete and Slab Construction: refer to ACI Code 302.1R-04.
   b. Concrete Surface Finish: steel troweled and finished smooth.
   c. Concrete Tolerance: +/- 1/8" in radius of 10'.
   d. Floor Flatness and Floor Levelness (FF and FL) numbers are not recognized.
   e. High spots shall be ground level and low spots shall be filled in with approved
      leveling compound by the general contractor to meet the tolerance above.
   f. Compressive Strength: Concrete shall be a minimum of 3,000 psi and a
      maximum of 4000 psi compressive strength after 28 days. Concrete shall be
      free of washed river gravel, pea gravel, flint or hardener additives. No
      lightweight concrete.
2. Section 07 1326: Waterproofing.
   a. Concrete subfloors on or below grade shall be adequately waterproofed
      beneath the slab and at the perimeter walls and on the earth side of below
      grade walls by general contractor using suitable type membrane.
   b. Sand-Poly-Sand slab construction is not an acceptable construction.
3. Section 08 7100: Door Hardware
4. Section 09 9000: Paints and Coatings
5. Section 08 8300: Mirrors

1.2 REFERENCES
   and Values for Shock Absorption of Floors Used in Live Performance Venues
B. FSC: Forest Stewardship Council®

1.3 SUBMITTALS
A. Submit under provisions of Section 01 3000: Administrative Requirements.
B. Specification: Robbins Performing Arts Bio-Channel Classic for Dance Wood
   specification sheet.
C. Drawings: Submit Robbins Performing Arts Bio-Channel Classic for Dance Wood
   drawing.
D. Material Sample: Submit one (1) sample of Robbins Performing Arts Bio-Channel Classic
   for Dance Wood, if requested by architect.
E. Maintenance Guidelines: Submit copy of Maintenance Instructions.
F. Submit Robbins Technical Services “Concrete Guide Specification” for further information regarding conditions and requirements of concrete prior to installation.

G. Installer and Manufacturer Qualifications: Documentation showing compliance with manufacturer and installer qualifications specified in the Quality Assurance paragraph.

1.4 QUALITY ASSURANCE

A. Floor System Manufacturers Qualifications


2. Manufacturer shall be an established firm experienced in field and have been in business for a minimum of ten (10) years; Robbins, Inc. or an approved equal.

3. Material other than those listed must be approved 10 days prior by written addendum. Materials from un-approved manufacturers will not be accepted.

B. Floor Contractor/Installer Qualifications and Certifications

1. The flooring contractor shall be a Robbins Accredited Installer and be on site for the duration of the floor installation; or, a contractor approved by Robbins Performing Arts.

2. Flooring contractor shall be an established firm experienced in field and have been in business or a minimum of ten (10) years; Robbins, Inc. or an approved equal.

3. Flooring contractor shall submit a list of at least three completed projects of similar magnitude and complexity completed under current corporate identity.

4. Flooring contractor shall be manufacturer trained.

C. Floor System Design

1. Resilient pad shall be made from 50 durometer EPDM rubber.

2. Resilient pad shall have built in stop blocks

D. Floor System Performance

1. **Bio-Channel Classic for Dance Wood** shall be tested for the following performance criteria:

   a. ANSI E1.26 -2006 (R2012)

1.5 DELIVERY, STORAGE, AND HANDLING

A. Materials shall not be delivered, stored or installed until all masonry, painting, plastering, tile, marble and terrazzo work is complete, and all overhead mechanical work, lighting, other overhead units are installed. Room temperature of 55-80 degrees Fahrenheit and relative humidity of 35-50% are to be maintained. The building shall be enclosed and weather tight. Ideal installation/storage conditions are the same as those that will prevail when building is occupied.

B. Materials shall not be delivered, stored or installed at the installation location if the In-Slab relative humidity level for the concrete slab is above 85% using ASTM F 2170 In-Slab Relative Humidity test.

1.6 PROJECT CONDITIONS-SEQUENCY

A. Do not install floor system until concrete has been cured 60 days and the requirements in Article 1.5 are obtained.
B. General Contractor is responsible to ensure slab is clean and free of all dirt and debris prior to floor installation beginning.

C. Maintain room temperature at 55 to 80 degrees F for one week prior to delivery of materials, during installation, and after installation.

D. Provide permanent electricity, heat, light, and ventilation 1 week prior to delivery of materials, during installation, and after installation. Maintain a temperature range of 55 to 80 degrees Fahrenheit and a relative humidity range of 35 to 50%.

E. Acclimatize wood flooring in accordance with period of time recommended by manufacturer. In applications in which very high or low levels of humidity are present, extend period of time accordingly.

1.7 WARRANTY

A. Robbins Performing Arts hereby warrants the **Bio-Channel Classic for Dance Wood** material to be free from manufacturing defects for a period of 2 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Robbins Performing Arts, which is located at: 4777 Eastern Ave; Cincinnati, OH 45226; Toll Free Tel: 800-831-8987; Fax: 513-871-7998; Email: request info (info@robbinsdancefloors.com) www.robbinsdancefloors.com

B. Substitutions: Not permitted.

C. Requests for substitutions may be considered in accordance with provisions of Section 01 6000 - Product Requirements.

2.2 MATERIALS

A. Vapor Barrier
   1. 6-mil polyethylene.

B. Subfloor
   1. Robbins Bio-Channels: engineered-wooden sleeper with 7/16” EPDM Bio-Pads attached, factory encased in a steel channel. Sleeper must be free to move vertically within steel channel confines to assure proper uniformity of resiliency and function.
   2. 23/32” structural rated sheathing, exposure 1 (CD-X).

C. Surface
   1. 25/32” thick x 1.5” wide, 2"nd and Better grade, Tongue and Grooved, End Matched, Kiln Dried Finger-Jointed Northern Hard Maple Flooring. Flooring same be graded and manufactured in accordance with industry standards. Flooring shall be design with flexibility cross cuts and built-in expansion technology. Flooring must be certified by the Forest Stewardship Council®

D. Fasteners
   1. Subfloor Fasteners: 1 ¼” coated staples or equivalent.
   2. Flooring Fasteners: 2” x 15 gauge barbed cleat or coated staple.
   4. Optional Sleeper Anchors: Powers SPIKE® anchors and sleeves
E. Finish Materials
   1. Robbins approved stain, seal and or finish.

F. Perimeter Base
   1. 3” x 4” heavy duty ventilating type base with pre-molded outside corners (black).

PART 3 EXECUTION

3.1 INSPECTION

A. Inspect concrete slab for proper tolerance and dryness, and report any discrepancies to the general contractor and architect in writing. Slab will be level to within 1/8” in a 10’. Moisture content of the concrete slab not exceed 85% in accordance to ASTM F 2170 In-Slab Relative Humidity test.

B. All work required to put the concrete subfloors in acceptable condition shall be the responsibility of the general contractor.

C. Floor area shall be broom cleaned by general contractor.

D. Verify that site conditions are acceptable for installation of wood flooring system.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding. Do not begin installation until substrates have been properly prepared.

F. Installer shall document all working conditions provided in General Specifications prior to commencement of installation.

3.2 INSTALLATION

A. Vapor Barrier
   1. Install polyethylene with joints lapped a minimum of 6” and turned up at walls 4”.

B. Subfloor
   1. Install Robbins resilient and force attenuation pads on sleepers per manufacturer’s recommendations.
   2. Place Bio-Channels 16-1/16” ON CENTER end-to-end staggering end joints in adjacent rows, perpendicular to the intended direction of the maple flooring. Gap the ends of the sleepers approximately ¼”. Provide 1-½” to 2” expansion void at the perimeter and all vertical obstructions.
   3. Anchor Bio-Channels at predetermined locations.
      NOTE: Anchor sleepers in 3 of the pre-determined holes, at both ends and in center. When shimming for leveling is necessary, anchor in all 5 holes.
      NOTE: If extensive shimming is necessary, alternate anchoring ‘non-standard’ method may be necessary. Additional costs for this ‘non-standard’ method are to be borne by the purchaser.
   4. Install stop blocking per manufacturer’s recommendations.
   5. Install 23/32” plywood subfloor parallel to sleeper channels and securely fasten subfloor 6” ON CENTER along each channel sleeper.

C. Flooring Surface
   1. Machine fasten maple flooring to the subfloor with end joints properly driven up. Use Robbins recommended standard nailing schedule on continuous subfloor systems. In certain geographical regions and site conditions, additional intermediate expansion spacing may be required.
   2. Provide 1.5” to 2” expansion void at the perimeter and all permanent vertical obstructions.
3.3 FINISHING

A. Sanding
   1. Sand flooring with appropriate grit papers with drum sander, edger, buffer, and hand scraper.
   2. Sand per manufacturer’s texture recommendations as indicated in Article 2.2, E.
   3. Examine floor area to insure the surface is acceptable for finishing. Floor shall present a smooth surface without drum stop marks, gouges, streaks or shiners.
   4. Vacuum or tack to remove sanding dust and debris from entire surface.

B. Finishing
   1. Inspect entire floor to be sure surface is ready to accept stain, seal and or finish. Floor should be free from dust and debris.
   2. Apply stain, sealer, and finish per manufacturer’s recommendations as indicated in Article 2.2, E. to provide approved finish appearance.
   3. Buff and clean floor between coats.

3.4 INSTALLATION OF WALL BASE

A. Install vent cove base anchored to walls with base cement or mechanical fastener. Use pre-molded outside corners and neatly mitered inside corner.

3.5 CLEANING AND PROTECTION

A. Remove rubbish, debris, and waste material from work area and legally dispose.

B. After floors are finished, area to be kept locked by general contractor to allow curing time for the finish. If after required curing time general contractor or owner requires use of the floor, he shall protect the floor by covering with non-fibered kraft paper or red rosin paper with taped joints, until acceptance by owner (or owner’s agent) of complete dance floor. Take necessary precautions to prevent damage from dropped objects. Use breathable materials to cover installed wood flooring. Do not completely cover installed wood flooring, as moisture and color shading issues may arise.

C. Clean floor surface using cleaning products recommended by flooring manufacturer.

3.6 INSTRUCTION

A. Instruct Owner's designated representatives in flooring maintenance.

END OF SECTION
SECTION 09 6519
RESILIENT TILE FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient tile flooring.

B. Installation accessories:
   1. Adhesives.
   2. Finishes and cleaners.

1.02 RELATED REQUIREMENTS

A. Section 01 7000 – Closeout - Construction Waste Management and Disposal.

B. Section 07 9005 - Joint Sealants.

1.03 REFERENCE STANDARDS


J. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.


W. NSF 332 - Sustainability Assessment for Resilient Floor Coverings; 2015.

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Shop Drawings.
C. Manufacturer's documentation for flooring and accessories:
   1. Technical Data.
   2. Installation and Maintenance.
   3. Warranty.
   4. Reclamation Program.
   5. Safety Data Sheets (SDS) for accessories.
D. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
E. Verification Samples: Submit two samples, 6 by 6 inch in size illustrating color and pattern for each resilient flooring product specified.

1.05 DELIVERY, STORAGE, AND HANDLING
A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and that the material is of the correct style, color, quantity and run number(s).
B. Store all materials flat and off of the floor in an acclimatized, weather-tight space between 65 to 85 degrees F.
C. Do not double stack pallets.

1.06 FIELD CONDITIONS
A. Acclimate material at jobsite between 65 to 85 degrees F, and 35 percent to 85 percent relative humidity for at least 48 hours prior to installation. Temperature and relative humidity should also be maintained at the same levels during installation, and after installation.
B. Spread unopened cartons no more than 6 cartons high and at least 4 inches (101 mm) apart.
C. Keep away from heating and cooling ducts and direct sunlight.
D. If permanent HVAC is not operational, temporary means should be used to maintain the recommended temperature and relative humidity levels.
E. Close areas to traffic during installation of flooring and accessories.

1.07 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.
B. Installer Qualifications: Aspecta® Five should only be installed by professional flooring contractors that have demonstrated successful installations of jobs in similar size and scope.

1.08 WARRANTY
A. See Section 01 7000 - Closeout Submittals, for additional warranty requirements.
B. Aspecta® Five Warranty - 25-Year Limited Non-Prorated Commercial Material Warranty. Coverage includes:
   1. 100 percent cost of material for the entire duration of warranty (25 Years).
   2. Pro-rated cost of labor (fair-market value) for the first 10 Years.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 RESILIENT TILE FLOORING
   A. Luxury Vinyl Plank and Tile:
      1. Pattern as selected by Architect in drawing set.
      2. Color: As selected from manufacturer's full range.
      3. Physical Properties:
         a. Construction: Phthalate-free solid plank and tile made from 100 percent virgin vinyl.
         b. Wear Layer Thickness: 28 mil.
         c. Total Thickness (Gauge): 0.126 inch.
         d. Finish: Urethane coating with ceramic bead particles.
      4. Manufacturing, Performance, and Safety Standards:
         a. NSF 332 Certified: Platinum level.
         b. ASTM F1700, Classification: Class III, Type B.
         c. ASTM F386, Thickness: Passes requirements.
         d. ASTM F410, Wear Layer Thickness: Passes requirements for commercial classification.
         e. ASTM F2421/F2055, Size and Squareness: Passes requirements.
         f. ASTM F1914, Residual Indentation: Surpasses requirements.
         g. ASTM F137, Flexibility: Surpasses requirements.
         h. ASTM F2199, Dimensional Stability: Surpasses requirements.
         i. ASTM F1514, Resistance to Heat: Surpasses requirements.
         j. ASTM F1515, Resistance to Light: Surpasses requirements.
         k. ASTM E648/NFPA 253, Critical Radiant Flux: Class I.
         l. ASTM E662, Smoke Density (Flaming and Non-Flaming): Passes requirements.
         m. ASTM F963, Sec. 4.3.5.2(2)(B), Heavy Metals: Passes requirements.
         n. ASTM D6329 and UL 2824, Mold and Microbial Resistance: Highly resistant.
         o. ASTM D2047, Coefficient of Friction (Dry): Greater than or equal to 0.6.
         p. ASTM F970, Static Load Limit: Greater than or equal to 1,000 pounds (surpasses requirements).
         q. ASTM D4060, Abrasion Resistance: Average of 30,000 cycles (results vary with emboss).

2.03 ACCESSORIES
   A. Moldings, Transition and Edge Strips: As selected by Architect in drawing set.
   B. Adhesives:
      1. Products:
         a. Metroflor Corporation; Prevail® 3100 Acrylic Spray Adhesive.
         b. Substitutions: See Section 01 6000 - Product Requirements.
   C. Finishes and Cleaners:
      1. Products:
         a. Metroflor Corporation; Prevail® Matte Finish.
         b. Substitutions: See Section 01 6000 - Product Requirements.
PART 3 EXECUTION

3.01 EXAMINATION - SEE ALSO SECTION 01 7000.

A. Install flooring and accessories after other operations (including painting) have been completed.

B. Acceptance of Conditions: Carefully examine all installation areas with installer/applicator present, for compliance with requirements affecting work performance.
   1. Verify that field measurements, product, adhesives, substrates, surfaces, structural support, tolerances, levelness, temperature, humidity, moisture content level, pH, cleanliness and other conditions are as required by the manufacturer, and ready to receive work.

C. Verify that substrate is contaminant-free, including old adhesives and abatement chemicals.

D. Test substrates as required by manufacturer to verify proper conditions exist.
   1. Concrete:
      a. Check for concrete additives such as fly ash, curing compounds, hardeners, or other surface treatments that may prevent proper bonding of floor coverings.
      b. Moisture testing: Perform either the In-Situ Relative Humidity (RH) test (ASTM F2170) or Moisture Vapor Emission Rate (MVER) test (ASTM F1869). Refer to the Manufacturer's Installation Guide/Manual for the maximum allowable substrate moisture content. Substrates above the maximum allowable moisture content will require a moisture mitigation system.
      c. Perform alkalinity testing per ASTM F710 to verify pH level is between 7 to 10.
      d. Check substrate for absorbency per manufacturer’s recommendations.
      e. Perform bond testing per ASTM F710 to determine compatibility of adhesive to concrete substrate.

E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Prior to installation, the flooring installer should plan and attend an on-site construction meeting with the General Contractor, Architect and Property Owner to review all requirements and inspect site conditions as outlined in the manufacturer's installation document, as well as to review the requirements of ASTM F710 and any relevant building codes, or local, state, or national regulations.

B. Flooring installation should not begin until all site conditions have been assessed, testing has been completed and subfloor conditions have been approved.

C. Prepare per manufacturer's written instructions, Section 01 7000, and as follows:
   1. Prepare substrates to ensure proper adhesion of Luxury Vinyl Plank & Tile.
   2. Concrete Substrates: Prepare substrate per ASTM F710.
      a. Verify that subfloor is clean, flat, smooth, free of dirt, rust, paint, oil, wax or any contaminant that will interfere with adhesive bonding.
      b. Mechanically remove substrate coatings that are not compatible with adhesives, such as sealers, curing, hardening or parting compounds, soap, wax, oil, etc.
         1) Do not use solvents or adhesive removers.
      c. Expansion joints, isolation joints, or other moving joints must be honored and must not be filled with underlayment products or other materials, and floor coverings must not be laid over them. Expansion joint covering systems should be detailed by the architect or engineer, and based upon intended usage and aesthetic considerations.
      d. Surface cracks, grooves, depressions, control joints or other non-moving joints, and other irregularities shall be filled or smoothed with high-quality Portland cement or calcium aluminate based patching or underlayment compound for filing or smoothing, or both.
         1) Do not skim-coat large areas with patching compound, especially slick power-troweled surfaces.
         2) Sand smooth per manufacturer’s instructions.
e. Slick surfaces such as power-troweled concrete shall be profiled as needed to allow for a mechanical bond between the adhesive and subfloor.

f. Do not use gypsum-based underlayment products and do not skim coat concrete subfloors.

g. Self-Leveling Underlayments: Provide a dry and smoothly-sanded underlayment substrate ready for installation of Luxury Vinyl Plank & Tile. Underlayment compound shall be moisture-resistant, mildew-resistant, and alkali-resistant and must have a minimum of 3,000 psi compressive strength per ASTM C109/C109M.

h. Lightweight concrete shall have a compressive strength greater than 90 pounds per cubic foot with minimum compression strength of 2,500 psi or greater.

3.03 INSTALLATION

A. Installation per manufacturer's written instructions, Section 01 7000, and as follows:
1. Layout shall be specified by Architect, Designer or End User.
2. Follow layout and ensure installation reference lines are square.
3. Field tiles shall be installed with directional arrows on back aligned in the same direction, or may be installed in quarter-turned fashion.
4. Check cartons for and do not mix dye lots.
5. Expansion Joints: Locate expansion, isolation, and other moving joints prior to installation.
   a. Do not fill expansion, isolation, and other moving joints with patching compound nor cover with resilient flooring.
   b. Install movement joint systems per manufacturer's instructions and per Section 07 9200.
6. Adhesives: Adhere flooring to substrate using the full spread method resulting in a completed installation without gaps, voids, raised edges, bubbles or any other surface imperfections.
   a. Select appropriate adhesive, trowel and follow manufacturer's instructions.
   b. Periodically spot-check transfer of adhesive to back of tile during installation.
   c. Roll floor with a 100 pound roller to ensure proper transfer of adhesive and bonding.
   d. Protect floor from traffic per manufacturer's instructions.
   e. Do not wet mop floor until the adhesive has properly set per written instructions.

3.04 FIELD QUALITY CONTROL

A. Site tests and inspections per Section 01 4000 and as follows:
1. Inspect flooring installation for non-conforming work including (but not limited to) the following:
   a. Lack of adhesion.
   b. Bubbles, loose tiles or raised edges.
   c. Dirt and debris underneath flooring.
   d. Excessive gaps.
   e. Improper substrate preparation (as indicated by telegraphing).
   f. Damage to tiles, including: dents/indentations, cuts, cracks, burns or punctures.

B. Non-conforming work per General Conditions and as follows:

3.05 CLEANING

A. Waste Management per Section 01 7000, and as follows:
1. Coordinate material reclamation program with manufacturer, if applicable.
   a. Store and return cartons and pallets to manufacturer or recycler for reuse or recycling.

B. Provide progress cleaning per manufacturer's written instructions, Section 01 7000, and as follows:
1. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the work.
   a. Clean and protect completed construction until Date of Substantial Completion.
b. During installation, remove wet adhesive from surface of flooring per manufacturer's instructions.

2. Site: Maintain project site free of waste materials and debris.

C. Provide final cleaning immediately prior to Date of Substantial Completion inspection per manufacturer's written instructions and Section 01 7000.
   1. Protection: Remove manufacturer's and other installed protection immediately prior to Date of Substantial Completion inspection, unless required otherwise.
   2. Clean floor with a neutral 6-8 pH cleaner.

3.06 MAINTENANCE

A. Initial maintenance per flooring manufacturer's written instructions and as follows:
   1. Allow the adhesive to cure for at least 48 hours prior to wet cleaning the floor.
   2. Sweep, dust mop or vacuum the floor thoroughly to remove all loose dirt, dust, grit and debris. Do not use vacuums with a beater bar assembly.
   3. Remove any dried adhesive residue from the surface with mineral spirits applied to a clean, lint-free cloth.
   4. Damp mop the floor using a cleaner recommended by the flooring manufacturer.
   5. If necessary, scrub the floor using an auto scrubber or rotary machine (300 rpm or less) with a cleaner recommended by the flooring manufacturer. Maintain the proper dilution ratio and use the appropriate scrubbing brush or pad.
   6. Thoroughly rinse the entire floor with fresh, clean water. Remove the dirty residue with a wet-vacuum or clean mop and allow the floor to dry completely.

3.07 PROTECTION

A. Protect materials from construction operations until Date of Substantial Completion or Owner occupancy, whichever occurs first.
   1. Protect finished floor from abuse and damage by using heavy non-staining kraft paper, drop cloths or equivalent. Use additional, non-damaging protective materials as needed.
   2. Light foot traffic on a newly installed floor can be permitted after 24 hours.
   3. Keep heavy traffic and rolling loads off the newly installed LVT flooring for 48 hours.
   4. Protect the floor from rolling loads by covering with protective boards.

END OF SECTION
SECTION 09 6813
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Carpet tile, loose laid with edges and control grid adhered.
B. Matching roll carpet for direct glue installation on base and stairs.

1.02 RELATED REQUIREMENTS
A. Section 01 7000 - Closeout- Construction Waste Management and Disposal: Reclamation/Recycling of new carpet tile scrap.
B. Section 03 3000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.

1.03 PRICE AND PAYMENT PROCEDURES
A. Section 01 2000 - Allowances: Cash allowances affecting this section.

1.04 REFERENCE STANDARDS
C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

1.05 SUBMITTALS
A. See Section 01 3000 - 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. Shop Drawings: Indicate layout of joints, pattern, location, direction, installation method, transitional details
D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
E. Submit two, 12 inch long samples of edge strip, base cap, and stair nosing.
F. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
G. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
H. 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 Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.06 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum five years documented experience.
B. Installer Qualifications: Company specializing in installing carpet tile with minimum five years documented experience and approved by carpet tile manufacturer.

1.07 FIELD CONDITIONS
A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Tile Carpeting:
   1. Patcraft, www.patcraft.com (darren.ault@patcraft.com)
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS
A. Tile Carpeting, Type 1: Tufted, manufactured in one color dye lot.
   1. Product: I0317 manufactured by Patcraft.
   2. Tile Size: 24 x 24 inch, nominal.
   3. Thickness: (.277 inch).
   5. Pattern: As selected by Architect from standard pattern.
   6. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
   7. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
   8. VOC Content: Provide CRI (GLP) certified product; in lieu of labeling, independent test report showing compliance is acceptable.
   10. Maximum Electrostatic Charge: 3 Kv. at 20 percent relative humidity.
   12. Stitches: 11 per inch.
   15. Primary Backing Material: Non Woven Synthetic.

B. Tile Carpeting, Type 2: Tufted, manufactured in one color dye lot.
   1. Product: I0421, manufactured by Patcraft.
   2. Tile Size: 12 x 48 inch.
   3. Thickness: (.198 inch)
   5. Pattern: As selected by Architect from standard pattern.
   6. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
   7. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
   8. VOC Content: Provide CRI (GLP) certified product; in lieu of labeling, independent test report showing compliance is acceptable.
   10. Maximum Electrostatic Charge: 3 Ky, at 20 percent relative humidity.
   12. Stitches: 11 per inch.
   15. Primary Backing Material: Artis
C. Tile Carpeting, **Type 3**: Tufted, manufactured in one color dye lot.
   1. **Product**: I0468, manufactured by Patcraft.
   2. **Tile Size**: 9 x 36 inch.
   3. **Thickness**: (.286 inch)
   4. **Color**: As selected by Architect from standard range.
   5. **Pattern**: As selected by Architect from standard pattern.
   6. **Critical Radiant Flux**: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
   7. **Surface Flammability Ignition**: Pass ASTM D2859 (the "pill test").
   8. **VOC Content**: Provide CRI (GLP) certified product; in lieu of labeling, independent test report showing compliance is acceptable.
   9. **Static Control Fiber**: ECO Solution Q Nylon.
   10. **Maximum Electrostatic Charge**: 3 Ky, at 20 percent relative humidity.
   11. **Gage**: 1/12 inch.
   12. **Stitches**: 10 per inch.
   13. **Pile Weight**: 24 oz/sq yd.
   14. **Density Factor**: 11.41 kilotex.
   15. **Primary Backing Material**: Woven Synthetic
   16. **Secondary Backing Material**: ECO Worx Tile

D. Roll Carpet: Same manufacturer, type, color and pattern, and face fiber characteristics as carpet tile, manufactured in same color dye lot as tile.

### 2.03 ACCESSORIES

A. **Sub-Floor Filler**: White premix latex; type recommended by flooring material manufacturer.
B. **Base Cap**: As selected by Architect on Drawings.
C. **Edge Strips**: Color as selected by Architect.
D. **Adhesives**:
   1. Compatible with materials being adhered; maximum VOC content of 50 g/L; CRI (GLP) certified; in lieu of labeled product, independent test report showing compliance is acceptable.
F. **Carpet Tile Adhesive**: Recommended by carpet tile manufacturer; releasable type.

### PART 3 EXECUTION

#### 3.01 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 wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile.
C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
D. **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.
E. Verify that required floor-mounted utilities are in correct location.

#### 3.02 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.

D. Vacuum clean substrate.

3.03 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 parallel to next unit, set parallel to building lines.

F. Locate change of color or pattern between rooms under door centerline.

G. Adhere carpet tile to substrate along centerline of rooms, at perimeter of rooms, where tiles are cut, and at 15 foot intervals throughout rooms. Lay remainder of tile dry over substrate.

H. Adhere carpet tile as base finish up vertical surfaces to form base. Terminate top of base with cap strip.

I. Trim carpet tile neatly at walls and around interruptions.

J. Complete installation of edge strips, concealing exposed edges.

3.04 INSTALLATION ON STAIRS

A. Use one piece of carpet for each tread and the riser below. Apply seam adhesive to all cut edges.

B. Lay carpet with pile direction in the length of the stair.

C. Adhere carpet tight to stair treads and risers.

3.05 CLEANING

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

END OF SECTION
SECTION 09 9000
PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.
B. Field application of paints, stains, varnishes, and other coatings.
C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
   1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
   2. Elevator pit ladders.
   3. Exposed surfaces of steel lintels and ledge angles.
   4. Mechanical and Electrical:
      a. In finished areas, paint all insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
      b. In finished areas, paint shop-primed items.
      c. On the roof and outdoors, paint all equipment that is exposed to weather or to view.
      d. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
      e. Paint dampers exposed behind louvers, grilles, and convector cabinets to match face panels.
D. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Non-metallic roofing and flashing.
   6. Stainless steel, anodized aluminum, bronze, terne, and lead items.
   7. Marble, granite, slate, and other natural stones.
   8. Floors, unless specifically so indicated.
   9. Ceramic and other tiles.
   11. Exterior insulation and finish system (EIFS).
   13. Concrete masonry in utility, mechanical, and electrical spaces.
   14. Acoustical materials, unless specifically so indicated.
   15. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Shop-primed items.
B. Section 05 5100 - Metal Stairs: Shop-primed items.
D. Section 21 0553 - Identification for Fire Suppression Piping and Equipment: Color coding scheme for items to be painted under this section.
E. Section 22 0553 - Identification for Plumbing Piping and Equipment: Painted identification.
F. Section 22 0553 - Identification for Plumbing Piping and Equipment: Color coding scheme for items to be painted under this section.
G. Section 23 0553 - Identification for HVAC Piping and Equipment: Painted identification.
H. Section 23 0553 - Identification for HVAC Piping and Equipment: Color coding scheme for items to be painted under this section.
J. Section 26 0553 - Identification for Electrical Systems: Color coding scheme for items to be painted under this section.

1.03 DEFINITIONS
A. Conform to ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS
E. SSPC (PM1) - Good Painting Practice: SSPC Painting Manual, Vol. 1; Society for Protective Coatings; Fourth Edition.

1.05 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide complete list of all products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
   4. Manufacturer's installation instructions.
   5. If proposal of substitutions is allowed under submittal procedures, explanation of all substitutions proposed.
C. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.
D. Manufacturer's Instructions: Indicate special surface preparation procedures.
E. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and coated surfaces, and color samples of each color and finish used.
F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Paint and Coatings: 1 gallon of each color; store where directed.
   3. Label each container with color in addition to the manufacturer's label.

1.06 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
C. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years experience.
1.07 Mock-up
   A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.
   B. Provide panel, four feet (4’) long by four feet (4’) wide, illustrating special coating color, texture, and finish.
   C. Locate where directed.
   D. Mock-up may remain as part of the work.

1.08 Delivery, Storage, and Handling
   A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
   B. Container Label: Include manufacturer’s name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
   C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer’s instructions.

1.09 Field Conditions
   A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
   B. Follow manufacturer’s recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
   C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
   D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer’s instructions.
   E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer’s instructions.
   F. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

Part 2 Products

2.01 Manufacturers
   A. Provide all paint and coating products from the same manufacturer to the greatest extent possible.
      1. In the event that a single manufacturer cannot provide all specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
      2. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by the same manufacturer.
      3. Substitution of a different paint system using MPI-approved products by the same manufacturer will be considered.
   B. Paints:
   C. Transparent Finishes:
   D. Stains:
E. Primer Sealers: Same manufacturer as top coats.
F. Block Fillers: Same manufacturer as top coats.
G. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
   1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
   2. Provide paints and 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.
   3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   4. Supply each coating material in quantity required to complete entire project's work from a single production run.
   5. 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: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
   1. Gypsum Board: Interior Latex Primer Sealer; MPI #50.
   2. Concrete Masonry: Interior/Exterior Latex Block Filler; MPI #4.
   3. Wood: Latex Primer for Interior Wood; MPI #39.
   4. Wood: Interior Alkyd Primer Sealer; MPI #45.
   5. Galvanized Steel: Interior Water Based Galvanized Primer; MPI #134.
   6. Products:
      a. Behr Premium Plus Interior All-In-One Primer and Sealer [No. 75].
      b. Behr Premium Plus Interior Drywall Primer and Sealer [No. 73].
      c. Behr Premium Plus Exterior Multi-Surface Primer and Sealer [No. 436]. (MPI #3, 107, 134)
      d. Behr Concrete and Masonry Bonding Primer [No. 880].
      e. Kilz Pro-X p50 Block Filler Primer.

C. Volatile Organic Compound (VOC) Content: Comply with Section 01 6000.

D. Chemical Content: The following compounds are prohibited:
   1. Intentionally added methylene chloride or perchloroethylene.
   2. Aromatic Compounds: In excess of 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
   3. Acrolein, acrylonitrile, antimony, benzene, butyl benzyl phthalate, cadmium, di (2-ethylhexyl) phthalate, di-n-butyl phthalate, di-n-octyl phthalate, 1,2-dichlorobenzene, diethyl phthalate, dimethyl phthalate, ethylbenzene, formaldehyde, hexavalent chromium, isophorone, lead, mercury, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, toluene (methylbenzene), 1,1,1-trichloroethane, vinyl chloride.

E. Flammability: Comply with applicable code for surface burning characteristics.

F. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

G. Colors: As indicated on drawings
   1. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
   2. Extend colors to surface edges; colors may change at any edge as directed by Architect.
3. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under, unless otherwise noted.
4. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the color coding scheme indicated.

2.03 PAINT SYSTEMS - EXTERIOR
A. Paint GE-OP-3A - Gypsum Board and Plaster, Opaque, Alkyd, 3 Coat:
   1. One coat of alkyd primer sealer.
   2. Flat: Two coats of alkyd enamel.
B. Paint ME-OP-2A - Ferrous Metals, Primed, Alkyd, 2 Coat:
   1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
   2. Gloss: Two coats of alkyd enamel.
C. Paint MgE-OP-3A - Galvanized Metals, Alkyd, 3 Coat:
   1. One coat galvanize primer.
   2. Gloss: Two coats of alkyd enamel.

2.04 PAINT SYSTEMS - INTERIOR
A. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood.
   1. Medium duty applications include doors, door frames, railings, handrails, guardrails, balustrades, and fasteners.
   2. Two top coats and one coat primer.
   3. Top Coat(s): Interior Epoxy-Modified Latex; MPI #115, 215.
   4. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
   5. Gloss: MPI gloss level 6; use this sheen at all locations.
   6. Top Coat Product(s):
      a. Sherwin-Williams Waterbased Catalyzed Epoxy.
   7. Primer(s): As recommended by manufacturer of top coats.
   1. Applications: See Finish Schedule.
   2. Two top coats and one coat primer.
   3. Top Coat(s): Interior Epoxy-Modified Latex; MPI #115, 215.
   4. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
   5. Gloss: MPI gloss level 6; use this sheen at all locations.
   6. Top Coat Product(s):
      a. Sherwin-Williams Pro Industrial Waterbased Catalyzed Epoxy. (MPI #115)
      b. Sherwin-Williams Waterbased Catalyzed Epoxy.
   7. Primer(s): As recommended by manufacturer of top coats.
C. Paint I-OP-DF - Dry Fall: Metals; exposed structure and overhead-mounted including metal fabrications, galvanized ducts, galvanized conduit, galvanized piping and hangers.
   1. Shop primer by others.
   2. One top coat; white.
   3. Top Coat: Alkyd Dry Fall; MPI #55, 89, 225.
   4. Flat: MPI gloss level 1; use this sheen at all locations.
   5. Eggshell: MPI gloss level 3; use this sheen at all locations.
   6. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
D. Paint I-OP-FL - Concrete and Wood Floors Indicated to be Painted.
   1. Two top coats and one coat primer.
   2. Top Coat(s): Thin Film Floor Coating for Aircraft Maintenance Facilities; MPI #212.
3. Top Coat(s): Latex Floor Paint, Gloss.
4. Gloss: MPI gloss level 6; use this sheen at all locations.
5. Stain Product(s):
   a. Sherwin-Williams Wood Classics 250 VOC Oil Stain. (MPI #90)
   b. Sherwin-Williams Wood Classics Interior Oil Stain. (MPI #90)

E. Paint I-TR-FL - Transparent Finish on Wood Floors:
   1. Per manufacturer’s specifications – Robbins Performing Arts, bio-channel classic with wood surface

F. Paint WI-TR-V - Wood, Transparent, Varnish, No Stain:
   1. One coat sealer.
   2. Gloss: One coat of varnish
   3. Satin: One coat of varnish
   4. Flat: One coat of varnish

G. Paint CI-OP-3L - Concrete/Masonry, Opaque, Latex, 3 Coat:
   1. One coat of block filler.
   2. Semi-gloss: Two coats of latex enamel
   3. Flat: Two coats of latex enamel

H. Paint MI-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:
   1. One coat of latex primer.
   2. Gloss: Two coats of latex enamel
   3. Semi-gloss: Two coats of latex enamel

I. Paint MgI-OP-3L - Galvanized Metals, Latex, 3 Coat:
   1. One coat galvanize primer.
   2. Gloss: Two coats of latex enamel
   3. Semi-gloss: Two coats of latex enamel

J. Paint GI-OP-3L - Gypsum Board/Plaster, Latex, 3 Coat:
   1. One coat of alkyd primer sealer.
   2. Gloss: Two coats of latex enamel
   3. Semi-gloss: Two coats of latex enamel
   4. Eggshell: Two coats of latex enamel
   5. Flat: Two coats of latex enamel

2.05 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.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION
3.01 EXAMINATION
A. Do not begin application of coatings until substrates have been properly prepared.
B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
E. Test shop-applied primer for compatibility with subsequent cover materials.
F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Gypsum Wallboard: 12 percent.
2. Plaster and Stucco: 12 percent.
3. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

### 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 repair existing coatings that exhibit surface defects.
D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
E. Seal surfaces that might cause bleed through or staining of topcoat.
F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
G. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
H. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
I. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
J. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
K. Interior Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.
L. Interior Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.
M. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

### 3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
B. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.
C. Apply products in accordance with manufacturer's instructions.
D. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
E. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
F. Apply each coat to uniform appearance.
G. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
H. Sand wood and metal surfaces lightly between coats to achieve required finish.
I. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
J. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
K. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FIELD QUALITY CONTROL
   A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.
   B. Owner will provide field inspection.
   C. Inspect and test questionable coated areas.

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

3.06 PROTECTION
   A. Protect finished coatings until completion of project.
   B. Touch-up damaged coatings after Substantial Completion.

3.07 SCHEDULE – COLORS: To be determined

END OF SECTION
SECTION 10 1400
SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Cash allowance for signs.
B. Room and door signs.
C. Interior directional and informational signs.
D. Luminous egress path marking and other "glow-in-the-dark" signs.
E. Emergency evacuation maps.
F. Building identification signs.
G. Plaque.
H. Traffic signs.

1.02 RELATED REQUIREMENTS
A. Section 05 5100 - Metal Stairs: Photoluminescent stair nosings.
B. Section 22 0553 - Identification for Plumbing Piping and Equipment.
C. Section 26 0553 - Identification for Electrical Systems.
D. Section 26 5100 - Interior Lighting: Exit signs required by code.

1.03 PRICE AND PAYMENT PROCEDURES
A. See Section 01 2100 - Allowances, for cash allowances affecting this section.
B. Room and door signs are not covered by the allowance.
C. Allowance amount covers purchase and delivery but not installation.

1.04 REFERENCE STANDARDS

1.05 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
   1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
   2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
   3. Submit for approval by Owner through Architect prior to fabrication.
D. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
F. Verification Samples: Submit samples showing colors specified.
G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.
H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Curved Sign Media Suction Cups: One for each 100 signs; for removing media.

1.06 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in
   this section with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING
A. Package signs as required to prevent damage before installation.
B. Package room and door signs in sequential order of installation, labeled by floor or building.
C. Store tape adhesive at normal room temperature.

1.08 FIELD CONDITIONS
A. Do not install tape adhesive when ambient temperature is lower than recommended by
   manufacturer.
B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Flat Signs:
   2. Cosco Industries (ADA signs); ADA Series 1: www.coscoarchitecturalsigns.com.
   5. Substitutions: See Section 01 6000 - Product Requirements.
B. Dimensional Letter Signs:
C. Plaques:

2.02 SIGNAGE APPLICATIONS
A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1,
   unless otherwise indicated; in the event of conflicting requirements, comply with the most
   comprehensive and specific requirements.
B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not
   including corridors, lobbies, and similar open areas.
   1. Sign Type: Flat signs with engraved panel media as specified.
   2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
   3. Character Height: 1 inch.
   4. Sign Height: 2 inches, unless otherwise indicated.
   5. Office Doors: Identify with room numbers to be determined later, not the numbers
      indicated on drawings; in addition, provide "window" section for replaceable occupant
      name.
   6. Conference and Meeting Rooms: Identify with room numbers to be determined later, not
      the numbers indicated on drawings; in addition, provide "window" section with sliding "In
      Use/Vacant" indicator.
   7. Service Rooms: Identify with room names and numbers to be determined later, not those
      indicated on drawings.
   8. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", room numbers
      to be determined later, and braille.
   1. Provide luminous egress path marking as required by local authority having jurisdiction.
   2. Allow for total of 100 directional signs, approximately 6 inches square.
   3. Allow for 1000 linear feet of guidance strips.
   4. Provide one numbered seat marker for each seat in auditorium and one numbered row
      marker for each row, each side of aisles.

D. Emergency Evacuation Maps:
   1. Allow for one map per elevator lobby.
   2. Map content to be provided by Owner.
   3. Use clear plastic panel silk-screened on reverse, in brushed aluminum frame, screw-
      mounted.

E. Recognition/Donor Panels: Engraved panel media; individual name signs attached with
   magnetic tape to fixed panel.
   1. Dimensions and Number of Name Signs: As indicated on drawings.
   2. Provide all name signs whether engraved or not, for uniform overall appearance.
   3. Color: Color as selected.

F. Building Identification Signs:
   1. Use individual metal letters.
   2. Mount on outside wall in location indicated on drawings.

G. Other Dimensional Letter Signs: Wall-mounted.
   1. Exterior: Allow for total of 50 letters, 6 inches high, metal.
   2. Interior: Allow for total of 50 letters, 6 inches high, metal.

H. Plaque: See Allowance for details.

I. Traffic Signs: To match campus standards; locate where indicated on drawings.

2.03 SIGN TYPES

A. Flat Signs: Signage media without frame.
   1. Edges: Square.
   2. Corners: Square.
   4. Wall and Ceiling Mounting of Two-Sided Signs: Aluminum wall bracket, powder coated,
      color selected from manufacturer's standard colors, attached with screws in predrilled
      mounting holes, set in clear silicone sealant.
   5. Suspended Mounting: Stainless steel suspension cables, cable clamps, and ceiling
      fastener suitable for attachment to ceiling construction indicated.

B. Radius / Curved Signs: One-piece, curved extruded aluminum media holder securing flat,
   flexible sign media by curved lip on two sides; other two sides closed by end caps; concealed
   mounting attachment.
   1. Sizes: As indicated on drawings.
   2. Finish: Fluoropolymer coating – color as selected by Architect from standard range.
   3. Sign Orientation: Curved in horizontal section.
   4. Wall Mounting of One-Sided Signs: Mechanical anchorage, with predrilled holes, and set
      in clear silicone sealant.
   5. Wall and Ceiling Mounting of Two-Sided Signs: Aluminum wall bracket, powder coated,
      color selected from manufacturer's standard colors, attached with screws in predrilled
      mounting holes, set in clear silicone sealant.
   6. Directories: For customer-produced media; provide divider strips.

C. Font: Unless otherwise indicated:
   1. Character Font: Helvetica, Arial, or other sans serif font.
   2. Character Case: Upper case only.
   3. Color: As selected by Architect from standard range.
2.04 TACTILE SIGNAGE MEDIA
   A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
      1. Total Thickness: 1/16 inch.
   B. Applied Character Panels: Acrylic plastic base, with applied acrylic plastic letters and braille.
      1. Total Thickness: 1/8 inch.

2.05 NON-TACTILE SIGNAGE MEDIA
   A. Silk Screened Plastic Panels: Letters and graphics silk screened onto reverse side of plastic surface:
      2. Total Thickness: 1/8 inch.

2.06 PLAQUES
   A. Metal Plaques:
      1. Metal: Stainless steel sheet, flat, etched.
      2. Metal Sheet Thickness: 1/8 inch, minimum.

2.07 DIMENSIONAL LETTERS
   A. Metal Letters:
      1. Metal: Aluminum casting.
      2. Finish: Brushed, satin.

2.08 ACCESSORIES
   A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.
   B. Exposed Screws: Chrome plated.
   C. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION
   A. Install in accordance with manufacturer's instructions.
   B. Install neatly, with horizontal edges level.
   C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
   D. Protect from damage until Substantial Completion; repair or replace damaged items.

END OF SECTION
SECTION: 10 2226
ACCORDION FOLDING PARTITIONS

PART 1 – GENERAL

1.01 SUMMARY OF WORK
A. Furnish and install all accordion folding partitions shown on the drawings and specified herein.

1.02 RELATED SECTIONS
A. All headers, support structures, surrounding insulation, jambs, pocket doors, blocking and trim shall be furnished and installed by other sections.
B. All electrical work including but not limited to the following electrical work by Electrical Section:
1. Provide 115/230 volt single-phase (or 208 volt, 3-phase A.C.) electrical service in conduit to the reversing magnetic starter.
2. Provide 115/230 volt single-phase (or 208 volt, 3-phase A.C.) electrical service between the starter and the gear motor.
3. Provide 4” x 4” electrical box for the key switch located within line-of-sight of the folding partition.
4. Provide 3-conductor, 18-gauge stranded wire in conduit between the key switch and starter.
5. Provide key switch for door operation (3 position switch, spring return to center from right or left).

1.03 QUALITY ASSURANCE
A. Installation shall be accomplished by factory trained personnel.
B. Sound rated partitions shall have the laboratory sound rating indicated, when tested in accordance with the requirements of ASTM E-90.

1.04 SUBMITTALS
A. Refer to Section 01 3000 – Shop Drawings and Submittals.
B. Indicate required stacking depth, pocket width (if applicable) and height of header above finished floor. Show installation details, layout and any optional electrical requirements.

1.05 DELIVERY, STORAGE AND HANDLING
A. Deliver to job site in manufacturer’s original, unopened package.

1.06 COORDINATION BY GENERAL CONTRACTOR
A. Coordinate the efforts of the various trades affected by the work of this section. Assure accurate installation of header, jamb and trim. Provide “As-Built” dimensions for opening and storage pocket.
B. Supervise unloading and handling. Store boxes flat (no more than three high) in a dry area and protect from elements that may damage materials. Replace damaged materials at no additional cost to the owner.
C. Permanent power shall be in place for final connection when partitions are erected. Assure access to and proper clearance for motor operators.
1.07 WARRANTY
   A. Materials shall be warranted against defects and workmanship for a period of one (1) year from the date of substantial completion.

PART 2 – PRODUCTS
2.01 MANUFACTURER
   A. Folding partitions shall be DuraSound as manufactured by Won-Door Corporation, Salt Lake City, Utah.

2.02 MATERIALS
   A. Operation: Shall be top supported and manually operated.
   B. Construction: Shall consist of two parallel accordion-type walls of panels independently suspended with no pantographs or interconnections except at the lead-post.
   C. Panels shall be formed of cold rolled vinyl-clad 24-gauge V-grooved steel. Vinyl shall be permanently bonded by heat pressure lamination to the steel panel. Panels shall be connected by full height extruded vinyl hinges.
   D. Insulation: Interior surfaces of both walls shall be completely covered with a continuous blanket of 2 lb. density foil-backed fiberglass fastened in place with steel spring-clips.
   E. Suspension systems: Shall consist of two extruded aluminum tracks spaced 6” or 8” on center attached to the overhead structural support. Each panel shall be suspended by a steel hanger pin and a pair of nylon-tired ball bearing rollers. Each lead-post shall be suspended by a 4-wheel ball bearing trolley.
   F. Lead-posts: Shall be of 16-gauge cold rolled steel and shall be connected to the partition by specially formed steel panels. Lead-post hardware shall include standard grip-type handles and sliding latch to affect closure.
   G. Perimeter Seals: Shall consist of continuous extruded vinyl sweep strips attached to the top and bottom of the partition. Leading edges of lead-posts and receiver posts shall be acoustically sealed by extruded vinyl interlocking seals.
   H. Hanging weight shall be 4.2 pounds per square foot.
   I. Stabilizer Bar: Shall consist of a top supported, internally mounted diagonal brace connected to the lead-post for proper alignment during operation and latching. (Requires 14” wide header. Required on all doors over 14'-0" high.)
   J. Motor Operator:
      1. Operation: Motor-operated folding partitions shall be driven by means of a roller chain attached to the stabilizer bar trolley. An internally mounted stabilizer bar shall keep lead posts plumb and in proper alignment during operation and insure a tight fitting closure without the use of mechanical latches.
      2. Assembly: Shall consist of a 115/230 volt single-phase A.C. motor or 208 volt 3-phase A.C. gear motor, reversing electromagnetic starter, and limit switch. Size of each motor shall be determined by manufacturer to insure proper operation.
   K. Key Locks: Key locks shall be provided by manufacturer.

2.03 ACOUSTICAL PERFORMANCE
   A. Sound transmission class (STC) shall be STC 48 when tested in accordance with requirements of ASTM E-90.

2.04 COLORS
   A. Vinyl finish color shall be selected by the architect from manufacturer’s standard colors.
PART 3 – EXECUTION

3.01 PREPARATION BY GENERAL CONTRACTOR
   A. Openings shall be to the dimensions specified, plumb and level.
   B. Headers shall be parallel with the finished floor to within ±1/4" tolerance over the entire length of the opening.

3.02 INSPECTION
   A. Contractor shall inspect prepared opening and immediately notify the architect, in writing, of unacceptable conditions.

3.03 INSTALLATION
   A. Install partitions in accordance with manufacturer’s printed instructions.
   B. Upon completion of the installation, the General Contractor shall protect partitions from damage and replace or repair subsequent damage so that partitions are acceptable to the architect, at no additional cost to the owner.

END OF SECTION
SECTION 10 2601
WALL AND CORNER GUARDS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Corner guards.

1.02 RELATED REQUIREMENTS
B. Section 05 5000 - Metal Fabrications: Anchors for attachment of work of this section, concealed in wall.
C. Section 06 1000 - Rough Carpentry: Blocking for wall and corner guard anchors.

1.03 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.
C. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Wall and Corner Guards:
   5. Trim-Tex, Inc; www.trim-tex.com/#sle.
   6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 COMPONENTS
A. Corner Guards - Surface Mounted:
   1. Material: High impact vinyl with full height extruded aluminum retainer.
   4. Performance: Resist lateral impact force of 100 lbs at any point without damage or permanent set.
   5. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
   6. Width of Wings: 2 inches.
   7. Corner: Square.
   8. Color: As selected from manufacturer's standard colors.
   10. Preformed end caps.
   D. Mounting Brackets and Attachment Hardware: Appropriate to component and substrate.

2.03 FABRICATION
A. Fabricate components with tight joints, corners and seams.
B. Pre-drill holes for attachment.
C. Form end trim closure by capping and finishing smooth.

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.
B. Verify that field measurements are as indicated on drawings.
3.02 INSTALLATION
   A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.
   B. Position corner guard 6 inches above finished floor to 48 inches high.
   E. Terminate rails 4 inches short of door opening.
   F. Coordinate installation of vinyl fabric wall covering with corner guard frame and cover.

3.03 TOLERANCES
   A. Maximum Variation From Required Height: 1/4 inch.
   B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

3.04 SCHEDULE
   A. Receiving 145: Corner guards, grey color, to external wall corners as indicated on Drawings.

END OF SECTION
SECTION 10 2800
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Commercial toilet accessories.
B. Commercial shower and bath accessories.
C. Electric hand/hair dryers.
D. Diaper changing stations.
E. Utility room accessories.

1.02 RELATED REQUIREMENTS
A. Section 08 8300 - Mirrors: Other mirrors.
B. Section 09 3000 - Tiling: Ceramic washroom accessories.

1.03 REFERENCE STANDARDS
C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS
A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.05 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
C. Samples: Submit two samples of each accessory, illustrating color and finish.
D. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Commercial Toilet, Shower, and Bath Accessories:
   1. Bobrick Washroom Equipment Inc: www.bobrick.com
   4. Substitutions: Section 01 6000 - Product Requirements.
B. Electric Hand/Hair Dryers:
3. Substitutions: Section 01 6000 - Product Requirements.

C. Diaper Changing Stations:
   2. Substitutions: 01 6000 - Product Requirements.

D. All items of each type to be made by the same manufacturer.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
   1. Grind welded joints smooth.
   2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.

B. Keys: Provide keys for each accessory to Owner; master key lockable accessories.

C. Stainless Steel Sheet: ASTM A666, Type 304.

D. Stainless Steel Tubing: ASTM A269, Grade TP304 or TP316.

E. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

F. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.

G. Adhesive: Two component epoxy type, waterproof.

2.03 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

B. Chrome/Nickel Plating: ASTM B456, SC 2, satin finish, unless otherwise noted.

C. Back paint components where contact is made with building finishes to prevent electrolysis.

2.04 COMMERCIAL TOILET ACCESSORIES

A. Toilet Paper Dispenser: Double roll, surface mounted bracket type, stainless steel, spindleless type for tension spring delivery designed to prevent theft of tissue roll.
   1. Attached Purse Shelf: 0.03 inch satin finished stainless steel, with rolled or formed edge at front.

B. Combination Towel Dispenser/Waste Receptacle: Recessed flush with wall, stainless steel; seamless wall flanges, continuous piano hinges.
   1. Waste receptacle liner: Reusable, heavy-duty vinyl.
   2. Towel dispenser capacity: 400 C-fold.
   4. Products:
      a. Substitutions: Section 01 6000 - Product Requirements.

C. Mirrors: Backlit CED mirrors, super bright, dim-able, stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
   1. Annealed Float Glass: Silvering, protective and physical characteristics in compliance with ASTM C1503.
   2. Size: As specified in drawings.
   3. Type/Style: As selected by Architect.
   4. Installation location: As specified in drawings.
   5. Install as per manufacturer instructions.
   6. Products:
      b. Substitutions: See section 01 6000 – Product Requirements.
D. Sink System: Sloan AER-DEC integrated sink system, with soap dispenser, faucet, hand dryer and sink basin.
   1. Standard mounting, hard wired, standard stainless steel, straight edge Corian counter.
   2. Size and materials: As specified by Architect.
   4. Standard soap dispenser included:
      a. ESD-400 electronic foam soap dispenser.
      b. 120 Vac.
      c. ANSI 117.1.
   5. Standard Basys faucet included:
      b. Refer to Basys series faucet specification for complete details.
   6. Standard hand dryer
      a. EHD-510 hand dryer.
      b. ANSI 117.1, UL 499.
   7. Install as per manufacturer instructions.
   8. Product:
E. Grab bars: Stainless steel, non-slip grasping surface finish, type 304
   1. Standard Duty Grab Bars:
      a. Push/Pull Point Load: 250 pound force minimum.
      b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, concealed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
      c. Length and Configuration: As indicated on drawings.
      d. Products:
         1) Bobrick Washroom Equipment Inc.: www.bobrick.com
         2) Substitutions: Section 01 6000 - Product Requirements.
   2. Heavy Duty Grab Bars: Floor supports are acceptable if necessary to achieve load rating.
      a. Push/Pull Point Load: Minimum 1000 pound-force, minimum.
      b. Dimensions: 1-1/2 inch outside diameter, minimum 0.125 inch wall thickness, concealed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
      c. Length and Configuration: As indicated on drawings.
      d. Products:
         2) Substitutions: Section 01 6000 - Product Requirements.

2.05 COMMERCIAL SHOWER AND BATH ACCESSORIES
A. Shower Curtain Rod: Stainless steel tube, 1 inch outside diameter, 0.04 inch wall thickness, satin-finished, with 3 inch outside diameter, minimum 0.04 inch thick satin-finished stainless steel flanges, for installation with concealed fasteners.
   1. Products:
      a. Substitutions: Section 01 6000 - Product Requirements.
B. Shower Curtain:
   1. Material: Opaque vinyl, 0.008 inch thick, bright white matte finish, with antibacterial treatment, flameproof and stain-resistant.
   3. Size: 36 by 72 inches, hemmed edges.
   4. Grommets: Stainless steel; pierced through top hem on 6 inch centers.
   5. Color: As selected from manufacturer's standard colors.
   6. Shower Curtain Hooks: Chrome-plated or stainless steel spring wire designed for snap closure.
   7. Products:
a. Substitutions: Section 01 6000 - Product Requirements.

C. Folding Shower Seat: Wall-mounted recessed; welded tubular seat frame, structural support members, hinges and mechanical fasteners of Type 304 stainless steel, L-shaped, right hand seat.
   1. Seat: Teakwood slats secured to supporting frame members with stainless steel screws. Ease edges of each slat.
   2. Size: ADA Standards compliant.
   3. Products:
      a. Substitutions: Section 01 6000 - Product Requirements.

D. Wall-Mounted Soap Dish: Heavy duty, seamless stainless steel, surface-mounted with drain holes, without grab bar, satin finish; with concealed mechanical fastening suitable for substrate and backplate.
   1. Products:
      a. As directed by Architect.

E. Robe Hook: Heavy-duty stainless steel, single-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.

2.06 DIAPER CHANGING STATIONS
   A. Diaper Changing Station: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.
      1. Material: Stainless steel, type 304.
      3. Color: As selected by Architect on drawings.
      5. Products:
         a. Substitutions: 01 6000 - Product Requirements.

2.08 UTILITY ROOM ACCESSORIES
   A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
      1. Drying rod: Stainless steel, 1/4 inch diameter.
      2. Hooks: 2, 0.06 inch stainless steel rag hooks at shelf front.
      3. Mop/broom holders: 3 spring-loaded rubber cam holders at shelf front.
      4. Length: 36 inches.
      5. Length: Manufacturer's standard length for number of holders/hooks.
      6. Products:
         a. Substitutions: Section 01 6000 - Product Requirements.

PART 3 EXECUTION
3.01 EXAMINATION
   A. Verify existing conditions before starting work.
   B. Verify exact location of accessories for installation.
   C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
   D. Verify that field measurements are as indicated on drawings.

3.02 PREPARATION
   A. Deliver inserts and rough-in frames to site for timely installation.
   B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION
   A. Install accessories in accordance with manufacturers’ instructions in locations indicated on the drawings.
B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.
   1. Grab Bars: As indicated on drawings.
   2. Mirrors: As indicated on drawings.
   3. Other Accessories: As indicated on drawings.

3.04 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION
SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Fire extinguishers.
B. Fire extinguisher cabinets.
C. Accessories.

1.02 RELATED REQUIREMENTS
A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.
B. Section 09 9000 – Painting and Coating: Field paint finish.
C. Section 21 1200 - Fire-Suppression Standpipes: Cabinet enclosure for extinguishers.

1.03 REFERENCE STANDARDS
D. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide extinguisher operational features.
C. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
E. Manufacturer’s Certificate: Certify that products meet or exceed specified requirements.
F. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.05 FIELD CONDITIONS
A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Fire Extinguishers:
   5. Strike First Corporation of America; ABC-Seamless Steel Fire Extinguisher: www.strikefirstusa.com/#sle.
   6. Substitutions: See Section 01 6000 - Product Requirements.
B. Fire Extinguisher Cabinets and Accessories:
9. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
   1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.

B. Water Type Fire Extinguishers: Stainless steel tank, pressurized, with premixed antifreeze solution, including hose and nozzle.
   1. Class: 2-A type.
   2. Finish: Polished chrome.
   3. Temperature Range: Minus 40 degrees F to 120 degrees F.

C. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gage.
   2. Class: A:B:C type.
   3. Size: 10 pound.
   4. Size and classification as scheduled.
   5. Finish: Baked polyester powder coat, color as selected.
   6. Temperature range: Minus 65 degrees F to 120 degrees F.

D. FFFP - Foam Type Fire Extinguishers: Stainless steel tank, with pressure gage.
   2. Size and classification as scheduled.
   4. Temperature range: 40 degrees F to 120 degrees F.

E. Carbon Dioxide Type Fire Extinguishers: Aluminum tank, with pressure gage.
   1. Class: B:C type.
   2. Size and classification as scheduled.
   3. Finish: Baked polyester powder coat, color as selected by Architect from standard range.
   4. Temperature range: Minus 40 degrees F to 120 degrees F.

F. Dry Chemical Type Fire Extinguishers: Stainless steel tank, with pressure gage.
   1. Class: K type.
   2. Size and classification as scheduled.
   4. Temperature range: Minus 20 degrees F to 120 degrees F.

G. FE-36 Clean Agent Type Fire Extinguishers: Stainless steel tank, with pressure gage.
   2. Size and classification as scheduled.
   3. Finish: Baked polyester powder coat, color as selected by Architect from standard range.
   4. Temperature Range: Minus 40 degrees F to 120 degrees F.

2.03 FIRE EXTINGUISHER CABINETS

A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.

B. Cabinet Construction: Non-fire rated.
   1. Formed primed steel sheet; 0.036 inch thick base metal.

C. Fire Rated Cabinet Construction: One-hour fire rated.
   1. Steel; double wall or outer and inner boxes with 5/8 inch thick fire barrier material.

D. Cabinet Configuration: Recessed type.
   1. Size to accommodate extinguishers and accessories.
   2. Trim: Flat square edge, with one inch wide face.
3. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.

E. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinge.

F. Door Glazing: Float glass, clear, 1/8 inch thick, and set in resilient channel glazing gasket.

G. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.

H. Weld, fill, and grind components smooth.

I. Finish of Cabinet Exterior Trim and Door: No. 4 - Brushed stainless steel.

2.04 ACCESSORIES
A. Extinguisher Brackets: Formed steel, chrome-plated.
B. Cabinet Signage: Fire extinguisher color in contrast to extinguisher cabinet.

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify existing conditions before starting work.
B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Install cabinets plumb and level in wall openings, 4 feet from finished floor to top of extinguisher.
C. Secure rigidly in place.
D. Place extinguishers in cabinets.
E. Position cabinet signage at vertically hinge side.

3.03 SCHEDULES
A. Corridors: Water Type, Class 2-A, 2 1/2 gallon capacity, polished chrome finish, placed in 12 inch wide by 30 inch high by 10 inch deep recessed polished stainless steel cabinet; locate two per floor.

B. Boiler Room: One fire blanket, and One Dry Chemical Type, Class 4-A:60-B:C fire extinguisher placed in 24 inch wide by 30 inch high by 10 inch deep surface mounted cabinet.

END OF SECTION
SECTION 10 5100
PLASTIC LAMINATE LOCKERS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Custom plastic laminate lockers and accessories.

1.2 REFERENCES
A. Minimum standard for wood lockers shall conform to AWI (Architectural Woodwork Institute) Architectural Woodwork Quality Standards Illustrated.

1.3 QUALITY ASSURANCE
A. All parts and hardware shall be AWI compliant, structurally sound and free from defects, in material and workmanship under normal use and service for the full warranty period.

1.5 SUBMITTALS
A. Product Data: Available upon request, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Product date specific to materials used in construction of locker.

B. Shop Drawings: Indicate locker plan layout for Hollman contracted installations, component profiles and elevations, schedule of finishes, and accessories.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING
A. Store products in a dry, ventilated area until ready for installation.
B. Protect finishes from moisture, soiling and damage during handling.

1.7 PROJECT CONDITIONS
A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
B. During and after installation, maintain same temperature and humidity conditions in building spaces as will occur after occupancy.
C. Protect locker finish and adjacent surfaces from damage.

2.0 PRODUCTS

2.1 MANUFACTURERS
A. Acceptable Manufacturer: Hollman Inc.; 1825 Walnut Hill Lane, Irving, TX 75038, Toll Free (800) 433-3630, Fax (972) 815-2921, Email: lockers@hollman.com.
B. Substitutions: Not permitted.
C. Requests for substitutions will be considered in accordance with provisions of Section 01600.
2.2 MATERIALS

A. Locker Frame: Tops, sides, and back shall be constructed of 5/8'' high density thermo-fused melamine.
   1. Expansion / contraction within +/-1/16'' per locker.

B. Locker Models:
   1. Double tier, Model B: 1-Coat Rod, 1-Coat Hook and integrated bench with concealed storage

C. Visible Edges: Sealed with a 1.5 millimeter PVC edge banding to closely match locker doors

D. Locker Doors:
   1. Laminate: 5/8 inch high-industrial grade particle board core with .030 inch vertical grade high pressure
      fire retardant plastic laminate. Matching laminate applied to interior & exterior door face.
      a. Door edges sealed with eased edge 1.5 mm PVC edge banding to closely match laminate.

E. Standard hardware:
   1. Number disk, 1-1/2'' Dia. flush mounted disc with 3/8'' high contrast digits. US Block 1L font.
   2. Coat Rod, 1'' Dia. recessed rod.
   3. Coat Hook(s), 2-prong metal hooks.
   4. Hinges are nickel finished, concealed, heavy duty European steel allowing 110 degree door opening with
      a limited lifetime warranty.
      a. 4 hinges per door 60'' H & over.
      b. 3 hinges per door 36'' ---59'' H.
      c. 2 hinges per door 35'' H & under.

F. Locks: Centered vertically in door & spaced horizontally per lock type: HS HASP for pad lock.

G. Venting: 12 millimeter openings between door and top and bottom of locker and dividers on multiple opening
   frames provide continuous natural air flow.

2.3 FABRICATION

A. Locker shall be fabricated using doweled and glued & nailed assembly process.

B. Fabricate lockers square, rigid and without warp, with the finished faces flat and free of scratches and chips.

C. Machine all parts and attachment holes accurately and without chips.

3.0 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until adjacent substrates and finishes have been properly prepared.

B. Verify prepared bases are in correct position and configuration.

C. If preparation is the responsibility of another installer, notify Architect 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.

C. Verify adequacy of backing and support framing.
3.3 INSTALLATION
A. Install in accordance with manufacturer’s instructions.
B. If Hollman is not contracted for installation, client must unload lockers from the delivery truck.
C. Set and secure lockers in place; rigid, plumb, and level.
D. Use concealed joint fasteners to align and secure adjoining cabinet units.
E. Conceal screw heads with plastic caps to match locker interior.
G. Install end panels, filler panels, tops and bases as indicated on the approved shop drawings.
H. Install accessories.

3.4 ADJUSTING
A. Adjust moving or operating parts to function smoothly and correctly.

3.5 CLEANING
A. Clean locker interiors and exterior surfaces.

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

END OF SECTION
SECTION 10 5617
WALL MOUNTED STANDARDS AND SHELVING

PART 1 PRODUCTS

1.01 MANUFACTURERS
A. Shelf Standards and Brackets:
   2. Alternate to be approved by Architect.
B. Shelves:
   1. As selected by Architect.

1.02 MATERIALS
A. Extra Heavy Duty Shelf Standards: Single-slotted channel standards for brackets adjustable in 1 inch (25 mm) increments along entire length of standard, drilled and countersunk for screws.
   2. Load Capacity: Recommended by manufacturer for loading of 540 to 1,060 pounds per pair of standards. Must withstand 20 lbs per linear foot of shelving space.
   3. Face Width: 5/8 inch, single slotted.
   4. Material: 12 gage, 0.1046 inch sheet steel.
   5. Lengths: As indicated on drawings.
   7. Brackets: 12 gage, 0.1046 inch sheet steel, reinforced, locking into slots with molded nylon cam lock lever; size to suit shelves; same finish as standards.
   9. Bracket Quantity: Provide one bracket for each 24 inches of standard length.
B. Closet Rods: Steel tubing for wall mounting in flange fittings.
   1. Type: Oval chrome look, extra heavy duty, welded seam; 1.18 inches high by 0.59 inches wide, 0.047 inch wall thickness.
   2. Length: As required for application, up to 12 feet.
   3. Provide mounting fittings to suit application.
C. Laminate Faced Shelves: Particleboard or medium density fiberboard covered with high pressure decorative laminate on both sides.
   1. Edge Finish: Matching laminate, all four edges.
   3. Length: As indicated on drawings.
   4. Laminate: NEMA LD 3 Type HGL.
   5. Laminate Color and Pattern: As indicated on drawings.
D. Wood Shelves: Solid board shelves, with edges sanded and eased.
   1. Species: Selected by Architect, as indicated on drawings.
   2. Thickness: 3/4 inch, nominal.
   3. Length: As indicated on drawings.
   6. Application: Use wood shelves as indicated on drawings.
   7. Shelf Quantity: As indicated on drawings.
E. Fasteners: Screws as recommended by manufacturer for intended application or as otherwise required by project conditions.

PART 2 EXECUTION

2.01 EXAMINATION
A. Do not begin installation until substrates have been properly prepared.
B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
2.02 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.

2.03 INSTALLATION
   A. Install in accordance with manufacturer's instructions.
   B. Mount standards to solid backing capable of supporting intended loads.
   C. Install brackets, shelving, and accessories.

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

END OF SECTION
PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Hydraulic passenger elevators as shown and specified. Elevator work includes:
   2. Elevator car enclosures, hoistway entrances and signal equipment.
   3. Jack(s).
   4. Operation and control systems.
   5. Accessibility provisions for physically disabled persons.
   6. Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.
   7. Materials and accessories as required to complete the elevator installation.

B. Related Sections:
   1. Division 3 Concrete: Installing inserts, sleeves and anchors in concrete.
   2. Division 4 Masonry: Installing inserts, sleeves and anchors in masonry.
   3. Division 5 Metals:
      a. Providing hoist beams, pit ladders, steel framing, auxiliary support steel and divider beams for supporting guide-rail brackets.
      b. Providing steel angle sill supports and grouting hoistway entrance sills and frames.
   4. Division 9 Finishes: Providing elevator car finish flooring and field painting unfinished and shop primed ferrous materials.
   5. Division 22 Plumbing:
      a. Sump pit and oil interceptor.
   6. Division 23: Heating and Ventilation:
      a. Heating and ventilating hoistways.
   7. Division 16 Sections:
      a. Providing electrical service to elevators. (note: fused disconnect switch to be provided as part of elevator manufacture product, see section 2.11 Miscellaneous elevator components for further details.)
      b. Emergency power supply, transfer switch and auxiliary contacts.
      c. Heat and smoke sensing devices.
      d. Convenience outlets and illumination in hoistway and pit.

C. Work Not Included: General contractor shall provide the following in accordance with the requirements 2015 International Building Code, NJ Edition, and ANSI A17.1 Code. For specific rules, refer to ANSI A17.1, Section 300 for hydraulic elevators. State or local requirements must be used if more stringent.
   1. Elevator hoist beam to be provided at top of elevator shaft. Beam must be able to accommodate proper loads and clearances for elevator installation and operation.
   2. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports and bracing including all setting templates and diagrams for placement.
   3. Hatch walls require a minimum two hours of fire rating. Hoistway should be clear and plumb with variations not to exceed 1/2" at any point.
   4. Elevator hoistways shall have barricades, as required.
   5. Install bevel guards at 75° on all recesses, projections or setbacks over 2" (4" for A17.1 2000 areas) except for loading or unloading.
   6. Provide rail bracket supports at pit, each floor and roof. For guide rail bracket supports, provide divider beams between hoistway at each floor and roof.
   7. Pit floor shall be level and free of debris. Reinforce dry pit to sustain normal vertical forces from rails and buffers.
8. Where pit access is by means of the lowest hoistway entrance, a vertical ladder of non-combustible material extending 42'' minimum, (48'' minimum for A17.1-2000 areas) shall be provided at the same height, above sill of access door or handgrips.

9. All wire and conduit should run remote from the hoistways.

10. When heat, smoke or combustion sensing devices are required, connect to elevator control cabinet terminals. Contacts on the sensors should be sided for 12 volt D.C.

11. Install and furnish finished flooring in elevator cab.

12. Finished floors and entrance walls are not to be constructed until after sills and door frames are in place. Consult elevator contractor for rough opening size. The general contractor shall supply the drywall framing so that the wall fire resistance rating is maintained, when drywall construction is used.

13. Where sheet rock or drywall construction is used for front walls, it shall be of sufficient strength to maintain the doors in true lateral alignment. Drywall contractor to coordinate with elevator contractor.

14. Before erection of rough walls and doors; erect hoistway sills, headers, and frames. After rough walls are finished; erect fascias and toe guards. Set sill level and slightly above finished floor at landings.

15. To maintain legal fire rating (masonry construction), door frames are to be anchored to walls and properly grouted in place.

16. The elevator wall shall interface with the hoistway entrance assembly and be in strict compliance with the elevator contractor’s requirements.

17. General Contractor shall fill and grout around entrances, as required.

18. All walls and sill supports must be plumb where openings occur.

19. Locate a light fixture (200 lx / 19 fc) and convenience outlet in pit with switch located adjacent to the access door.

20. Provide telephone line, light fixture (200 lx / 19 fc), and convenience outlet in the hoistway at the landing where the elevator controller is located. Typically this will be at the landing above the 1st floor. Final location must be coordinated with elevator contractor.

21. As indicated by elevator contractor, provide a light outlet for each elevator, in center of hoistway.

22. For signal systems and power operated door: provide ground and branch wiring circuits.

23. For car light and fan: provide a feeder and branch wiring circuits to elevator control cabinet.

24. Controller landing wall thickness must be a minimum of 8 inches thick. This is due to the controller being mounted on the second floor landing in the door frame on the return side of the door. For center opening doors, the controller is located on the right hand frame (from inside the elevator cab looking out). These requirements must be coordinated between the general contractor and the elevator contractor.

25. Cutting, patching and recesses to accommodate hall button boxes, signal fixtures, etc..

1.02 SUBMITTALS

A. Product data: When requested, the elevator contractor will provide standard cab, entrance and signal fixture data to describe product for approval.

B. Shop drawings:
  1. Show equipment arrangement in the pit and hoistway. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.
  2. Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.
  3. Show floors served, travel distances, maximum loads imposed on the building structure at points of support and all similar considerations of the elevator work.
  4. Indicate electrical power requirements and branch circuit protection device recommendations.
C. Powder Coat Paint selection: Submit manufacturer's standard selection charts for exposed finishes and materials.

D. Plastic laminate selection: Submit manufacturer's standard selection charts for exposed finishes and materials.

E. Metal Finishes: Upon request, standard metal samples provided.

F. Operation and maintenance data. Include the following:
   2. Parts list, with recommended parts inventory.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: An approved manufacturer with minimum fifteen years experience in manufacturing, installing, and servicing commercial elevators.
   1. Must be the manufacturer of the power unit, controller, signal fixtures, door operators cab, entrances, and all other major parts of the elevator operating equipment.
      a. The major parts of the elevator equipment shall be manufactured in the United States, and not be an assembled system.
   2. The manufacturer shall have a documented, on-going quality assurance program.
   5. LEED Gold certified elevator manufacturing facility.

B. Installer Qualifications: The manufacturer or an authorized agent of the manufacturer with not less than fifteen years of satisfactory experience installing elevators equal in character and performance to the project elevators.

C. Regulatory Requirements:
   1. ASME/ANSI A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code.
   6. CAN/CSA C22.1 Canadian Electrical Code.
   8. California Department of Public Health Standard Method V1.1–2010, CA Section 01350

D. Fire-rated Entrance Assemblies: Opening protective assemblies including frames, hardware, and operation shall comply with ASTM E2074, CAN4-S104 (ULC-S104), UL10(B), and NFPA 80. Provide entrance assembly units bearing Class B or 1 1/2 hour label by a Nationally Recognized Testing Laboratory (2 hour label in Canada).

E. Inspection and testing: Elevator Installer shall obtain and pay for all required inspections, tests, permits and fees for elevator installation.
   1. Arrange for inspections and make required tests.
   2. Deliver to the Owner upon completion and acceptance of elevator work.

F. Product Qualifications:
   1. LCA, EPD and HPD data must be provided for all major components of the elevator system.
2. LCA data must be compatible with GaBI Software.
3. Environmental Product Declaration (EPD): Publicly available, critically reviewed life cycle analysis having at least a cradle-to-gate scope.
4. GreenScreen Chemical Hazard Analysis: All ingredients of 100 parts-per-million or greater evaluated using GreenScreen for Safer Chemicals Method v1.2.
5. Health Product Declarations (HPD v2 or later): Complete, published declaration with full disclosure of known hazards, prepared using the Health Product Declaration Collaborative's "HPD builder" online tool; Unknown hazard listed will not be considered acceptable.

1.04 DELIVERY, STORAGE AND HANDLING
A. Manufacturing will deliver elevator materials, components and equipment and the contractor is responsible to provide secure and safe storage on job site.

1.05 PROJECT CONDITIONS
A. Prohibited Use: Elevators shall not be used for temporary service or for any other purpose during the construction period before Substantial Completion and acceptance by the purchaser unless agreed upon by Elevator Contractor and General Contractor with signed temporary agreement.

1.06 WARRANTY
A. Warranty: Submit elevator manufacturer's standard written warranty agreeing to repair, restore or replace defects in elevator work materials and workmanship not due to ordinary wear and tear or improper use or care for 12 months after completion of installation or acceptance thereof by beneficial use, whichever is earlier.

1.07 MAINTENANCE
A. Furnish maintenance and call back service for a period of 12 months for each elevator after completion of installation or acceptance thereof by beneficial use, whichever is earlier, during normal working hours, excluding callbacks. Service shall consist of periodic examination of the equipment, adjustment, lubrication, cleaning, supplies and parts to keep the elevators in proper operation.

1. Manufacturer shall have a service office and full time service personnel within a 100 mile radius of the project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Manufacturer: ThyssenKrupp Elevator

2.02 MATERIALS, GENERAL
A. All Elevator Cab materials including frame, buttons, lighting, wall and ceiling assembly, laminates and carpet shall have an EPD and an HPD, and shall meet the California Department of Public Health Standard Method V1.1–2010, CA Section 01350 as mentioned in 1.03.9 of this specification.
B. Colors, patterns, and finishes: As selected by the Architect from manufacturer's standard colors, patterns, and finish charts.
C. Steel:
1. Shapes and bars: Carbon.
2. Sheet: Cold-rolled steel sheet, commercial quality, Class 1, matte finish.
3. Finish: Factory-applied baked enamel for structural parts, powder coat for architectural parts. Color selection must be based on elevator manufacture’s standard selections.

D. Plastic laminate: Decorative high-pressure type, complying with NEMA LD3, Type GP-50 General Purpose Grade, nominal 0.050” thickness. Laminate selection must be based on elevator manufacture’s standard selections.

E. Carpet: By others.

2.03 HOISTWAY EQUIPMENT

A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood subfloor. Underside of the platform shall be fireproofed. The car platform shall be designed and fabricated to support one-piece loads weighing up to 25% of the rated capacity.

B. Sling: Steel stiles affixed to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.

C. Guide Rails: Steel, omega shaped, fastened to the building structure with steel brackets.
   1. Guide Shoes: Slide guides shall be mounted on top and bottom of the car.
   2. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on a steel template that is fastened to the pit floor. Provide extensions if required by project conditions.
   3. Jack: Jack unit shall be of sufficient size to lift the gross load the height specified. Factory test jack to insure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Provide the following jack type: Twin post holeless telescopic 2-stage. Two jacks piped together, mounted one on each side of the car with each having two telescopic sections designed to extend in a synchronized manner when oil is pumped into the assembly. Each jack section will be guided from within the casing or the plunger assembly used to house the section. Each plunger shall have a high pressure sealing system which will not allow for seal movement or displacement during the course of operation. The jack shall be designed to be mounted on the pit floor or in a recess in the pit floor. Each jack section shall have a bleeder valve to discharge any air trapped in the section.
   4. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the landings and correct for overtravel or undertravel. Self-leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.

Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary code compliant pipe and fittings shall be provided to connect the power unit to the jack unit. Provide proper grade readily biodegradable oil as specified by the manufacturer of the power unit (see Power Unit section 2.04.G for further details).

Pit moisture/water sensor located approximately 1 foot above the pit floor to be provided. Once activated, elevator will perform “flooded pit operation”, which will run the car up to the designated level.
floor, cycle the doors and shut down and trip the circuit breaker shunt to remove 3 phase power from all equipment, including pit equipment.

5. Motorized oil line shut-off valve shall be provided that can be remotely operated from the controller landing service panel. Also a means for manual operation at the valve in the pit is required.

2.04 POWER UNIT

A. Power Unit (Oil Pumping and Control Mechanism): A self-contained unit located in the elevator pit consisting of the following items:
   1. NEMA 4/Sealed Oil reservoir with tank cover including vapor removing tank breather
   2. An oil hydraulic pump.
   3. An electric motor.
   4. Electronic oil control valve with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and electro-magnetic controlling solenoids.

B. Pump: Positive displacement type pump specifically manufactured for oil-hydraulic elevator service. Pump shall be designed for steady discharge with minimum pulsation to give smooth and quiet operation. Output of pump shall not vary more than 10 percent between no load and full load on the elevator car.

C. Motor: Standard manufacture motor specifically designed for oil-hydraulic elevator service. Duty rating – motors shall be capable of 80 starts per hour with a 30% motor run time during each start.

D. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.
   1. Relief valve shall be adjustable and be capable of bypassing the total oil flow without increasing back pressure more than 10 percent above that required to barely open the valve.
   2. Up start and stop valve shall be adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, ensuring smooth up starts and up stops.
   3. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.
   4. Lowering valve and leveling valve shall be adjustable for down start speed, lowering speed, leveling speed and stopping speed to ensure smooth “down” starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling after slowdown is initiated.
   5. Provided with constant speed regulation in both up and down direction. Feature to compensate for load changes, oil temperature, and viscosity changes.


F. A secondary hydraulic power source (powered by 110VAC single phase) must be provided. This is required to be able to raise (reposition) the elevator in the event of a system component failure (i.e. pump motor, starter, etc.)

G. Oil Type: Readily biodegradable that is USDA certified biobased product, ultra low toxicity, readily biodegradable, energy efficient, high performing fluid made from canola oil with antioxidant, anticorrosive, antifoaming, and metal-passivating additives. Especially formulated for operating in environmentally sensitive areas. USDA certified biobased product, 95% bio-based content, per ASTM D6866.
2.05 HOISTWAY ENTRANCES

A. Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening bolted/knock down construction.
   1. Manufacturer's standard entrance design consisting of hangers, doors, hanger supports, hanger covers, fascia plates, sight guards, and necessary hardware.
   2. Main landing door & frame finish: Stainless steel panels, no. 4 brushed finish.
   3. Typical door & frame finish: Stainless steel panels with no. 4 brushed finish.

B. Integrated Control System: the elevator controller to be mounted to hoistway entrance above 1st landing. The entrance at this level, shall be designed to accommodate the control system and provide a means of access to critical electrical components and troubleshooting features. See section 2.09 Control System for additional requirements.

C. At the controller landing, the hoistway entrance frame shall have space to accommodate and provide a lockable means of access (group 2 security) to a 3 phase circuit breaker. See section 2.11 Miscellaneous Elevator Components for further details.

D. Interlocks: Equip each hoistway entrance with an approved type interlock tested as required by code. Provide door restriction devices as required by code.

E. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoistway horizontal sliding door.
   1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
   2. Hangers: Provide an adjustable device beneath the track to limit the up-thrust of the doors during operation.
   3. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.

F. Hoistway Sills: Extruded metal, with groove(s) in top surface. Provide mill finish on aluminum.

2.06 CAR ENCLOSURE

A. Car Enclosure:
   1. Walls: Cab type TKAP, reinforced cold-rolled steel with two coats factory applied baked enamel finish, with applied vertical wood core panels covered on both sides with high pressure plastic laminate.
      a. Reveals and frieze: Powder Coated
   2. Canopy: Cold-rolled steel with hinged exit.
   3. Ceiling: Downlight type, metal pans with suspended LED downlights.
   5. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic sliding guides.
      a. Door Finish: Stainless steel panels: No. 4 brushed finish.
      b. Cab Sills: Extruded aluminum, mill finish.
   6. Handrail: Provide 1.5” diameter cylindrical metal on side and rear walls on front opening cars and side walls only on front and rear opening cars. Handrails shall have a stainless steel, no. 4 brushed finish.
   7. Ventilation: Manufacturer’s standard exhaust fan, mounted on the car top.

B. Car Top Inspection: Provide a car top inspection station with an “Auto-Inspection” switch, an “emergency stop” switch, and constant pressure “up and down” direction and safety buttons to make the normal operating devices inoperative. The station will give the inspector complete control of the elevator. The car top inspection station shall be mounted in the door operator assembly.
2.07 DOOR OPERATION

A. Door Operation: Provide a direct current motor driven heavy duty operator designed to operate the car and hoistway doors simultaneously. Door movements shall be electrically cushioned at both limits of travel and the door operating mechanism shall be arranged for manual operation in event of power failure. Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing. Closed-loop, microprocessor controlled motor-driven linear door operator, with adjustable torque limits, also acceptable. AC controlled units with oil checks or other deviations are not acceptable.

1. No Un-Necessary Door Operation: The car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as a dispatch car.

2. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.

3. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is not registered before the door closes to within 6 inches of fully closed, the travel will reverse and the door will reopen to answer the other call.

4. Nudging Operation: The doors shall remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door closing is prevented for a field programmable time, a buzzer will sound. When the obstruction is removed, the door will begin to close at reduced speed. If the infra-red door protection system detects a person or object while closing on nudging, the doors will stop and resume closing only after the obstruction has been removed.

5. Limited Door Reversal: If the doors are closing and the infra-red beam(s) is interrupted, the doors will reverse and reopen partially. After the obstruction is cleared, the doors will begin to close.

6. Door Open Watchdog: If the doors are opening, but do not fully open after a field adjustable time, the doors will recycle closed then attempt to open six times to try and correct the fault.

7. Door Close Watchdog: If the doors are closing, but do not fully close after a field adjustable time, the doors will recycle open then attempt to close six times to try and correct the fault.

8. Door Close Assist: When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied to possibly overcome mechanical resistance or differential air pressure and allow the door to close.

B. Door Protection Devices: Provide a door protection system using 150 or more microprocessor controlled infra-red light beams. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen.

2.08 CAR OPERATING STATION

A. Car Operating Station, General: The main car control in each car shall contain the devices required for specific operation mounted in an integral swing return panel requiring no applied faceplate. Swing return shall have a brushed stainless steel finish. The main car operating panel shall be mounted in the return and comply with handicap requirements. Pushbuttons that illuminate using long lasting LED’s shall be included for each floor served, and emergency buttons and switches shall be provided per code. Switches for car light and accessories shall be provided.
B. Emergency Communications System: Integral phone system shall be provided.

C. Auxiliary Operating Panel: Not Required

D. Column Mounted Car Riding Lantern: A car riding lantern shall be installed in the elevator cab and located in the entrance. The lantern, when illuminated, will indicate the intended direction of travel. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop. The lantern shall remain illuminated until the door(s) begin to close.

2.09 CONTROL SYSTEMS

A. Controller: Shall be integrated in a hoistway entrance jamb. Should be microprocessor based, software oriented and protected from environmental extremes and excessive vibrations in a NEMA 1 enclosure. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops, and by "up-down" push buttons at each intermediate landing and "call" push buttons at terminal landings.

B. Service Panel – to be located outside the hoistway in the controller entrance jamb and shall provide the following functionality/features:
   1. Access to main control board and CPU
   2. Main controller diagnostics
   3. Main controller fuses
   4. Universal Interface Tool (UIT)
   5. Remote valve adjustment
   6. Electronic motor starter adjustment and diagnostics
   7. Operation of pit motorized shut-off valve with LED feedback to the state of the valve in the pit
   8. Operation of auxiliary pump/motor (secondary hydraulic power source)
   9. Operation of electrical assisted manual lowering
   10. Provide male plug to supply 110VAC into the controller
   11. Run/Stop button

C. Automatic Light and Fan shut down: The control system shall evaluate the system activity and automatically turn off the cab lighting and ventilation fan during periods of inactivity. The settings shall be field programmable.

D. Special Operation: Not Applicable

E. Emergency Power Operation: (Battery Lowering 10-DOC) When the loss of normal power is detected, a battery lowering feature is to be activated. The elevator will lower to a predetermined level and open the doors. After passengers have exited the car, the doors will close and the car will shut-down. When normal power becomes available, the elevator will automatically resume operation. The battery lowering feature is included in the elevator contract and does not utilize a building-supplied standby power source.

2.10 HALL STATIONS

A. Hall Stations, General: Provide buttons with red-illuminating LED halos to indicate that a call has been registered at that floor for the indicated direction. Provide 1 set of pushbutton risers.
   1. Phase 1 firefighter’s service key switch, with instructions, shall be incorporated into the hall station at the designated level.
B. Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.

C. Hall Position Indicator: Not Applicable

D. Hall lanterns: Not Applicable

2.11 MISCELLANEOUS ELEVATOR COMPONENTS

A. Oil Hydraulic Silencer: Install multiple oil hydraulic silencers (muffler device) at the power unit location. The silencers shall contain pulsation absorbing material inserted in a blowout proof housing.

B. Lockable three phase circuit breaker with auxiliary contact with shunt trip capability to be provided. Circuit breaker to be located behind locked panel (Group 2 security access) at controller landing entrance jamb and should be sized according to the National Electrical Code.

C. Lockable single phase 110V circuit breaker for cab light and fan to be provided. Circuit breaker to be located behind locked panel (Group 2 security access) at controller landing entrance jamb should be sized according to the National Electrical Code.

PART 3 EXECUTION

3.01 EXAMINATION

A. Before starting elevator installation, inspect hoistway, hoistway openings, pits and control space, as constructed and verify all critical dimensions, and examine supporting structures and all other conditions under which elevator work is to be installed. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION

A. Install elevator systems components and coordinate installation of hoistway wall construction.
   1. Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1, manufacturer's installation instructions and approved shop drawings.
   2. Comply with the National Electrical Code for electrical work required during installation.

C. Coordination: Coordinate elevator work with the work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to ensure dimensional coordination of the work.

D. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum safe, workable dimensions at each landing.

D. Lubricate operating parts of system where recommended by manufacturer.
3.03 FIELD QUALITY CONTROL

A. Acceptance testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required by A17.1 Code and local authorities having jurisdiction. Perform other tests, if any, as required by governing regulations or agencies.

B. Advise Owner, Contractor, Architect, and governing authorities in advance of dates and times tests are to be performed on the elevator.

3.04 ADJUSTING

A. Make necessary adjustments of operating devices and equipment to ensure elevator operates smoothly and accurately.

3.05 CLEANING

A. Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided. Stainless stall shall be cleaned with soap and water and dried with a non-abrasive surface; shall not be cleaned with bleached-based cleansers.

B. At completion of elevator work, remove tools, equipment, and surplus materials from site. Clean equipment rooms and hoistway. Remove trash and debris.
   a. Use environmentally preferable and low VOC emitting cleaners for each application type. Cleaners that contain solvents, pine and/or citrus oils are not permitted.

3.06 PROTECTION

A. At time of Substantial Completion of elevator work, or portion thereof, provide suitable protective coverings, barriers, devices, signs, or other such methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

3.07 DEMONSTRATION

A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.

B. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

3.08 ELEVATOR SCHEDULE

A. Elevator Qty. 1
   1. Elevator Model: enduraMRL Above-Ground (2-Stage)
   2. Rated Capacity: 2500 lbs.
   3. Rated Speed: 150 ft./min.
   4. Operation System: TAC32
   5. Travel: 16”
   6. Landings: 2 total
7. Openings:
   a. Front: 3
   b. Rear: 0
8. Clear Car Inside: 6' - 8" wide x 4' - 3" deep
9. Cab Height: 8'-0" nominal
10. Hoistway Entrance Size: 3' - 6" wide x 7'-0" high
11. Door Type: Single Speed
12. Power Characteristics: 480 volts, 3 Phase, 60 Hz., 40 hp motor
13. Seismic Requirements: Zone 1
14. Fixture & Button Style: Signa4 Signal Fixtures
15. Special Operations: None

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hydraulic freight elevators as shown on drawings and as specified. Elevator work includes:
1. Commercial design freight elevators.
2. Elevator car enclosures, hoistway entrances and signal equipment.
4. Operation and control systems.
5. Accessibility provisions for physically disabled persons.
6. Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.
7. Materials and accessories as required to complete the elevator installation.

1.02 RELATED REQUIREMENTS:

A. Division 3 Sections: Installing inserts, sleeves and anchors in concrete.
B. Division 4 Sections: Installing inserts, sleeves and anchors in masonry.
C. Division 5 Sections:
   1. Providing hoist beams, pit ladders, steel framing, auxiliary support steel and divider beams for supporting guide-rail brackets.
   2. Providing structural steel door frames with extensions to beam above if required on hoistway sides and sills for freight elevators, including finish painting.
D. Division 9 Sections: Providing elevator car finish flooring and field painting unfinished and shop primed ferrous materials.
E. Division 15 Sections:
   1. Sump pit and oil interceptor.
   2. Heating and ventilating hoistways and machine rooms.
F. Division 16 Sections:
   1. Providing electrical service to elevators, including fused disconnect switches.
   2. Emergency power supply, transfer switch and auxiliary contacts.
   3. Heat and smoke sensing devices.
   4. Convenience outlets and illumination in machine room, hoistway and pit.

1.03 SUBMITTALS

A. Product data: When requested, submit product data for the following:
   1. Elevator car enclosures and hoistway entrances.
   2. Operation, control, and signal systems.

B. Shop drawings:
   1. Show equipment arrangement in the machine room, pit and hoistway. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.
   2. Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.
3. Show floors served, travel distances, maximum loads imposed on the building structure at points of support and all similar considerations of the elevator work.
4. Indicate electrical power requirements and branch circuit protection device recommendations.

C. Color selection: Submit color charts of exposed finishes and materials for color selection.
1. When requested, submit samples of exposed finishes and materials selected for the elevator system materials and components.

D. Certificates: Inspection and acceptance certificates of elevator system installation.

E. Operation and maintenance data. Include the following:
1. Operation and maintenance instructions.
2. Parts list, with recommended parts inventory.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: An approved manufacturer regularly engaged in manufacturing, installing, and servicing elevators of the type required for the project.
1. The manufacturer of the machine, controller, signal fixtures, and all other major parts of the elevator operating equipment.
   a. The major parts of the elevator equipment shall be manufactured in the United States, and not be an assembled system.
2. The manufacturer shall have a documented, on-going quality assurance program.

B. Installer Qualifications: The manufacturer or an authorized agent of the manufacturer with not less than five years of satisfactory experience installing elevators equal in character and performance to the project elevators.

C. Regulatory Requirements:
1. ASME A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code.

D. Fire-rated entrance assemblies: Opening protective assemblies, hardware and operation shall comply with ASTM E152, UL 10B and NFPA Standard 80. Provide entrance assembly units bearing UL Class B labels.

E. Inspection and testing: Elevator Installer shall obtain and pay for all required inspections, tests, permits and fees for elevator installation.
1. Arrange for inspections and make required tests.
2. Deliver to the Owner upon completion and acceptance of elevator work.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver elevator materials, components and equipment in manufacturer's protective packaging.

B. Store materials in a dry protected area provided by others. Protect and handle materials in accordance with manufacturer's recommendations to prevent damage, soiling, or deterioration.
1.06 PROJECT CONDITIONS

A. Prohibited Use: Elevators shall not be used for any purpose during the construction period before Substantial Completion.

B. Painting:
   1. Except as otherwise specified, paint all metal work provided by the elevator manufacturer and installer.
   2. Provide all ferrous metals installed in the hoistway shop primed with a rust inhibitive primer.

C. Provide the hole for the jack unit if required by the type of jack provided, based on excavation through normal soil or clay which can be removed by manual digging or by standard truck-mounted regular drilling unit. Provide a casing if required to retain the walls of the hole. General contractor shall remove excavation spoils deposited in the elevator pit.
   1. If a physical obstruction or hindrance is encountered below the ground surface, including boulders, rock, gravel, wood, metal, pilings, sand, water, quick sand, caves, public utilities or any other foreign material, obtain written authorization to proceed with excavating using special excavation equipment.
   2. Maintain a daily log of time and material costs involved and submit to Owner and Architect for approval.
   3. Elevator contractor will be compensated on a time and material basis for additional costs incurred after encountering the physical obstruction or hindrance, including the cost of the special excavation equipment.

1.07 WARRANTY

A. Warranty: Submit elevator manufacturer's standard written warranty agreeing to repair, restore or replace defects in elevator work materials and workmanship not due to ordinary wear and tear or improper use or care for 12 months from date of Substantial Completion.

1.08 MAINTENANCE

A. Furnish maintenance and call back service for a period of 12 months for each elevator from date of Substantial Completion. Service shall consist of periodic examination of the equipment, adjustment, lubrication, cleaning, supplies and parts to keep the elevators in proper operation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer: Thyssen Dover Elevator, Memphis, TN.

2.02 MATERIALS, GENERAL
A. Colors, patterns, and finishes: As selected by the Architect from manufacturer's full range of standard colors, patterns, and finishes.

B. Steel:
   2. Sheet: ASTM A 366, cold-rolled steel sheet, commercial quality, Class 1, matte finish, stretcher leveled.
   3. Finish: Factory-applied baked enamel unless otherwise indicated.

C. Stainless steel:
   1. Shapes and bars: ASTM A 276, Type 304 (18-8).
   2. Tubing: ASTM A 269, Type 304 (18-8).

D. Aluminum:
   2. Extrusions: ASTM B 221, alloy 6063-T52.

E. Plastic laminate: Decorative high-pressure type, complying with NEMA LD3, Type GP-50 General Purpose Grade, nominal 0.050" thickness.

F. Glass: Clear laminated safety glass, complying with ANSI Z97.1, nominal 9/16" thickness.

2.03 HOISTWAY EQUIPMENT

A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a non-skid steel floor.

B. Sling: Steel stiles affixed to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.

C. Guide Rails: Steel, fastened to the building with steel brackets.

D. Guide Shoes: Slide guides shall be mounted on top and bottom of the car.

E. Guide Rail Lubricators: Provide a leakproof reservoir on top of upper guide shoes. Wool felt wiper shall apply an even, uniform flow of lubricant which shall thoroughly cover face of guide rail.

F. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on continuous channels fastened to the elevator guide rail or securely anchored to the pit floor. Provide extensions if required by project conditions.

G. Jack: Jack unit shall be of sufficient size to lift the gross load the height specified. Factory test jack to insure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Jack unit shall consist of the following components:
   1. Heavy seamless steel tubing plunger accurately turned and polished.
   2. Stop ring shall be electrically welded to the plunger to prevent plunger leaving the cylinder.
   3. Internal guide bearing.
   4. Packing or seal of suitable design and quality.
   5. Drip ring around cylinder top.
   6. Cylinder made of steel pipe and provided with a pipe connection and air bleeder.
   7. Weld brackets to the jack cylinder for supporting the elevator on pit channels. An auxiliary safety
bulkhead shall be provided in the lower end of the cylinder.

8. Jack cylinder and underground piping shall be double wrapped with an approved coating designed to help protect it from electrolytic and chemical corrosion.

9. Provide PVC cylinder protection to protect the cylinder from corrosion and to contain any oil in the event of a cylinder leak.

H. Automatic Terminal Limits: Place electric limit switches in the hoistway near the terminal landings. Limit switches shall be designed to cut off the electric current and stop the car if it runs beyond either terminal landing.

I. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the floor landings and correct for overtravel or undertravel. Self-leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.

J. Failure Protection: Design electrical control circuit so if a malfunction occurs, due to motor starter failure, oil becoming low in the system, or the car failing to reach a landing in the up direction within a pre-determined time, the elevator car will automatically descend to the lowest terminal landing. If power operated doors are used, the doors will automatically open when the car reaches that landing to allow passengers to depart. The doors will then automatically close and all control buttons, except the "door open" button in the car station, shall be made inoperative.

K. Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary pipe and fittings shall connect the power unit to the jack unit. Provide proper grade oil.

L. Emergency Terminal Stopping Device: Provide emergency terminal stopping devices for speeds over 100 FPM. The emergency terminal stopping device shall operate independently of the normal terminal stopping device if it fails to slow down the car at the terminal as intended. Stopping devices shall not be prevented from functioning by a single short circuit caused by a combination of grounds or by other conditions.

1. Normal and emergency terminal stopping devices shall not control the same controller switches unless two or more separate and independent switches are furnished, two or which shall be closed in either direction of travel to complete the circuit to the control valve solenoids in the down direction and to complete the circuit to the pump motor for the up direction of travel.

2.04 POWER UNIT

A. Power Unit (Oil Pumping and Control Mechanism): A self-contained unit consisting of the following items:

1. Oil reservoir with tank cover and controller compartment with cover.
2. An oil hydraulic pump.
3. An electric motor.
4. Oil control unit with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and magnetic controller.

B. Pump: Positive displacement type pump specifically manufactured for oil-hydraulic elevator service. Pump shall be designed for steady discharge with minimum pulsations to give smooth and quiet operation. Output of pump shall not vary more than 10 percent between no load and full load on the elevator car.
C. Drive: Drive shall be by direct coupling with the pump and motor submerged in the oil reservoir or by multiple V-belts and sheaves of number and size to insure maximum factor of safety. Drive type shall be determined based primarily on the load on the car, travel, and speed.

D. Motor: Standard manufacture motor specifically designed for oil-hydraulic elevator service. Duty rating shall comply with specified speeds and loads.

E. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.
   1. Relief valve shall be externally adjustable and be capable of bypassing the total oil flow without increasing back pressure more than 10 percent above that required to barely open the valve.
   2. Up start and stop valve shall be externally adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, ensuring smooth up starts and up stops.
   3. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.
   4. Lowering valve and leveling valve shall be externally adjustable for drop-away speed, lowering speed, leveling speed and stopping speed to ensure smooth "down" starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling when slowdown is initiated.

F. Power controller shall contain electrical contactors, electro-mechanical switches and thermal overload relays. Mount components in a NEMA 1 enclosure. Logic control system shall be microprocessor based and protected from environmental extremes and excessive vibrations.

G. Nordic Reduced Voltage Solid State Starting.

2.05 HOISTWAY ENTRANCES

A. Hoistway Doors: Supply a bi-parting, counterbalanced, vertical sliding, hoistway door at each landing. The doors shall be of substantial metal plate. The upper edge of each lower door shall have a truckable sill which shall support trucking loads equal to the capacity of the elevator. The lower edge of each upper door shall have a safety astragal which will close the space between the door sections when closed. The upper section shall have a 4" x 9" glass vision panel. Doors shall have a "B" label.

B. Interlocks: Equip each hoistway entrance with an Underwriters' Laboratories "B" label approved type interlock tested as required by code. Interlock shall be designed to prevent operation of the car away from the landing until the doors are locked in the closed position as defined by code and shall prevent opening the doors at any landing from the corridor side unless the car is at rest at that landing or is in the leveling zone and stopping at that landing.

2.06 CAR ENCLOSURE

A. Car Enclosure: The car shall be enclosed with 14 ga. Steel panels on the unopened sides to a height of 8 feet and be painted the standard color enamel. A 14 ga. Solid metal top shall be provided over the car, with approved safety hinged section. An incandescent light fixture shall be included.

B. Car Top Inspection: Provide a car top inspection station with an "emergency stop" switch and constant pressure "up-down" direction buttons to make the normal operating devices inoperative and give the inspector complete control of the elevator.
2.07 DOOR OPERATION

A. Motorized Operation: Each hoistway door and car gate shall be equipped with an individual electric operator. The operators shall open and close the car gate and hoistway doors at a panel speed of not less than one foot per second with slamming. Limit switches shall be provided to stop the motors as the doors approach their limit of travel. Provisions shall be made for manual operation of the doors from the car in the event of power failure.

2.08 CAR OPERATING STATION

A. Car Operating Station, General: A flush mounted operating panel shall be mounted in each car and shall contain the devices required for the specified operation. The panel shall include pushbuttons marked to correspond to the landings served, an "emergency stop" switch and a key operated car light switch. The operation of the "emergency stop" switch in the car shall, in addition to stopping the car, cause the alarm bell to ring.

B. Emergency Light: An emergency light and capacity plate shall be integrated into a module inclined 20 degrees from vertical. Emergency light shall illuminate automatically upon loss of the building's normal power supply.

D. Emergency Communications System: Provide an emergency communications device mounted in the swing return. Emergency communications device shall comply with Americans with Disabilities Act (ADA) requirements.

2.09 CONTROL SYSTEMS

A. The Controller utilizes erasable programmable logic devices (EPLDs) for all major control logic functions. These EPLDs combine the logistical advantage of standard fixed integrated circuits with the architectural flexibility of custom devices. All input and output functions are optically isolated on the LMH. The micro-computer logic will simultaneously respond to the inputs received by the EPLDs. The LMH is reprogrammable by changing the EPLDs. LED status indicators will be provided for the following functions: Car Position, Call Registration, Mode of Operation, Safety Circuit and Door Status.

B. The elevator shall be controlled automatically by means of push buttons in the car marked to correspond with the respective landings served, and by single "Call" buttons at each hoistway opening. The momentary pressure of any button shall operate the car, if all car and hoistway doors are closed. The car shall travel to its destination in the direction chosen without interference. After the car has been placed in motion, all other push buttons shall become inoperative until the car has reached its designated landing. A time delay, non-interference feature shall be incorporated in the control circuit to allow ample time for opening car and hoistway doors before the car can be dispatched to another landing. An emergency stop switch shall be provided in the car push-button station which, when in the off position, will render the elevator inoperative, and which will enable attendant or passenger to stop the car at any point during its travel. Each landing station shall contain "In-Use" signal lights to indicate that the car is in motion and that it cannot be called until it has completed the registered call at which time the "In-Use" signal light will be extinguished, and the car will be available to answer the next call registered.
2.10 HALL STATIONS
A. Hall Stations: Each landing station shall contain "In-Use" signal lights to indicate that the car is in motion and that it cannot be called until it has completed the registered call at which time the "In-Use" signal light will be extinguished, and the car will be available to answer the next call registered.

2.11 MISCELLANEOUS ELEVATOR COMPONENTS
A. Oil Hydraulic Silencer: Install an oil hydraulic silencer (muffler device) at the power unit location. Silencer shall contain pulsation absorbing material inserted in a blowout proof housing arranged for inspecting interior parts without removing unit from oil line. Rubber hose without blowout proof features will not be acceptable.
B. Vibration Pads: Mount vibration pads under the power unit assembly to isolate the unit from the building structure.
C. Sound Insulating Panels: When pump and motor are not submerged, provide panels manufactured of reinforced 14 gauge steel with 1 inch thick 1-1/2 pound fiberglass core attached to interior and mounted on all four open sides of the power unit frame.
D. Sound Isolating Couplings: When pump and motor are not submerged, install a minimum of two couplings in the oil line in the machine room between pump and jack.

PART 3 EXECUTION

3.01 EXAMINATION
A. Before starting elevator installation, inspect hoistway, hoistway openings, pits and machine rooms, as constructed, verify all critical dimensions, and examine supporting structures and all other conditions under which elevator work is to be installed. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION
A. Install elevator systems components and coordinate installation of hoistway wall construction.
   1. Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1, manufacturer's installation instructions and approved shop drawings.
   2. Comply with the National Electrical Code for electrical work required during installation.
B. Perform work with competent, skilled workmen under the direct control and supervision of the elevator manufacturer's experienced foreman.
C. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports, and bracing including all setting templates and diagrams for placement.
D. Jack unit excavation: Drill or otherwise excavate below elevator pit construction as required to install the jack unit.
1. Install casing for jack unit.
2. Set casing for jack unit assembly plumb, and fill water-settled sand, eliminating voids.
3. Immediately before installation of jack unit-cylinder assembly, remove water and debris from casing and provide watertight, permanent plug at bottom of casing.

E. Set jack unit-cylinder assembly plumb, centered accurately and shimmed to proper elevation, using centering lugs to prevent dislocation during filling. Fill space between casing and cylinder with clean, dry, compacted sand. Seal at pit slab with 4" thickness of non-shrinking concrete grout.

F. Welded construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn Parts. Comply with AWS standards for workmanship and for qualification of welding operators.

G. Coordination: Coordinate elevator work with the work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to ensure dimensional coordination of the work.

H. Install machinery, guides, controls, car and all equipment and accessories to provide a quiet, smoothly operating installation, free from side sway, oscillation or vibration.

I. Sound isolation: Mount rotating and vibrating elevator equipment and components on vibration-absorption mounts, designed to effectively prevent the transmission of vibrations to the structure, and eliminate sources of structure-borne noise from the elevator system.

J. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum safe, workable dimensions at each landing.

K. Erect hoistway sills, headers, and frames before erection of rough walls and doors; erect fascias and toe guards after rough walls finished. Set sill units accurately aligned and slightly above finish floor at landings.

L. Lubricate operating parts of system, including ropes, as recommended by manufacturer.

3.03 FIELD QUALITY CONTROL

A. Acceptance testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required and recommended by Code and governing regulations or agencies. Perform other tests, if any, as required by governing regulations or agencies.

B. Advise Owner, Contractor, Architect, and governing authorities in advance of dates and times tests are to be performed on the elevator.

3.04 ADJUSTING

A. Make necessary adjustments of operating devices and equipment to ensure elevator operates smoothly and accurately.
3.05 CLEANING

A. Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided.

B. At completion of elevator work, remove tools, equipment, and surplus materials from site. Clean equipment rooms and hoistway. Remove trash and debris.

3.06 PROTECTION

A. At time of Substantial Completion of elevator work, or portion thereof, provide suitable protective coverings, barriers, devices, signs, or other such methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

3.07 DEMONSTRATION

A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.

B. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

3.08 ELEVATOR SCHEDULE

A. Elevator Qty. 1,

1. Elevator Model: Freight Class class A
2. Rated Capacity: 5,000 pounds
3. Rated Speed: 98100 ft/min
4. Operation System: Single Automatic
5. Travel: 32 ft
6. Openings:
   a. Front: 3
   b. Rear: 2
7. Cab Height: Nominal 8'-0"
8. Hoistway Entrance Size: 7’ 6” high x 5’ 6” wide
9. Type: Power Door operation
10. Power Characteristics: 480 volts, 3 Phase, 60 Hz, 40 hp motor
11. Seismic requirements for zone 1

END OF SECTION